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Editorial

Education is not only simply imparting knowledge or making one to fair well in exams or making one to secure a job, but also a training to inculcate critical thinking which helps the coming generations adjust to the ever-changing environment. It also means opening the doors of the mind, cleansing the soul and realization of the self. The quality of education greatly influences the quality of manpower for the societal benefits. This issue of IJTE journal presents comparison between the ancient and present education system. The shift in education during and after Covid-19 and some possible changes in education after Covid-19 are foreseen. However, we can always make an attempt to integrate ancient systems into our present systems to obtain a proper synergy between the two systems. With the advent of Covid and other viruses, more innovations and advancements in education are needed to face more such challenges in the future.

Artificial Intelligence (AI) is one of the disruptive technologies which is being used to customize the experiences of various learning groups, instructors and tutors. It is considered the most in-demand technology in today's education system which enhance the education system worldwide. The educational institutions are nowadays facing various challenges like high dropouts, unavailability of smart content, lack of customized content as per the textbooks, lack of personalized learning systems, rigid examination patterns etc. It helps to create personalized learning experiences, develop smart content, expand the range of education, and facilitate the management & administration of education by integrating information and disseminating data as per the needs of the target group. The AI tools and programs are inclusive which makes the classrooms accessible to all irrespective of language or any other disabilities.

This issue of IJTE journal contains articles on "Comparative Study Between Ancients Methods and Modern Methods of Education", "Sequel of school environment on the self-esteem of adolescents, "Artificial Intelligence in Education", "Plant disease detection using deep learning,", "Innovation approach among aphonic, amaurosis People using hand gesture recognition with electromyography signals", "Traversing Serverless architecture", Print Quality Evaluation in Paperboard", "Printing Induced by Changes in Viscosity and Screen Parameters", Zero-Knowledge Proof for Online Auctions". "A stuy on the Aspects of Hyperinflation and its Impact on Financial Results : A Case Study of selected listed Indian Pharmaceutical Companies", Novel Design of Cross-Shaped Rectangular Slotted Microstrip Antenna for Sub-6GHZ 5G Applications", etc..

We take this opportunity to thank all authors for their contribution of manuscripts and reviewers in making this issue more informative and useful to the readers. Suggestions and feedback from our readers are highly appreciated to improve the quality of journal.

New Delhi **Editorial Board**
30th September, 2022

COMPARATIVE STUDY BETWEEN ANCIENT METHODS AND MODERN METHODS OF EDUCATION

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ABSTRACT

There is always a constant comparison between ancient and modern forms of education. This article brings out the advantages and disadvantages of both forms of education. The shift in education during and after Covid is discussed and some possible changes in education after Covid are foreseen. It is felt that a judicious mixture of both forms of education would benefit mankind as a whole.

Keywords : *Gurukula,Varnashrama,Women's education, COVID*

1. INTRODUCTION

In ancient days, especially in India, the Gurukula system of education was considered the norm. Students from all walks of life went to an ashram and learnt the nuances of life from a reputed guru. Nowadays, it is not practically possible for this to happen as the general feeling is that most of the valuable information is at our fingertips, either on our smartphones or laptop and desktop. However, even though a lot of information is available on Google and other search engines, the purpose of a faculty, teacher or Professor is to sift through the vast amount of knowledge and give what is required to the students. Hence, in a way, faculty have become knowledge facilitators or knowledge directors in modern times.

2. GURUKULA SYSTEM - A HOLISTIC APPRAOCH

In ancient India, there existed many gurus who had attained enlightenment. They constructed small ashrams on the outskirts of big cities or towns and lived a simple life in tune with nature. They had a moral duty to help all sections of society and with their wisdom and deep knowledge of shastraas, were part and parcel of kingdoms. For example- Lord Ram and Lakshman studied under Guru Vasistha.Lord Krishna studied under Guru Sandeepani. At the end of their tenire, they were obliged to pay a gurudakshina to their guru. Children of all sections of society stayed with their gurus in the ashrama and helped the guru and his family. This was a kind of modern-day socialism, but in ancient days, it was part of everybody's dharma or duty. Teamwork would be instilled automatically and

students were always under the watchful eyes of the guru. This stay in the ashram was on till the end of the brahmacharya period. The main thrust of ancient education seemed to be character building, apart from training in different arts, culture, music and teamwork.

3. MODERN EDUCATION

Modern education stresses too much on getting marks or grades. There seems to be a lot of unnecessary competition. Competition is necessary up to a limit, but nowadays admissions are based on marks alone, which leads to a scramble for marks, sometimes in unethical ways. One also finds that in countries like India, there is a huge thrust on engineering and medicine education. Thankfully, over the last decade or so, this trend is reducing somewhat mainly due to western influence where all fields of study are given equal importance.

4. ANCIENT SYSTEM AND VARNASHRAMA

Swami Srila Prabupada in his book Science of self realization states the importance of varnashrama in the ancient days, in India, also called Bharathavarsha [1]Kings themselves used to send their progeny to gurus ,who lived on the outskirts of towns. Royal princes mixed with children from all other communities in gurukuls and automatically a system of equality and neutrality got inculcated. There was perfect balance between the professions of the four varnas, namely Brahmins, Kshatriyas, Vaishyas, and Sudras. They were all interdependent on each other and there was nothing superior or inferior about each class. The relevance of ancient education system in modern times has been brought out by Mishra.[2] Similarly, a study has been done on educational theory evolution by Salahshoori et al.[3] The changing face of education up to the digital era has been brought out by Ritu Sharma et al.[4]

According to information on ancient science, plastic surgery was discovered in Varanasi by Maharishi Sushruta and tools inspired by nature such as KaakaMukhasana and SimhaMukhasana were used for surgery.It seems there were nearly 131 tools used in surgery in ancient times.

5. WOMEN'S EDUCATION - A COMPARISON

There is not much evidence to show co-educational societies in ancient India. It seems that women were trained to face household work and responsibilities, a trend which modern educators would term as male chauvinist. However, it appears that women were held in high esteem and given a great deal of respect in households. In fact, women seem to be the central figure of a household, but were not trained much to face the world outside a household, except maybe in royal households. The fact that women were not allowed much of outside the house work cannot be misunderstood that they were treated as second to man .It was just that division of labour was very perfect and the woman's role was clearly defined. This type of clear cut definition of women's roles may not be possible or practical in the modern world,except maybe in villages.

However, in recent times for the last at least 100 to 200 years, we have seen women emerge from outside the shadows of a household and make an entry into traditional male bastions. There are endless debates whether this is good or not desirable for society, but the general feeling in the modern world is that women feel liberated from the clutches of a boring existence doing household work and are ready to face challenges in the real world. There could be endless debates about whether this is desirable or not, but it is felt that this could be an individual choice.

6. EDUCATION AFTER COVID TIMES AND CHALLENGES FOR THE FUTURE

The last two years have changed the face of education quite dramatically. Online classes were conducted and online courses have now become more of a norm, whereas before Covid, they were conducted in only a few places. One can say with confidence that Covid hastened the pace of technology for the better. However,it is found that adaptation to physical classes is taking its own sweet time as far as students are concerned. Students have become a little laid back in their approach and are finding it difficult to work out problems, especially in problem oriented subjects.

It is definitely a challenge to both the faculty and the students to slowly get back to normal. The present generation of students cannot be scolded or punished like the earlier generation used to be dealt with. The present generation is more logical, questioning and need concrete answers to why they have to behave in a certain way. With the internet and Youtube videos reaching each and every corner of the globe, leading to an information explosion, I think it becomes the duty of faculty and teachers to guide the students and what to see and what not to view on the internet. Again, with privacy of an individual becoming another issue and each student wanting elders to respect their privacy, there seems to be a thin line to walk on as far as dealing with student behavior is concerned. Faculty may not be able to punish students like in yesteryears because the repercussions may be worse than the punishment itself. So,we have to sit down with a combined group of senior and junior faculty and work out best practices to deal with students and students behavior in the present age.

It is felt that in future, hybrid mode of education would become a norm, what with other virusus looming their heads. Any challenge or change has two facets to it and so was the case with Covid. Educational Institutes, which were successful in adapting themselves to the Covid challenge and showed flexibility in their approach, not only thrived in this situation, but also improved their teaching-learning methodologies.

7. CONCLUSIONS

This comparative work is a small compilation of modern versus ancient education and the purpose of the study is to highlight the pluses and minuses of both ancient and modern systems. With the onset of time, it is doubtful whether ancient systems would be fully accepted in modern society. It is also not practical to expect this to happen. However, we can always make an attempt to integrate ancient systems into our present systems to obtain a proper synergy between the two systems. With the advent of Covid and other viruses, more innovations and advancements in education are needed to face more such challenges in the future.

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SEQUEL OF SCHOOL ENVIRONMENT ON THE SELF-ESTEEM OF ADOLESCENTS

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ABSTRACT

The school environment or a place of learning is very cardinal in the life of a child. After receiving basic education from parents, or elders at home he/she first-time visit the school. A child spends many years of his/her life in school, so one can understand that it greatly impacts a child's personality and, development of "self" According to WHO, a child should receive equal treatment in school, without discrimination of any kind in respect of caste, religion, etc. In a good school environment, students will be able to develop physically, mentally, emotionally, and socially. The school environment plays a significant role in developing the self-esteem, self-image, and self-concept of adolescents. This study examines the role of the school environment on the self-esteem of boys and girls. To fulfill the aim of this study, the researcher administered the "school environment inventory developed by Dr. Karuna Shankar Mishra" and self-esteem scale developed by Dr. Sudha Kumari Sharma, on the sample of this study comprised 200 adolescents (100 boys and 100 girls). After data collection, the data were analyzed by using the SPSS program. Results reveal school environment has a significant effect on the self-esteem of boys and girls.

Keywords*- Gender, School environment, self-esteem, equal rights of education,*

1. INTRODUCTION

The word school is derived from the Greek word "schole" meaning ideal hours. In ancient Greece, liberal education was not available to everyone in society, thus 'leisure' was associated with the school. Education for all people of society started in the 18th century. In Indian culture during the Vedic period, the system of "Gurukul" came in the form, where a disciple lives in Ashram and acquires knowledge from their "Guru". In "Gurukul" a student learns everything, studying different languages, science, arts, archery, etc. They are doing overall development of a child. Now it's the era of school. A school is a place wherein planned

way teachers used to give specific instructions to pupils during a fixed period. The school is an organization; it is upon the school environment that all the activities and important functions of the school depend. Children are going to school. Schools are of also two types: Public schools and Private schools, public schools are those whose expenditures are borne by the government, whereas private school expenditures are borne by some organization or religious institution. There are many differences in the infrastructure of both types of schools. It is observed that mostly the parent who has enough money send their children to private as well as a school with good infrastructure, whereas the poor parents send their offspring to public schools.

It is not almost true because accessibility of school depends on many factors, for example, geographical area, transport, parents' wish, financial assistance, etc. The government is trying to give education to every child. In this concern, the "Right of education act" passed in India in April 2010, then India become the 135 countries in which education is a fundamental, right of every child. According to the Indian constitution, it comes in Article 21a. So, in this way government is trying to provide education to every child. A child attains education or withdraws from it, it almost depends on the school environment. School environment as defined by Mick Zais (2001) as the degree to which students' safety and health are promoted within the school setting, including the physical environment, the academic setting, the availability of supports and services for physical and mental health, and the fairness and adequacy of disciplinary procedures as supported by research and evidence. means the extent to which the school setting promotes student safety and student health, which may include topics, such as the physical atmosphere, the academic environment, available physical and mental health supports and services, and the fairness and adequacy of disciplinary procedures, as supported by relevant research and assessment of validity. A student spends almost 8 hours per day in this environment. It is the school environment that instills great values in students.

The school environment is comprised of a variety of facilities, classrooms, health support programs, and disciplinary policies and practices. School environments have a meaningful influence on student outcomes. Children spend a big part of their time in this environment and do learning-related activities there. Although the prime focus of the school is the scholastic development of children, its effects on children are far wider, school enhances children's physical and mental health, and involvement in social activities further enhances their socialization, formal pedagogy, and school activities, nurturing activities, etc. Pilar Martin, M.P.P and Brett Brown (2008).

Kidger.J, Donovan.J, Gunnel.D, (2012) revealed in their research that, children's perception of connectedness with school, support from teachers, and classmates predicts their psychological well-being. Many studies showed similar findings of school effects on children. Harinarayana.S, and Pazhanivelu.G (2018) shows a positive relationship between school environment and academic achievement. So, the school should be enriched to enhance students' academic level performance. Based on the work of Asrori (2004), through the school environment, students are able to develop relationships with peers from different racial and ethnic backgrounds. Results showed that the school environment was positively related to adolescents' social intelligence. It is consistent with Shah and Sharma's (2012) study which found a significant relationship between social intelligence and adjustment to school. The quality of the school environment may help adolescents in rural areas maximize their social intelligence.

Ranmatika.M, and Harnawati.N, (2016) result shows that gender and school environment significantly and positively affect on academic performance of students. Although family income had a negative effect on the scholastic level of rural adolescents. Pilar Marin, M.P.P, &Brett Brown (2008), the school is one of the important places where a child spends a big part of their day and does many school-related activities there. Although the prime focus of the school is the scholastic development of children, its effect on children is wider. The school enhances children's physical and

mental health. Involvement in school activities further enhances their social involvement. It also impacts "formal pedagogy, after-school activities, nurturing activities, etc."

As part of the school environment, teachers and students interact with each other in order to assess the quality and quantity of the cognitive, creative, and social support the students have received throughout their schooling. Any school, no matter at what level of society, has the following characteristics of a school environment. These are educator-students communication, withdrawal, sprightliness, attachment, product insistence, psychophysical impediment, severance, sway, civilized faith, agitation, cliques, gratification, hurry, passivity, hardship, positive discrimination, courtesy, directions, heterogeneity, derangement, government by self, autonomy, eagerness, ordinance, reproach, disliking or vanishing, educator supportiveness, accepting feelings, giving a compliment or motivate, facets or utilize, thoughts of students, address, direct, evaluate or explain authority, pupils activity reaction, student-activity initiative, and quietness skepticism, etc.

McEwen.S, Edgartan.E, Mckechnic.J, (2007) revealed in research that, students' perception of the school environment and their behavior are interlinked. The result supports the view that students' perception of their school environment is associated with their cognition, affect, and behavior.

Han.S.S, Kim.M.K., (2006) conducted research to find out the crucial determinants that impact the self-esteem of students. The sample was taken using a questionnaire. A total of 1155 high school students in Korea took participated in the study. Results reveal that prominent strands that effect the self-esteem of children are, "depression, social support, body image, problematic behavior school environment, adjustment and harmony between family members", all these factors explained 54.7%of self-esteem. McEwen.S, Edgarton.E, & Mckechnic.J., (2007) show in their studies, that students' perception of the school environment and their behavior are interlinked. The result supports the view that students' perception of their school environment is associated with their cognition, affect, and behavior. All these research reviews make us set the following objectives for the present research.

1.1 The study's objectives

The present study has the following objectives:

1. To examine the perception of the school environment by boys and girls.
2. To know the self-esteem of adolescents in respect of gender.
3. To determine the effect of the school environment on the self-esteem of boys.
4. To assess the impact of the school environment on the self-esteem of girls' adolescents.

1.2 Hypotheses of the study

Taking into account the above objectives, the following hypotheses were formulated for the present study:

1. Boys and girls would not significantly differ in respect of their perception of the school environment.
2. The level of self-esteem of adolescents would not differ significantly according to their gender.
3. School environment would not have a significant effect on the self-esteem of boys.
4. There would be no significant effect of the school environment on the self-esteem of girls.

1.3 Sample of the study

A sample of 200 adolescents was taken for the present research. The age range of the collected sample was (14-16) years. The data was collected from the single-sex government school in western Uttar Pradesh. In which 100 girls and 100 boys, would be selected from single-sex government schools. The purposive sampling technique was used for data collection. Further, the data will be normalized on a normal probability curve.

2. VARIABLES

Independent variable

1. School environment.
2. Gender

Dependent variable

1. Self-esteem

The psychological measure used:

2.1 School environment scale

School environment scale was prepared and standardized by Dr. Karuna Sankar Misra (1971). This scale measured the psycho-social climate of schools as perceived by students. The Hindi version of this scale was used for the study. There are 70 items in this scale distributed into 6 dimensions. This inventory five-point Likert-type scale. The items of this inventory related to six dimensions, namely "Creative stimulation, Cognitive encouragement, Acceptance, Permissiveness, Rejection, and Control".

2.2 Self-esteem inventory

Self-esteem inventory constructed and standardized by Dr. Sudha Kumari Sharma (2015), was used to measure the self-esteem of students. This inventory five-point Likert-type scale. The items of this inventory related to general self-esteem, social self-esteem, and cognitive self-esteem. The reliability of this scale was found the coefficient of correlation (split-half method) be 0.680 and spearman brown 0.809.

2.3 Procedure

At first, the permission for data collection from different single-sex schools (boys or girls) is taken from the respective principal of the school. Further rapport is established with children. Instruction for answering the question given in the inventory is given to students, and further school environment inventory and self-esteem scale were administered to students. After the data collection data were analyzed by using SPSS, for further calculation of statistical measures (t-test and analysis of variance) was used.

Interpretation of results

Table 1 : Showing Gender differences in terms of School Environment.

Gender	N	Mean	SD	df	t-value
Boys	100	204.31	27.13	198	.243
Girls	100	199.45	31.43		

Table-1 shows that due to studying in same-sex schools, the perception of boys and girls, about the school environment would be almost the same. It reveals that boys and girls are not found significantly differ in terms of their perception of the school environment. The mean for boys was 204.31 as compared with girls' mean of 199.45, It yielded a t-value of (t-.243), which is found insignificant at both levels of confidence.

Table 2 : Showing Gender differences in terms of Self-Esteem level of boys and girls.

Gender	Number	Mean	SD	DF	t-value
Boys	100	108.27	15.824	198	2.387
Girls	100	112.97	11.713		

The result of table -2 describes those boys and girls significantly differ in respect of their self-esteem. The mean score of boys on the self-esteem inventory was (M-108.27) as compared to their counterpart (M-112.97), but it yielded an insignificant t-value (t-2.387). This shows that boys and girls are not remarkably different in respect of the level of self-esteem. Although girls show more self-esteem as compared to boys.

As shown in table-3 high and low scorers on creative stimulus (dimension of school environment inventory) will significantly differ in respect of self-esteem, the found Mean of a high scorer was (M-112.48) while, the mean of a low scorer in this dimension was (M-104.06), it yielded a t value (t-2.747), which found significant at 0.01 level of confidence. So, the result shows that creative stimulation in school significantly impacts the self-esteem of boys. In the dimension of cognitive encouragement, the high and low scorer mean was (High scorer mean-115.46) (low scorer mean-101.08). It yielded a t-value of (t- 5.081), which shows a significant difference between high and low scorers in respect of self-esteem. Further in the dimension of Acceptance, the high scorer and low scorer are remarkably differing at a 0.01 level of confidence. The mean score of high scorers in the acceptance dimension is (M- 114.28) as compared to their counterparts' low scorers (M-102.94). It yielded a t-value (t- 3.811). The result shows that High scorers on acceptance have high self-esteem, as compared to low scorers. In Permissiveness the mean of low scorers was (M-104.04), and the mean score of high scorers were found to be (M-113.66), which yielded a t-the value of (t-3.152) significant at a 0.002 level of confidence. On dimension "Rejection" the found t- value for the difference between two groups is (t-1.929) is not significant at any level of confidence. More ever on dimension "control", the mean of the high scorer was found (M- 13.581) and the mean score of the low scorer was (M- 16.044) yielding a t-value of (t-3.719) which is found to be significant at both level of confidence.

Table 3 : Impact of school environment on Boys' self-esteem.

Dimensions of the School environment	N	Mean	S.D	DF	T-Value	Sig.
Creative stimulus	100			98	2.747	.007**
	Low-50	104.06	13.958			
	High-50	112.48	16.580			
Cognitive Encouragement	100			98	5.081	.000**
	Low-50	101.08	14.780			
	High-50	115.46	13.490			
Acceptance	100			98	3.811	.000**
	Low-50	102.94	12.700			
	High-50	114.28	16.942			
Permissiveness	100					
	Low-50	104.04	15.270	98	3.152	.002**
	High-50	113.66	15.007			
Rejection	100			98	1.929	.057
	Low-50	105.43	15.347			
	High-50	111.47	15.904			
Control	100			98	3.719	.000**

Table 4 : Impact of six dimensions of school environment on Girls' self-esteem.

Dimensions of the school environment	N	Mean	S.D	DF	T-Value	Sig.
Creative stimulus	100					
	Low-50	**109.34**	**10.369**	**98**	**3.470**	**.001****
	High-50	**117.06**	**11.866**			
Cognitive Encouragement	100			**98**	**2.058**	**.042****
	Low-50	**111.11**	**10.293**			
	High-50	**116.00**	**13.313**			
Acceptance	100			**98**	**1.970**	**.052***
	Low-50	**110.87**	**10.727**			
	High-50	**115.43**	**12.443**			
Permissiveness	100			**98**	**2.167**	**.033****
	Low-50	**110.62**	**10.383**			
	High-50	**115.62**	**12.645**			
Rejection	100			**98**	**.298**	**.766**
	Low-50	**112.61**	**19.708**			
	High-50	**113.31**	**13.451**			
Control	100			**98**	**2.020**	**.046****
	Low-50	**110.69**	**10.049**			
	High-50	**115.35**	**12.903**			

Table- 4 results reveal, the effect of the school environment on girls' self-esteem. As we see on the criteria of "creative stimulation" the found t-value (t-3.470) for both groups i.e., high scorer and the low scorer was found significant at a 0.001 level of confidence. This shows creative stimulation significantly impacts the self-esteem of girls in government schools. More ever on the dimension of "cognitive encouragement" the found difference between two means i.e., high scorer and the low scorer yielded a t-value of (t-2.058) was also found significant at a 0.04 level of confidence. Next on the criteria of "acceptance" the found t-value (t-1.970) show a remarkable difference between the two groups i.e., the high scorer and the low scorer. Acceptance of the school environment also impacts the self-esteem of girls. On the dimension of "permissiveness," the found t-value (t-2.167) was significant at a .033 level of confidence. Permissiveness in the school environment also impacts the self-esteem of girls. Except for these criteria of "control" the found t-value (t-2.020) was a significant at .04 level of confidence. Control in the school environment also put an effect on the self-esteem of girls, as we see in all the dimensions of the school environment high scorers and low scorers show differences in respect of self-esteem. But in the criteria of "rejection", both groups were not found to be significant at any level of confidence. The found t-value was (t-.298), not showing differences between the two groups.

3. CONCLUSION

It can be concluded on behalf of found result that, school environment physical as well as activity in school all play an important role in boosting the self-esteem of adolescents. So, there is a need to get aware of the perception of the school environment among students. If the school provides cognitive stimulation, a good physical environment, and appropriate interaction between students and teachers it put a significant effect on the self-esteem of adolescents.

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ARTIFICIAL INTELLIGENCE IN EDUCATION

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ABSTRACT

Artificial Intelligence (AI) is one of the disruptive technologies which is being used to customize the experiences of various learning groups, instructors, and tutors. It is considered the most in-demand technology in today's education system. It is expected that AI will enhance the education system worldwide. The educational institutions are nowadays facing various challenges like high dropout rates, unavailability of smart content, lack of customized content as per the textbooks, lack of personalized learning systems, rigid examination patterns etc. The use of AI brings hope to overcome these challenges. It helps to create personalized learning experiences, develop smart content, expand the range of education, and facilitate the management & administration of education by integrating information and disseminating data as per the needs of the target group. With AI, teachers/instructors can identify the learning styles and hard points of students and provide new avenues of teaching and support to students. The current study discusses about AI in various areas of education and its application in Indian education. AI has the potential for enabling students to achieve their goals and streamline the process of education. It can analyse the students' previous learning history, identify their weaknesses, and improve the upcoming learning opportunities for personalized learning experiences. AI can be used effectively for transcription of faculty lectures in local languages which can thus become a good educational resource to students of technical education. The AI tools and programs are inclusive which makes the classrooms accessible to all irrespective of language or any other disabilities.

Keywords: *Artificial Intelligence (AI), Artificial Intelligence in Education (AIED), Artificial Intelligence in Technicial Education, Artificial Intelligence in Indian Education*

1. INTRODUCTION

The Information and communication technologies (ICT) have become a commonplace entity in all aspects of our daily lives. Over the last few decades, ICT has nearly transformed the procedures and practices of all sorts of business and governance. It has begun to make an impact in education, although not to the extent that it has in other disciplines [9]. The main purpose of using ICT in education is to introduce new teaching and learning practices and to develop 21st century

thinking and learning skills. Its use in education ensures the proper implementation of all the technologies and makes students and teachers proficient in using these technologies. Its use in the classrooms by the teachers increases the student's motivation to learn efficiently. The National Education Policy (NEP), 2020 the first education policy of India in the 21st century has rightly acknowledged the future role of disruptive technologies in education system. In such a technology driven knowledge environment, it becomes inevitable to become familiar with various disruptive technologies like "Artificial Intelligence, Block Chain Technology, Machine Learning, Data Science etc". These disruptive technologies are going to impact equally all the areas of education like technical education, teacher education, vocational education, professional education, adult education etc. In India, technical education plays an important role in development of human resource by creating a skilled manpower, enhancing the industrial productivity and improving the quality of life of the people. It covers various programmes which includes "engineering, technology, management, architecture, town planning, pharmacy, applied arts & crafts, hotel management and catering technology".

The NEP 2020 also calls for imparting professional education in higher education. It also advises that the technical universities in India should aim to become multidisciplinary institutions to offer holistic and multidisciplinary education. The policy further mentions that India must take the lead to prepare the professionals in areas like "Artificial Intelligence (AI), 3-D machining, big data analysis, and machine learning". Thus, AI is becoming the key driver of development and innovation not only in various industries but also in various areas of education. In the next three years, the Learning Management Systems will be empowered with AI capabilities [6] and AI driven applications, would collaborate more closely to improve quality of education system. As a result, artificial intelligence software would become increasingly intelligent in the day to day world.

2. ARTIFICIAL INTELLIGENCE (AI)

In recent years, AI has brought major developments and represents an emerging technology that will transform how human beings live [14]. Since 1950, the experts on regular intervals predicted that the world would have to wait a few more years to reach to Artificial General Intelligence. A system that will show behaviour which will be indistinguishable from humans in every aspect with cognitive, emotional, and social intelligence [7]. In 1955, the first AI system was designed by Allen Newell and Herbert A. Simon which was called Logic Theorist. The system was implemented by J. Clifford Shaw [5]. The term was first used by John McCarthy in 1956. The term has been defined by various researchers. [3] define AI as "Computers that can perform cognitive tasks that are normally associated with human minds". The researchers further explain that AI isn't a single technology but rather an umbrella term that describes a wide range of technologies such as machine learning (ML), data mining and natural language processing. AI can be defined as the creation of smart machines that possess human behaviour and response [1]. It also refers to the potential of computer-controlled machines for executing tasks in an almost similar way as human beings [18]. [16] believed that the definitions in the existing literature largely focus on cognition and ignore the various other aspects like political, psychological, and philosophical aspects of the theory of intelligence. The researchers define AI as "computing systems which are capable of engaging in human-like processes such as learning, adapting, synthesizing, self-correction, and use of data for complex processing tasks".

AI has the potential for enabling students to achieve their goals and streamline the process of education. It provides students access to the right course, improving their communication with faculties and helping them to lay their focus on other aspects of life by saving their time. A key aspect of AI is personalization which helps students to have a personalized approach to learning based on their unique abilities, preferences and experiences. AI adapts itself to the students' level of knowledge, their pace of learning and preferred goals so that students receive maximum benefits from their

education. Besides this, AI can analyse the students' previous learning history, identify their weaknesses and improving the upcoming learning opportunities for a personalized learning experience. It empowers faculties as well by automating different tasks like administrative work, paper grading and assessment of learning patterns. According to [19], the faculties devote 31% of their time in planning their future lessons, grading the tests and in doing various administrative work. The use of AI and automation tools will help faculties to automate their work and allows them to use saved time in other teaching core competencies [10]. The AI use can help in providing constructive feedback to faculties by helping them improve their instruction and make the learning more fun and interesting. It will also help students in understanding their mistakes and to learn how to do better by rectifying the mistakes.

The rapid growth of computing technologies has made the application of AI in Education (AIED) easier. The use of AI technologies or application programmes in educational settings to aid teaching, learning, or decision-making is referred to as AIED [8]. AI also possesses the ability to respond to various educational needs of students. AI and ML are technologies that not only enhance the safety of institutions but also improve the efficiency of an educational system by contributing to the teaching and learning process [12]. Thus, AI is believed to play a considerable influence in supporting educational reforms. It will provide educational institutions with new intelligent teaching tools, create new teaching and learning modes, and encourage innovation in teaching assessment and management systems [13]. It helps teachers in creating smart content for students which facilitates learning and makes it comfortable. The smart content can change and adapt dynamically, depending on who is reading it. It helps in generating and updating the content of the lessons and keeping the information up-to-date. It also makes the content customized for different learning curves. It also empowers them for accessing knowledge with a single click and makes their knowledge more in-depth and broader for keeping themselves in line with the students of the 21st century. The AI-powered chatbots are available for students for their queries round the clock. It helps them for getting answers to their queries without waiting for the teacher in the physical classroom. The use of chatbots in education is to empower teachers and not to replace them. It decreases the burden of repetitive and low cognitive level tasks which are carried out by the teachers and thereby increasing their productivity [22]. The chatbots allow the colleges to answer the queries of students at a lightning-fast speed which builds the motivation and interest among the students in learning.

3. AI IN EDUCATION (AIED)

The discussion paper of NITI Aayog's "Responsible AI" (2021) has highlighted Education as one of the sectors where AI has a high potential for solving societal needs. It further highlights the potential use of AIED and claims that AI could enhance the learning experience of students through personalised learning and help in predicting the need for interventions for decreasing the dropout rate [11]. The educational institutions are using various AI technologies like chatbots, adaptive learning platforms and virtual teaching assistants for improving their efficiency and effectiveness. There exists a link between AI and education which mainly involves three areas 1) "learning with AI which involves the use of AI-powered tools in classrooms, learning about AI (which lays the main focus on AI technologies and its techniques and Preparing for AI" which enables citizens for better understanding the potential impact of AI on the human lives [21]. The use of AIED makes learning universally accessible to all students. It is considered a blessing for students who are residing in remote areas and for those students who are unable to attend physical classes due to any illness or injury. It overcomes the geographical barriers to learning, and It empowers students to learn from the best teachers in the world while sitting at home. It helps teachers to identify gaps in their teachings and their content material. Coursera a MOOCs platform has already put this into practice. Adaptive learning is considered one of the most potential use of AIED. It helps in tracking the progress of every student and provides the necessary information to teachers if students face any difficulty in the learning content. Additionally, adaptive learning also modifies the learning content

as per students' need which helps them to learn at their own time and pace. In higher education institutions (HEIs), AI-powered systems are being used to decrease human bias during the process of admission. It enhances the credibility of the admission process by giving specific criteria to select applications in admissions. AI tools helps in making global classrooms available to all students irrespective of their language that they speak [15]. The AI tools and programs are inclusive which makes the classrooms accessible to all irrespective of language or any other disabilities.

4. AI IN INDIAN EDUCATION

There are several academic institutions in India that have adopted AI. These institutions include "Centre for Excellence in AI (CAI) in IIT Kharagpur, the Centre for AI and Robotics (CAIR) associated with DRDO, the Robert Bosch Centre for Data Science and AI (RBC-DSAI) in IIT Madras, AI Group (AI@IISc) at IISC Bangalore and the Department of AI at IIT Hyderabad". The Ministry of Education (MOE), Govt of India launched "AI for All" in cooperation with the Intel and CBSE in August 2021. The main purpose of this programme was to create awareness of AI among Indian citizens. The "AI for All" is a self-learning online program that aims at creating awareness about AI. The self-learning program aims at developing all individuals like students, professionals, and senior citizens. The program wants to attract those users who want to have a 'Digital First Mindset'. In a survey conducted by Analytics Insight [2], 46% of the respondents believe that AI could predict school dropout rates in India while 24.4% do not believe it is a feasible choice. Among the participants, 29.3% were neutral. 65.9% of participants believed that AI could enhance the efficiency of individualised education and 31.7% of participants believed that 31.7% believed that the models of AI could enhance personalized education while 2.4% of participants didn't believe that AI could enhance personalized education. About 34.1 % of the participant's believed that the educational apps of AI help in covering the syllabus in their homes. However, 65.9% of participants don't use the educational apps of AI.

In yet another survey by Analytics Insight [23] for understanding the thought process of Indian people about AIED and whether they are ready to implement it. Around 241 participant's participated in the survey. About 90.2% believed that parents and students are aware of AI and 9.8% are unaware of it. Around 39% of individuals believe that AI will have a significant influence on education because it would bring new insights into educating children and adults. Only 4.9 per cent of people are fully negative, believing that AI would have no impact on the advancement of AI. When the participants were asked about the AI tools and technologies, around 46.3% of participants described the usage of AI as low. However, 2.4% of participants believed that AI use was extensive. Regarding AI use in schools, 12.2% of participants believed that there was low usage of AI in schools and 31.7% of participants were neutral.

The recent technological breakthroughs based on AI have made it clear that AI will continue to play a major role in the education system and may even become more prominent. The AI-powered solutions have encouraged schools and Universities to adopt the technology-driven front in imparting education. It has also become a new instrument for teachers which assists them in carrying out administrative tasks. To investigate the future of AI in Indian education, a study was conducted by Analytics Insight [20]. About 41.5% of participants were unsure whether AI can replace a teacher in future. 36.6% of participants believed that AI would never replace teachers in future and 22% of participants believed that AI would definitely replace a teacher in future. The participants were asked whether AI can become the future of Indian education. Around 46.3% of the participants believed that AI would be the primary technology driving the Indian education sector in the near future. Around 41.5% of participants were unsure about the AIED implementation. Around 12.2% of the participants believed that AI would never take over the Indian education system anytime soon.

5. AI IN TECHNICAL EDUCATION

Like AIED, AI will improve the quality of education in technicial education as well. The

statutory body of technical education, "All India Council for Technical Education (AICTE)" has suggested the educational institutions in the country to offer AI as elective in B.Tech. course and to start offering B.Tech. in AI and Data Science. The AICTE in a report has revealed that since 2019-20, atleast 127 diploma institutes and 663 UG colleges across India have opted for courses on "AI, Data Science & Analytics, blockchain, machine learning and robotics". The 127 institutions consist of 222 institutes for AI and machine learning, 186 institutes for AI and data science [4]. Not just offering the course on AI in technical education but AI can help in education management and delivery. It can be used to empower the teaching and teachers and also be a helpful tool in improving learning and learning assessment practices. It also has a strong potential for providing opportunities for lifelong learning [21]. Further, the NEP 2020 puts emphasis on developing teaching learning material in local languages and AI can be used effectively for transcription of faculty lectures which can thus become a good educational resource to students of technical education. Chatbots can also be used in technical education monitor the enrolment and retention of students and also to analyse students success matrices [17].

6. CONCLUSION

The future of AIED is not fully defined but it is estimated that in future almost all areas of education be it technical, professional, non-technicial will depend more on technologies and tools for creating a holistic learning environment for students and faculties. Day by day new and innovative tools of AI are being developed and it is expected that these tools will help students to plan their career paths with clarity and work in achieving their goals. AI has begun to demonstrate its benefits and potential in various educational settings, and it remains to be seen how the technology will empower and improve overall learning outcomes of students.

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PLANT DISEASE DETECTION USING DEEP LEARNING

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ABSTRACT

Agriculture has long been a major driver of both economic development and human habitation. Depending on the type of soil, local climatic conditions, and economic value, the farmer selects the best crop. Agriculture businesses started seeking for creative ways to increase food production as a result of the growing population, changing weather patterns, and unstable political situation. Crop diseases lower crop productivity and cost farmers and agricultural enterprises money. It is crucial to determine the condition and its severity as a result. It is very difficult to monitor plantations of excessive production process by normal human vision. Farmers could be required to present samples of their harvest in order to check for any infections or diseases, which costs time and money. In order to identify and categories crop illnesses. In this paper, we have presented different ways of identifying plant diseases using deep learning methods, have implemented convolutional neural network (CNN) for it and have shown comparison with other exiting methods.

Keywords : *Deep learning, convolutional neural network*

1. INTRODUCTION

Early detection of plant infections is the most important thing that a farmer need to do in agriculture. Plant diseases causes minor symptoms to severe crop damage which ultimately results in financial loses which indirectly causes financial loses to agricultural economy. The majority of the verification is still done manually, with plant leaves being visually examined. This has increased the relevance of automatic infection detection and prompted the development of strategies that can

more efficiently recognize and classify the disease from photographs of plant leaves. Deep learning has attracted growing interest as a method for developing a fast, automatic, and accurate image identification and categorization system. The automatic recognition and classification of diseases in plants or crops with the help of hyper spectral images seems to be a significant challenge for sustainable agriculture. It has also caught the interest of researchers in these years. Plant illnesses can be recognized by looking at the plant's leaves, stems, and roots. Diseased leaves, stems, fruits, and flowers, as well as the form and color of the affected area, can all be detected using digital image processing. The classification process is shown in figure 1. Plant disease dataset is taken in image form, feature extraction is made after doing preprocessing, finally model is trained and classified using test data in whether the plant contains disease or not.

Plant diseases are brought on by pathogens, infectious viruses, and other living creatures that damage a plant's bud, seed, flower, fruit, stem, leaf, or roots. There are two forms of plant diseases. Infectious and Non-Infectious. They go by the names biotic and abiotic as well. Pathogens can range in severity from mild to severe yield damage and can be roughly categorized into fungi, fungal-like organisms, bacteria, phytoplasmas, viruses, viroid, nematodes, and parasites. A few common illnesses are shown in figure 2.

2. RELATED WORK

This section describes the existing deep learning methods for plant diseases detection. J Amara et al [29] identified banana bud and leaf diseases with the help of convolution networks based techniques. Farmers can use this model as a call network to detect infections in banana plants. It is done just by photographing the leaf with symptoms so that the system may determine the type of illness. It detects two common banana diseases, banana sigatoka and banana speckle, in tough situations such as lighting, a complex background, and images with varying resolution, size, cause, and orientation. G Wang et al [44] used deep learning approach that will mechanically discover discriminative possibilities for fine-grained categorization, diagnosing the entire illness severity pipeline. CNN is built from the ground up using four cutting-edge dl models: VGG16, VGG19, Inception-v3, and ResNet50. M Brahimi et al [45] proposed the system that used 2 CNN architectures AlexNet and GoogleNet, Evaluating convolution network with the help of public dataset named PlantVillage. B Liu et al [25] identified features of leaf diseases. They have used GoogleNet and NAG features such as diseases of the plants of apple leaf are identified correctly and accurately. A Fuentes et al [46] used dataset of tomato plant disease and a variety of things have been considered such as lighting conditions, object scale, and backdrop variations.

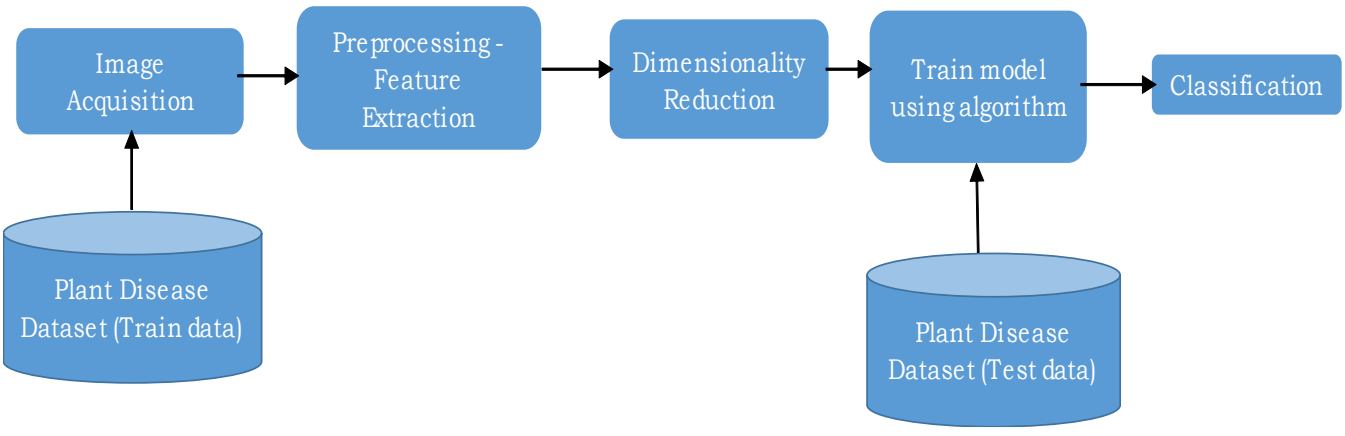


Fig.1: Block diagram of classification process

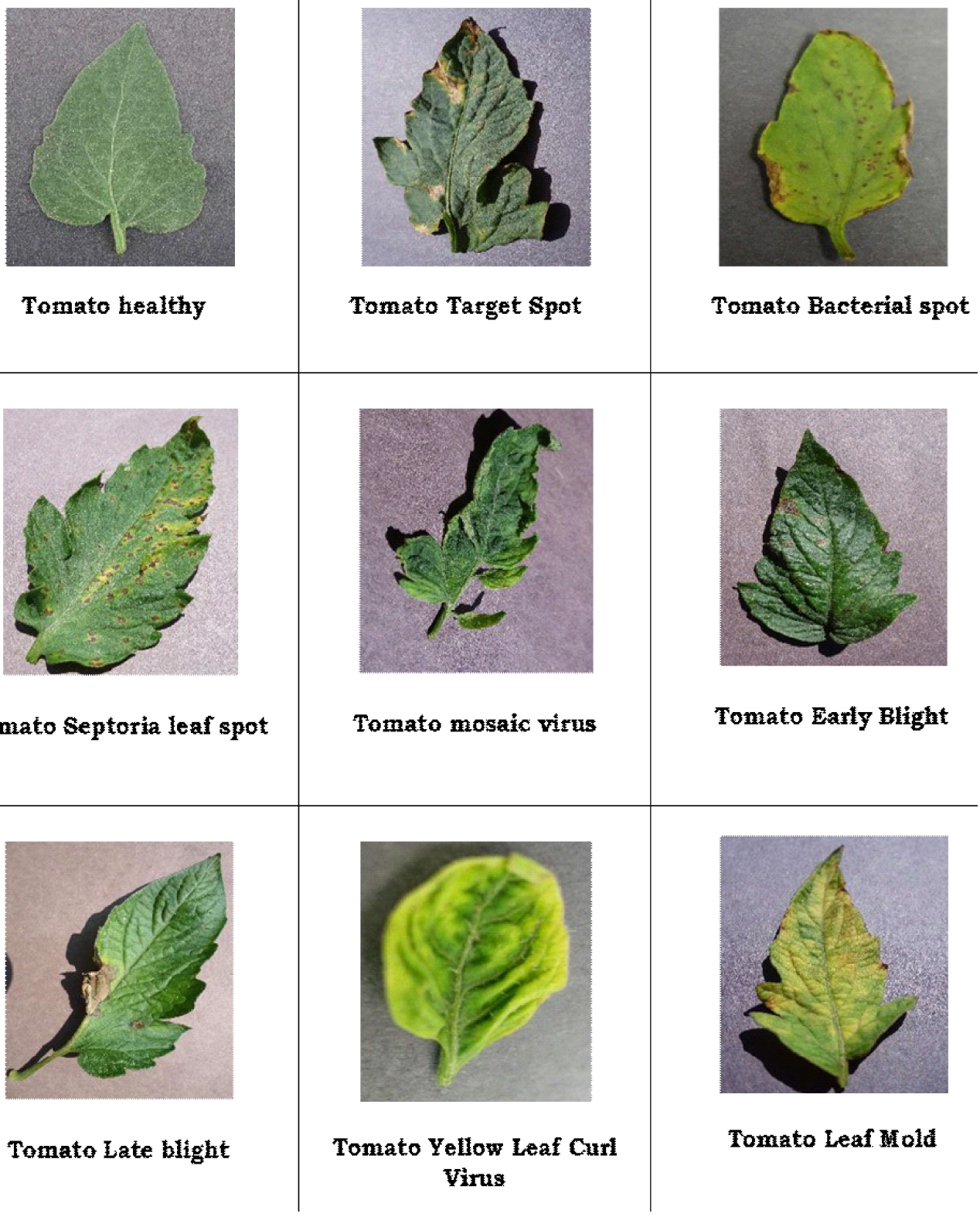


Fig.2: Common illness in tomato plants

3. PROPOSED SYSTEM

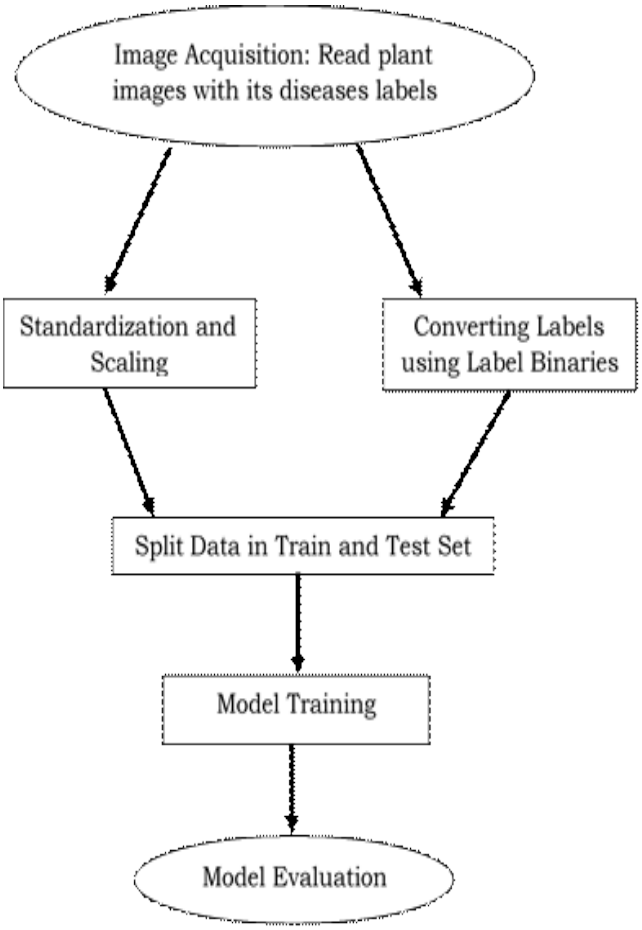


Fig. 3: Proposed system to detect plant disease

2.1 Reading Images

This step contains reading images in variable list. We have used opencv-python (cv2) for. Once images are read in to variable those are to being converted into array to be processed as two dimensional feature vectors.

2.2 Standardization and Scaling

Two dimensional feature vectors of images, created in previous step, are scaled in to range of 0 to 1. For this, all the values in list are divided by 255 which is highest value any pixel can take so if we divide smallest value, which is 0, by 255 it will result in 0 and if division of highest values of pixel results in 1. This will create all values in feature vectors between 0 to1.

2.3 Converting Labels using Label Libraries

As this is supervised learning problems, each observation/image vector is having label which is read in corresponding list along with image vectors. This is also a multiclass classification problem and labels that are in string format needs to be encoded with numbers. Also, converting strings to numbers is not sufficient as it may establish ordinal relationship between class labels so those integer labels are to be converted using one hot encoding. We have used sk-learn library for it.

2.4 Splitting the Data into Train and Test Set

Dataset is divided in train and test sets to check their performance on unseen data. There are some rules of thumbs for creating size of train and test splits such as If data is very small like 1000 instances it is advisable to divide them in to 70 to training and 30 for testing. If data is big enough to have proper size of training set, it is advisable to take 80% as training and 20 % as testing. If data is very big such as 1000000 instances, testing size would be enough if it is 10% to 90% training data is taken. We used dataset of around 2000 images which indicates to take 75% as training data and 25% as testing data which makes around 500 samples as testing samples.

2.5 Model Development

Image classification problem can be solved elegantly using Convolution Neural Network (CNN). In this system CNN custom model is used along with fine tuning of VGG16 and VGG19 model. Details of the custom model are given in following image 4.

2.6 Training and Evaluation

Model evaluation is done using parameter named accuracy on 25% of dataset with categorical cross entropy and binary cross entropy as loss functions. Learning rate is taken by experiments which are adaptive. Total number of epochs is 10, from the charts it shows after 10th epoch model starts to over fit the training data. Batch size is experimented as 16 and 32 out of which 16 is optimal. Two optimizers Stochastic Gradient Decent (SGD) and Adaptive Stochastic Gradient Descent (ADAM) have been used for experiments.

3. DATASET DESCRIPTION

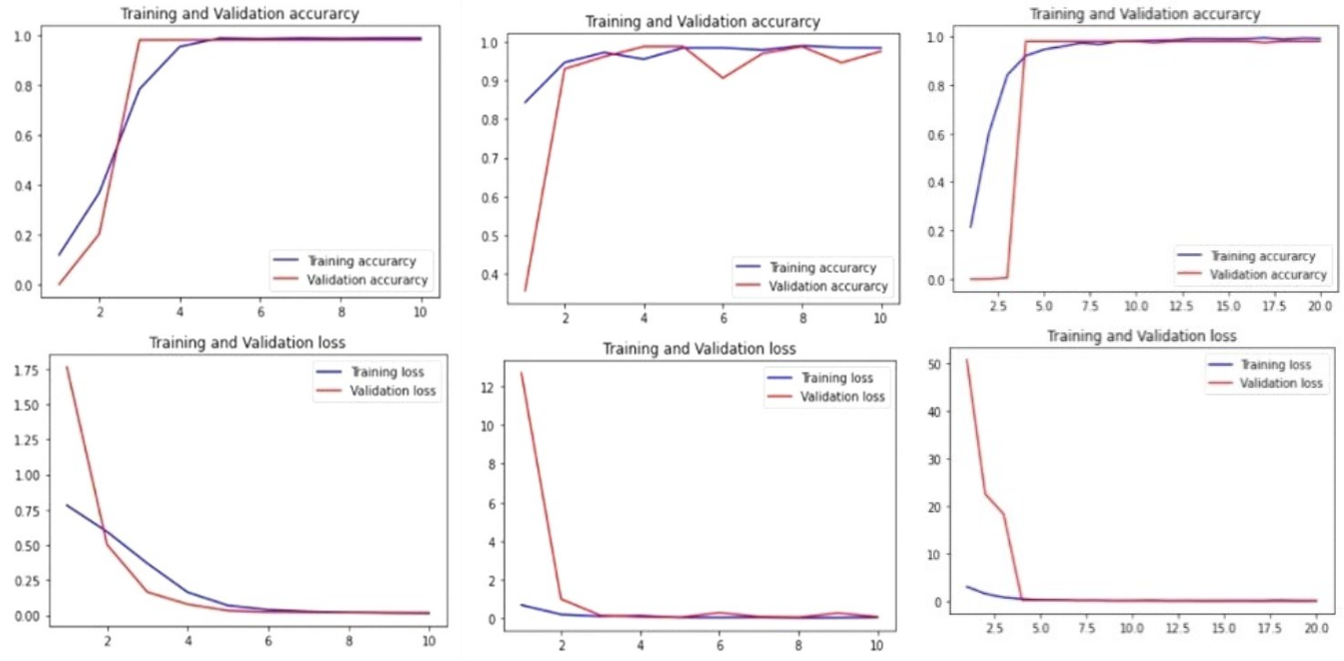
The PlantVillage dataset consists of 20303 healthy and unhealthy leaf images divided into 15 categories by species and disease.

Table 1: Dataset Discription

Sr. No	Plant Leaf	No. of Images	Sr. No	Plant Leaf	No. of images
1	Pepper_bell_Bacterial_spot	997	9	Tomato_YellowLeaf_Curl_Virus	3209
2	Pepper_bell_healthy	1478	10	Tomato_Bacterial_spot	2127
3	Potato_Early_blight	1000	11	Tomato_Early_blight	1000
4	Potato_Late_blight	1000	12	Tomato_Late_blight	1909
5	Potato_healthy	152	13	Tomato_Leaf_Mold	952
6	Tomato_healthy	1591	14	Tomato_Septoria_leaf_spot	1771
7	Tomato_Target_Spot	1404	15	Tomato_Two_spotted_spider_mite	1676
8	Tomato_mosaic_virus	373			

4. RESULT

We have implemented three deep learning models: VGG16, VGG19 and our custom CNN model and gather result of the experiments. Training - validation accuracy and Training – validation loss of three models are shown in figure 4. We have considered different scenarios with various models, optimizers, loss functions and batch size. Table 2 shows result of them.



VGG16 Model **VGG19 Model** **Custom Model**

Fig. 4: Experiment result of VGG16, VGG19 and Custom model

Table 2: Result of Experiments

Experiment No	Model Name	Optimizer	Loss Function	Batch Size	Training Accuracy	Validation Accuracy	Training Loss	Validation Loss
1	Fine Tuned VGG16	Adam	Binary Cross Entropy	32	96.49%	96.82%	0.01%	0.04%
	Fine Tuned VGG19				98.67%	98.21%	0.0%	0.0%
	Custom Model				98.47%	93.24%	0.01%	0.04%
2	Pre-trained VGG16	Adam	Categorical Cross Entropy	32	99.34%	98.81%	0.02%	0.10
	Pre-trained VGG19				99.60%	98.41%	0.01%	0.07%
	Custom Model				95.49%	59.05%	0.15%	3.33%
3	Pre-trained VGG16	Adam	Binary Cross Entropy	16	98.14%	97.81%	0.00%	0.01%
	Pre-trained VGG19				97.68%	97.61%	0.01%	0.1%
	Custom Model				97.41%	91.65%	0.0%	0.0%
4	Pre-trained VGG16	Adam	Categorical Cross Entropy	16	98.81%	95.83%	0.04%	0.4%
	Pre-trained VGG19				90.58%	94.63%	0.2%	0.3%
	Custom Model				92.04%	93.84%	0.2%	0.2%
5	Pre-trained VGG16	SGD	Binary Cross Entropy	32	99.40%	93.84%	0.2%0.0%	0.0%
	Pre-trained VGG19				99.80%	98.21%	0.01%	0.08%
	Custom Model				81.63%	77.93%	0.4%	0.5%
6	Pre-trained VGG16	SGD	Categorical Cross Entropy	32	99.40%	98.21%	0.01%	0.02%
	Pre-trained VGG19				93.57%	92.64%	0.5%	0.4%
	Custom Model				91.98%	80.52%	0.2%	0.2%
7	Pre-trained VGG16	SGD	Binary Cross Entropy	16	95.89%	93.44%	0.3%	0.4%
	Pre-trained VGG19				94.03%	96.02%	0.3%	0.2%
	Custom Model				87.60%	84.10%	0.19%	0.12%
8	Pre-trained VGG16	SGD	Categorical Cross Entropy	16	98.47%	96.02%	0.04%	1.4%
	Pre-trained VGG19				97.94%	97.81%	0.09%	0.1%
	Custom Model				94.30%	96.82%	0.3%	0.3%

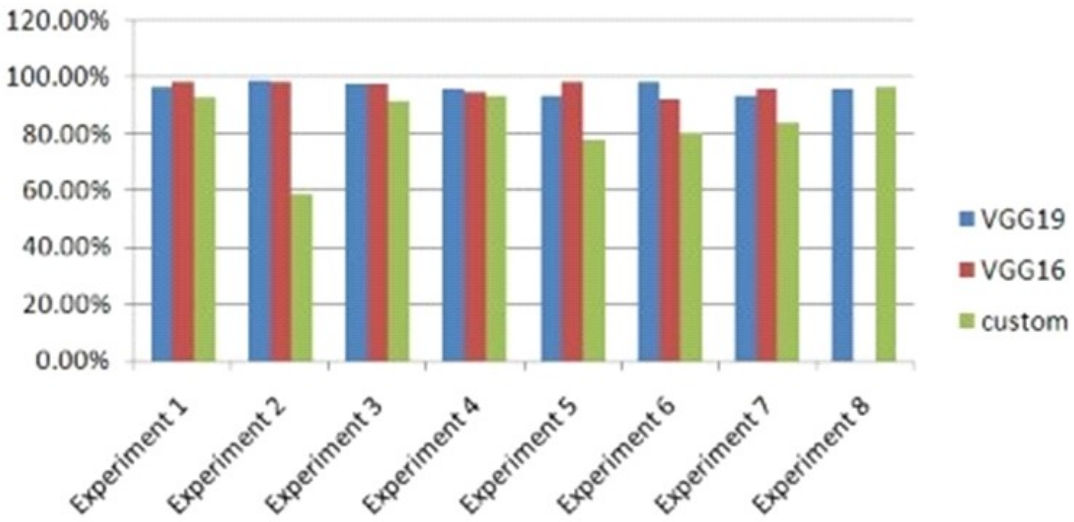


Fig.5: Experiment results of VGG16, VGG19 and Custom models

We have conducted experiments with different number of epoch to get its effect on the measurement parameters.

Sr. No.	Model	Number of Epochs	Training Accuracy	Validation Accuracy
1	VGG16	20	99.01%	98.81%
2	VGG19	20	96.82%	98.52%
3	CUSTOM	10	98.03%	94.30%
4	VGG16	20	93.44%	99.14%
5	VGG19	20	98.03%	95.89%
6	CUSTOM	10	98.03%	91.26%
7	VGG16	20	97.61%	96.42%
8	VGG19	20	98.03%	98.77%
9	CUSTOM	10	97.61%	96.42%
10	VGG16	20	99.01%	98.64%
11	VGG19	20	98.84%	99.10%
12	CUSTOM	10	98.81%	99.34%

5. CONCLUSION

An experiment has been conducted to classified disease from plant leaf images. This all started with aim to automate process of disease identification at early stages from plants. In this work literature of this area is extensively studies based on which three models are created. Two models are fine-tuned using VGG16 and VGG19 and one is completely custom built. Result of experiments suggests that fine-tuned models are performing better on classification while custom model also not falls back. Custom model when trained with very basic parameter tuning just to compare with other model gives acceptable though not higher accuracy of classification. This experiment indicates capacity of custom built model to be efficient and effective in specialized classification task v/s pre-trained generalized models. Experiments also suggest that in the cases of very high training requirements pre-trained models really help with many of features already learned and only new to be trained.

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INNOVATION APPROACH AMONG APHONIC, AMAUROSIS PEOPLE USING HAND GESTURE RECOGNITION WITH ELECTROMYOGRAPHY SIGNALS

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ABSTRACT

Advanced technology is used for disable person in different areas such as Hospital, Institute ,Railway Station School etc. Some technologies are easy to use such that Human Alternative and Augmentative Communication (HAAC) is vital in our lives. One of the most essential approaches for developing a gesture -based interface system for HAAC application is hand gesture recognition.

Technology provides some gesture which are useful for aphonic and amaurosis people. In this technology voice command are generated by using hand gestures, such voice command and picture is used to communicate easily with disables person. we proposed a method for recognising hand movements using electromyography based on acquisition subsystem and transmission through LAN. The original sEMG signal is pre-processed to remove noise and detect muscle activity areas. We used a neural network classification model to predict various gestures. Finally, we put this model to the test for see if it could recognise their gestures with it is an accuracy of 95 percent.

Keywords: *EMG; HAAC, Person–system interactivities, Acquisition Subsystem.*

1. INTRODUCTION

With the developed computer technology, digital facility is very necessary to our everyday lives. It's not simply used nature of personal computers in today's society, but how pervasive their use has become in every sector of commerce, government, and culture. However, the most significant difficulty brought on by the prevalence of computers is in the area of communication. Human Alternative and Augmentative Communication (HAAC) has branched out in many directions over the past decades, and not simply in terms of improved interaction quality. Various academics have been consistently focusing on improving human computer interfaces by making use of fundamental human communication and manipulation abilities [1]. Hand gestures are widely recognised as an effective mode of communication in daily life. Hand-gesture recognition, a way of categorising important hand movements, is gaining a lot of popularity recently. Gesture-based interaction is a common technique used in many contexts, such as sign language interpretation, sports, human-robot interaction, and human-machine

interaction [2]. Medical applications of hand gesture recognition systems often rely on bioelectrical signals rather than visual cues to ensure accuracy. Many facets of daily life, including gaming, healthcare, education, and commerce, call for the usage of hand gestures. Hand gesture recognition is the process by which a computer is able to identify the actions of a user's hands through the automated detection and analysis of bioelectrical signals [3-4]. There has been a lot of focus on developing human-computer interfaces that make use of natural human behaviours including gestures, vision, and speech. Gesture recognition on the human hand is an ingenious, relaxed, and natural way for humans to interact with computers. Its primary applications are gesture-based control and sign language recognition. Deaf people may find it easier to communicate with the world around them if signs could be automatically translated by computers, which is exactly what sign language recognition hopes to achieve. Despite its rigid organisation and foundation in an alphabet and symbols, this system may be used to build generic gesture-based HCI [5].

Multiple sensors can be utilised to gather information for gesture recognition. Some examples of sensors you could encounter are cameras, data gloves, IMUS, Electromyographic (EMG), and image sensors. Although installing sensors in strategic places might be the answer, gesture recognition technology has a number of limitations that make it less than ideal. EMG has advantages over the other two identifying methods in terms of power consumption and mobility. EMG signals are the most dependable and established source of control signals and may be utilised to reflect a number of different movements [6]. Electromyography (EMG) provides data on muscle flexion and extension, as well as the shape and position of the limbs at movement's end by superimposing the action potentials of the muscle tissue that occur during a voluntary contraction. Hand gesture identification using EMG has several benefits over ocular detection. The EMG sensor is not affected by its environment due to its simple design. Biomechanics, neuromuscular physiology, gesture-based control, sign language interpretation, military applications, gaming, and virtual reality are just few of the many scientific areas where EMG is used. Recognizance systems that utilise EMG signals have challenges in signal collection, among other areas. Signal processing techniques for minimising noise [7-8] by using acquisition subsystem and feature extraction.

2. WORKING PROCESS

The approach pre-process and control sub system architecture to categorise the EMG signals, and it was created [9] on the basis of the extraction of time-domain information. The findings show that the acquisition subsystem classifier stabilises through LAN with minimal mean square error at 6 epochs for finger movement datasets and at 4 epochs for hand grasps datasets, where the major emphasis [10] was on categorising separate finger movements of a single hand. In [11], we presented a technique for developing and fine-tuning feature models using a multichannel sEMG amplifier. In [12], a novel architecture for processing subsystem and control subsystem. This is why [13] presented a unique autonomous learning framework that automatically identifies the class of acquired EMG data using depth information, bringing together the benefits of depth vision and EMG signals. With regards to processing surface electromyographic (sEMG) signals across several channels, [14] compared and contrasted the efficacy of several action classification strategies based on a serial communication [15] proposed using a multi-stream residual network to identify dynamic hand motions. In [16], we saw a sensor fusion architecture that takes data from several sources, such as electromyography (EMG) of muscle activity and visual data, and merges them. [17] demonstrated the usage of HDC in a smart prosthesis application dubbed hand gesture identification using a stream of EMG data. With this method, the four analogue channels of EMG signal production may be combined into a single hyper vector. To perform accurate identification despite illumination changes, backdrop clutter, rapid movement, and partial occlusion, a method based on action classification [18]. In order to improve online categorization of hand

movements using EMG data collected from the forearm muscles, [19] proposes the use of feature extraction [20] There was a proposal for a model that could detect hand gestures in real time using sEMG. The armband is used to gather sEMG signals, and the data is segmented using a sliding window approach so that features may be extracted. A data-forwarding through LAN transmission. For this purpose, classifiers for hand/finger movements based on electromyographic data were developed using machine learning methods. Ensemble techniques and time-domain variables were used to categorise eight distinct types of hand movements. Raw EMG signals were processed to extract different time-domain features used to train and test machine learning models: integrated EMG (IEMG), An app on a single smartphone was able to accurately categorise different hand gestures using just inaudible high-frequency sound, with a classification accuracy of 95% frequency spectrum of raw EMG signals shown in figure1.

3. METHODOLOGY

In process, analyse, and recognise the hand gesture signal, an EMG signal-based HGR system has been developed. Figure 2 is a simplified processing and control subsystem. The extreme vulnerability of EMG signals makes them susceptible to contamination by artefacts and environmental noise. Noise, interference and artefacts from several sources can corrupt EMG data. Some of the most prevalent sources are electrode noise, power line noise, motion artefacts, inherent noise and ambient noise in electronic and electrical equipment.

Acquisition subsystem are used for action recognition and Manipulator control, raw surface electromagnetic signals are provided through LAN transmission to filter. Some signals are overlapping thus filter signals are connect to overlapping sliding windows analysis, After that feature extraction used for remove unwanted signals during this process, Action classification verify each signal, differentiate

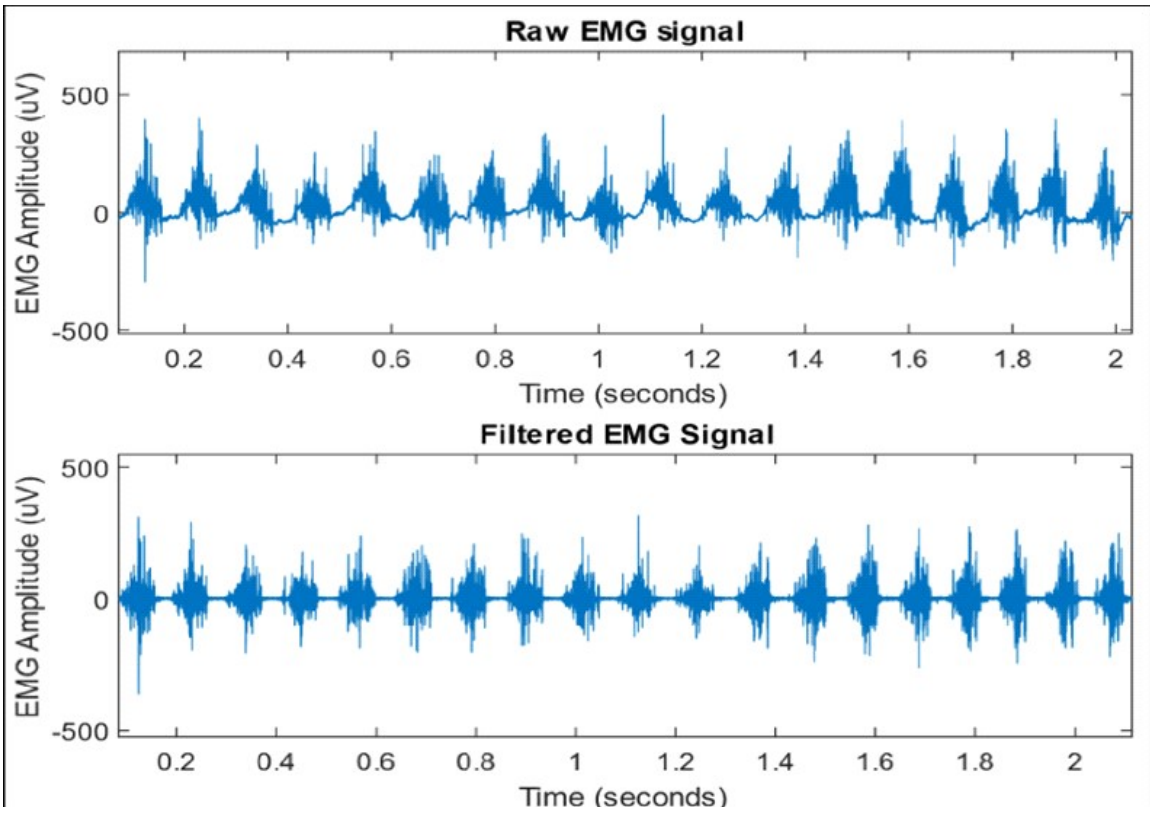

Fig.1: Frequency Spectrum of raw EMG signal and Filter EMG signal

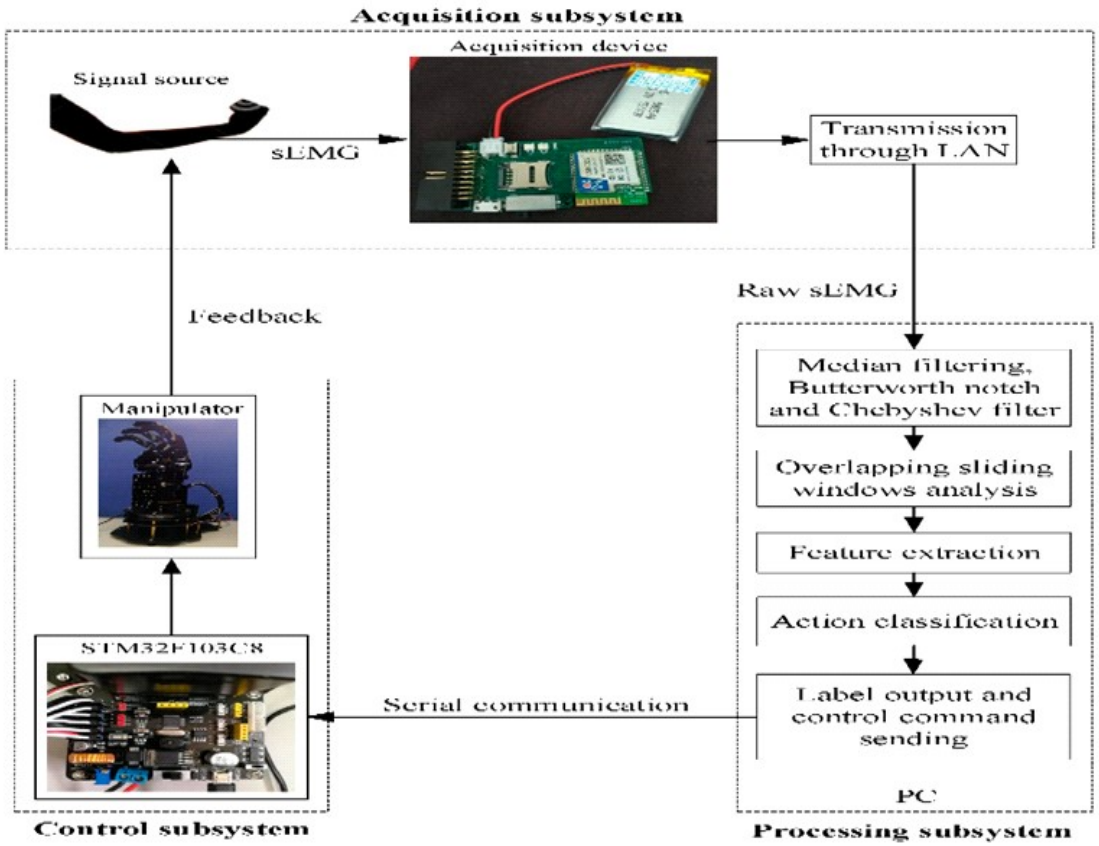

Figure 2: Processing and Control subsystem

each and every action of signals, finalised corrected signals provide to the Label output and control command by using personal computer under the processing subsystem. Second part is controlling subsystem, this system is used some hard ware part through transmission line. Thus, the control subsystem properly worked, then not necessary to provide feedback path sEMG signal through manipulator. Feedback path is used for error signals.

3.1 Processing subsystem

`The extreme vulnerability of EMG signals makes them susceptible to contamination by artefacts and environmental noise. Bad classification outcomes can be achieved by avoiding the usage of such tainted signals. Noise, interference and artefacts from several sources can corrupt EMG data. Some of the most prevalent sources are electrode noise, power line noise, motion artefacts, inherent noise and ambient noise in electronic and electrical equipment. Using high-quality gear with the appropriate electrode position, or employing traditional filtering methods like a band stop filter or band pass filter, will get rid of the first three forms of noise. It is difficult to filter out the background noise, artefacts, and interferences that occur in the principal EMG frequency range with filter and active classification, as demonstrated by feature selection techniques. The results of feature extraction revealed that some compiled sets of features might be detrimental to the classifier's efficiency. One statistic for feature selection is the number of times a feature causes a tree to divide. The following computations are utilised when developing the proposed architecture.

3.2 Control subsystem

In control subsystem feedback path generated from manipulator to original signal source. this system control through transmission

line between pre-process subsystem and control sub system. voice command and label is produced by algorithm. Various hand gesture with EMG signal is input of the system and various voice command and related label is generated for aphonic and amaurosis people.

3.3 Algorithm

Input - EMG Signals of Various Hand Gestures

Output - Manipulated voice command and label

Fig. 3 : Example of Hand Gesture

4. EXPERIMENTAL RESULTS AND DISCUSSION

For this experiment, proposed experimentation used MATLAB R2019b to create a model of the proposed architecture and test it. An Intel® CoreTM i5 processor and 8 GB of RAM were used in the analysis of the suggested concept. Using an 8x16 electrode array and state-of-the-art collection technology, an extensive collection of high-density surface electromyography (sEMG) recordings of hand gestures from a variety of individuals is available in the CapgMyo dataset Our evaluation procedure consists of two phases, first phase is prepressing subsystem and second phase is controlling sub system for this phase, 95% accuracy obtained. Assessment data are shown in Table 1 is generating Text massages with related hand gestures.

Table 1 : Text Massage with Hand Gesture

Dataset	Description	Text massage
	nice	Okay and Good
	Peace sign	Allow Any Two Person
	Thumbs up	Work is done
	Thumbs down	Work is not done

5. CONCLUSION

In order to enhance EMG-based hand gesture identification with CapgMyo datasets from the Myo armband device, this research proposes voice command generated by using pre-process and control sub system. This command is useful for Aphonic, Amaurosis people at various places. Manipulated signal is generated specific command by using different label, every label work as single voice command. Thus, the disable person can work as per voice command or specific label as shown in screen. A classifier is required to classify each test feature vector for accurate identification, rather than merely having the results recognised by any motion. If no gesture is recognised for a feature vector, it is categorised as no gesture. A future possibility is a real-time implementation. Also, surgical robots and other applications that rely on hand gestures will be able to be remotely controlled thanks to advancements in future technology.

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TRAVERSING SERVERLESS ARCHITECTURE

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ABSTRACT

For a long time, developers have been spending a big part of their time and efforts in managing and caring for the server infrastructure of their application or website. Moreover, they have had to tend to the operating system and web server hosting process required for their application. They have had to divide their attention away from the main product their organisation offers. There has to be an easier way. A serverless architecture is a way to build and run applications and services without having to manage the backend infrastructure. Your application still runs on servers, but all the server management is done by the cloud provider. The purpose of this project is to completely explore the serverless architecture in its whole depth and breadth. It contains the comparison of serverless way of architecting applications with the traditional way of deploying applications on provisioned servers. It includes the comparison of cost, dependency on code quality, type and domain of project and the correct way of architecting applications for serverless. Serverless applications are made to run pods for each process request and these pods kill themselves or are killed by a master process in a master-slave architecture. A completely separate microservice based on NodeJS was created as the NodeJS based microservice is acting as a storage location server which stores all data that is required to be saved.

Keywords : *Serverless Architecture, AWS, Persistent Storage, Traditional Server, Web Crawler*

I. INTRODUCTION

Servers are the backbone of any real-world, production-grade application. If you want to maintain such an application on the internet, you need to have servers that handle user traffic and requests. Traditionally these things have been managed through manually-maintained, offline databases and servers. Even though they may do the job in a lot of cases, they are a nuisance even in the best of scenarios. The larger an organisation gets, the bigger does its traffic gets. This means in the long-term you need more and more people to maintain and upgrade your backend servers, the very same people who could have been productive in different ways at different places.

Thus, serverless architecture offers a lot of incentives to companies which desire a better way to manage their backend. Companies can now offload the burden of managing their complex databases to cloud providers like Amazon and

Google, who offer services like AWS and GCP respectively. Users of these services can opt for their paid plans, even though free plans are also usually available. Users pay for having cloud servers and computers on a pay-as-you-use basis, and therefore all the traffic and data management is managed by these cloud providers in lieu of a fee for their services.

2. LITERATURE REVIEW

Quite a bunch of work has already been done on Building serverless applications. Salesforce.com started the first popular SaaS cloud computing services in 1999. Today, Amazon, Google and Microsoft lead the pack in terms of providing cloud computing services. Cost-effective-Serverless provides a pay-per-use model where businesses don't need to invest in extra servers for handling an estimated workload.

The inherent convenience and scalability of serverless cloud providers has enticed quite a few big companies and startups. A serverless implementation of a core banking system is presented Pu et al. [1]. Goli et al. [2] presents a case study of migrating to serverless in the FinTech industry.

Big cloud providers like Amazon and google often offer complex, multi-layered solutions like Cache and Ram on the cloud too. Amazon for example offers ElastiCache, which is an in-memory cache and data store. It is around 700x more expensive than Amazon's standard storage service. InfiniCache [3] is another in-memory object caching system based on stateless cloud functions. CloudBurst [4] also proposes a caching mechanism in its architecture. Other latest advancements in the area are elaborated in [5][6][7].

3. OBJECTIVES

The primary objective of our project is to design an effective, optimized, and automated pipeline of the complete serverless architecture. The secondary objective is to create applications with different scenarios and to compare the cost, dependency on code quality, traffic dependency, and fit of different kind of projects in serverless.

We approach this problem:

1. Create a project on serverless architecture.
2. Compare it with the traditional server approach in terms of cost, code quality, flexibility.
3. Solve the problem of persistent storage on serverless architecture.

4. METHODOLOGY

This section presents details of the tools and techniques used, and implementation details of our proposed work.

4.1 Tools And Techniques Used:

Tools and techniques we used for "Traversing Serverless Architecture" project include:

A. React JS

B. Node JS

C. AWS

A. React JS: React JS is a JavaScript library to build online Single page applications in a quick and efficient manner. It is a component-based library which accomplishes state management via hooks. We will use React Js in tandem with Material UI to build a beautiful frontend interface for our website in an efficient manner.

B. Node JS: NodeJS is an open-source JS framework that is designed to build scalable network applications. NodeJS is a server-side platform built on Google Chrome's V8 JavaScript Engine.

C. AWS: AWS is the world's leading cloud database/server offering company with more than 100 distinct services available. More and more businesses are increasingly choosing to go online without having to deal with the hassle of independently managing a server. That is where AWS comes in.

4.2 Implementation

For the proposed website, we developed the entire application on React JS and NodeJS, while using AWS to host and power our website. We used beautiful Soup to write web crawlers in python to

fetch data from our chosen websites and arrange the information on our webpage. We hosted our crawlers on AWS and they will run every day at a selected time. The resources needed to run the crawlers along with the cloud space needed to store our data will incur cost to us, and we compared how the costs vary with various software tweaks, and how they compare with a local server architecture. We noted how different parameter variations lead to cost fluctuations in our cost.

A. UI/UX

We have created a beautiful UI to present this functionality in a pleasing manner. We are using ReactJS as our frontend framework. Users can come to our website and see jobs from various big tech companies in a sorted manner, thus saving their time while job hunting.

B. Traditional Server vs Cloud Server

Fig.1 and Fig. 2 depict how the data that our web crawler fetched from the Amazon website. The crawler is deployed on Amazon's cloud servers, thus saving us the need to set up our own. The data is fetched in JSON format, and can then be displayed using react JS in a pleasing manner. Table 1 shows the comparison of Traditional vs. Serverless architecture.

Fig. 3 shows the implementation of a traditional JSON server using NodeJS. It is powered by our local machine, and hence is less powerful, even if we retain more control.

```
mongoose.connect(
  "mongodb+srv://admin:admin@cluster0-nbxol.mongodb.net/jobsSkillingaiRetryWrites=true&w=majority",
  {
    //useMongoClient: true
    useNewUrlParser: true,
    useUnifiedTopology: true,
  },
  console.log("Database Connected")
);

app.use(bodyParser.urlencoded({ extended: false }));
app.use(bodyParser.json());

app.use((req, res, next) => {
  res.header("Access-Control-Allow-Origin", "*");
  res.header("Access-Control-Allow-Headers", "*"); //'Origin, X-Requested-With, Content-Type, Accept, Authorization'
  if (req.method === "OPTIONS") {
    res.header("Access-Control-Allow-Methods", "PUT, POST, PATCH, DELETE, GET");
    return res.status(200).json({});
  }
  next();
});

const emailRoute = require("./backend/api/email");
const jobsRoute = require("./backend/api/jobs");
const emailSendRoute = require("./backend/api/functions/sendEmail");

app.use("/api/email", emailRoute);
app.use("/api/jobs", jobsRoute);
app.use("/api/email", emailSendRoute);
```

Fig.1- Code for Web Crawler

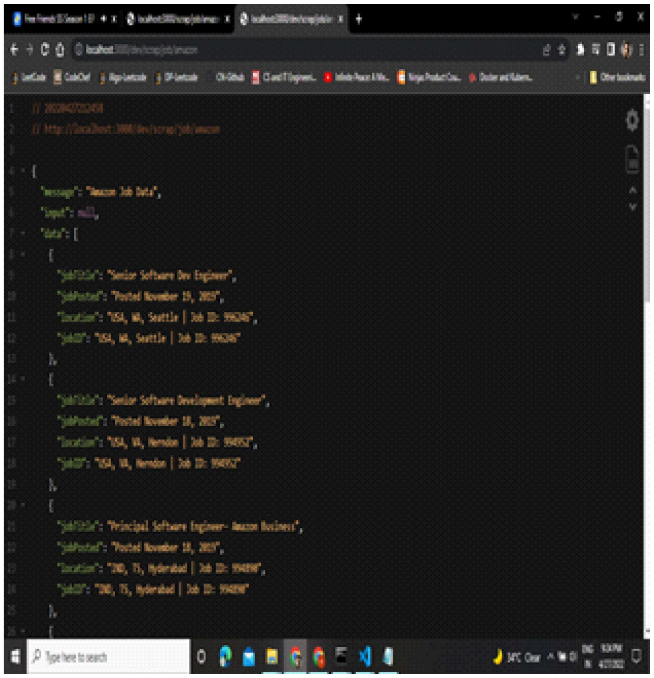

Fig.2 : Data fetched by Web Crawler

Table 1- Traditional vs Serverless Architecture

Topic	Traditional On-premise Server	Serverless
Cost on production	Preferred for applications with huge traffic	Preferred for applications with moderate and less traffic
Use Case	Works best for heavy applications connected with multiple services running together	Works best for APIs and trigger-based systems.
Speed of Development	No initial setup required.	Initial setup is required but load balancing is not required
Speed	Depends on both the intermediate services and the resources of the hosted system	Depends majorly on the code quality

```
const mongoose=require("mongoose");
const express= require("express");
const router= express.Router();

const jobData=require("../../../models/HiristJob");

router.get('/hirist/backend',async(req,res)=>{
    jobData.find({UID:"hirist_engineering_Backend"},async(err,found)=>{
        if(err){
            return res.status(500).json({
                status: 500,
                message: err,
            })
        }
        else{
            if(found.length){
                return res.status(200).json({
                    status: 200,
                    message: found,
                })
            }
            else{
                return res.status(404).json({
                    status: 404,
                    message: "No jobs found"
                })
            }
        }
    })
```

Fig.3 : Traditional Server

3. PERSISTENT STORAGE

Serverless applications are made to run pods for each process request and these pods kill themselves or are killed by a master process in a master-slave architecture. Thus, serverless applications cannot persist storage or maintain a permanent storage point for files. While databases help store structured data and similarly S3 buckets and other static storage services help us store images, permanent native file storage is required for storage while processes run. This problem is solved in the following manner: A completely separate microservice based on NodeJS was created which was hosted separately.

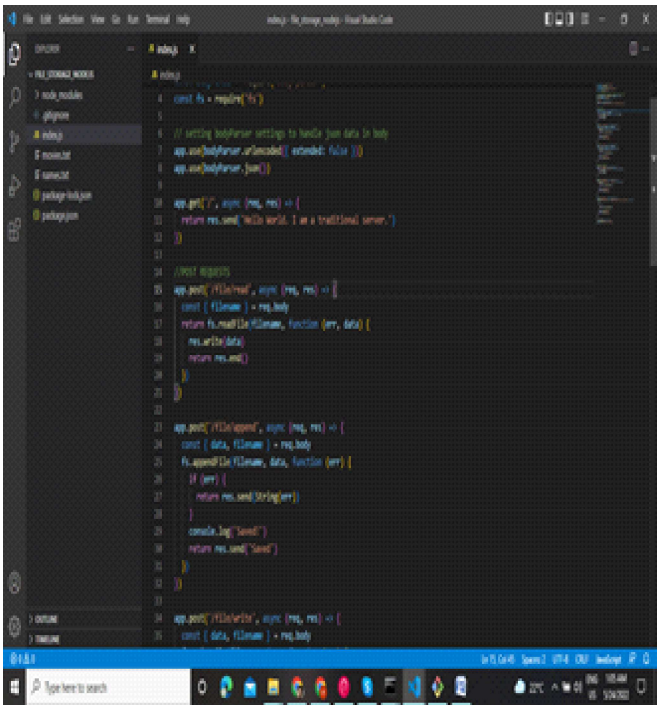

Fig.4 : NodeJS code

4. RESULT

Serverless applications cannot persist storage or maintain a permanent storage point for files. While databases help store structured data and similarly S3 buckets and other static storage services help us store images, permanent native file storage is required for storage while processes run.

The UI screen is as shown in Fig. 6 and Fig.7.

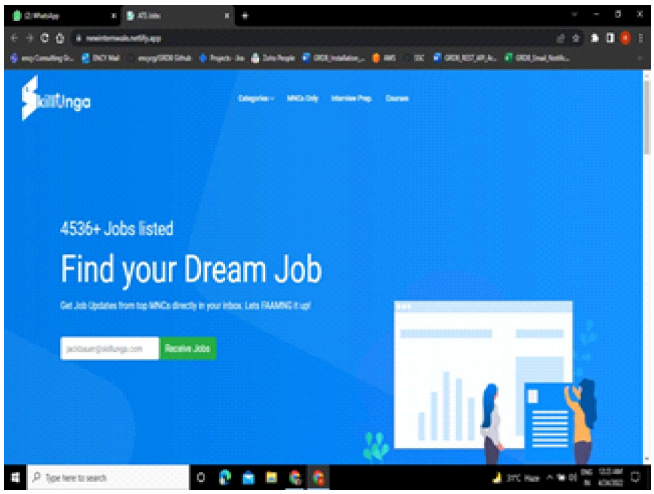

Fig.6 : UI screen

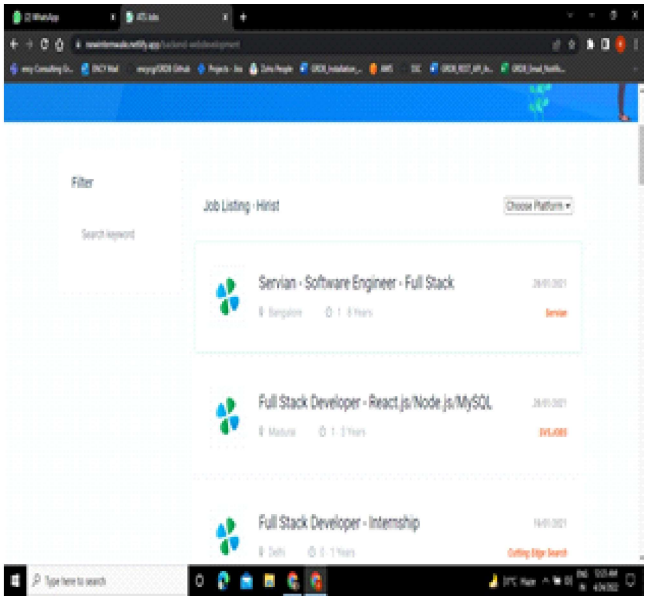

Fig.7: Dashboard

This problem is solved in the following manner: A completely separate microservice based on NodeJS was created which was hosted separately. This microservice was capable of handling incoming request which has data that needs to be stored or a request to read existing data. This microservice helps store data permanently. Whenever the serverless architecture requires to store some data permanently, it sends a request to the microservice, which in turn creates mapping of that particular request and the file it creates and stores data in it. This data can then be later accessed by making another request from the serverless architecture. Thus, the NodeJS based microservice is acting as a storage location server which stores all data that is required to be saved.

5. CONCLUSION

Our comparisons in data storage and processing between local NodeJS servers and AWS cloud servers have yielded the expected results. While we retained more instantaneous control over our data and privacy while using persistent storage, we found it easy to scale our application when the backend was hosted on AWS, as in when we were using serverless architecture.

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PRINT QUALITY EVALUATION IN PAPERBOARD PRINTING INDUCED BY CHANGES IN VISCOSITY AND SCREEN PARAMETERS

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ABSTRACT

Newer offset printing technologies demand improved rheological properties of inks ensuring predictable printability and runnability. Printing performance of printing technology is a function of raw materials namely printing ink and substrate. Interaction between ink and surface of substrate influence densitometric quantities of printed layer. Consistent performance of ink is a function of its rheological properties mainly viscosity. Surface properties of substrate such as smoothness whiteness and color are critical for printability. In this paper an attempt is made to analyse variance in percent tone value on print on paperboard by conducting experiments involving three levels each of dot shape and screen ruling. Experiments also yielded relationship between viscosity and percent tone value increase.

Keywords: *Viscosity, Tone Value Increase, Dot Gain Curve, Gray scale*

1. INTRODUCTION

Offset printing has been a dominant printing technology for printing on paper and paperboards having halftone printing range upto 300 LPI. Surface properties of substrate decide reproducible printing resolution and overall print quality. [1] Offset being an impact based printing technology printed dot enlarges resulting in dot gain. This enlargement depends upon the ink viscosity governing the flow properties. [2]. As per ISO 12647-2 the tone value increase in percentage of process ink print increase with screen ruing (LPI) and is different for different dot shape. [1] Offset and letterpress inks are paste inks having less solvent as compared to flexographic and gravure ink. The general range of offset printing ink viscosity is 400-1000 poise and that of flexographic and gravure ink is between 0.5 and 5.0 poise. Thus offset ink much thick viscous and shorter than gravure and flexographic inks. [2] Calendering process of paper and paper-board making enhances gloss and print quality but reducing brightness. The penetrating ink changes print density, mottling and dot gain affecting appraisal. Print squeeze in case of porous substrate also influences print quality. [3]

Some other printing problems include improper overlapping of colours, mist, and forming pile of paper surface resulting in changes in print density. [4] In case of paper and paper board, surface sizing chemical process is used that applies starch to substrate improving its printability. Sizing controls surface energy of substrate, its

hydrophilic character, affinity towards different ink and smoothness of paper surface. Print quality is achieved if the balance between absorption and spreading if ink on surface of substrate is optimized. Sizing results in application of thin, uniform film of starch added with synthetic sizing agents on surface of paper. The performance of sizing agents depends on starch added with copolymers of styrene identified, maleic unhydride, acrylic acid esters or polyurethane. [4, 6]

Common dot shapes in offset halftone printing are round, elliptical and rhomboidal wherein the round dot having no specific direction are not affected by moiré issues. Slur, doubling printing troubles appear irrespective of screen dot geometry. An elliptical dot show controlled tonal jump whereas in square dots the tonal loss corresponding to shadow parts of original is noticed. [5]

A good work can be seen regarding tone value changes with ink viscosity and chemical formulation of paper finish. Moutinho et al. [6] used different levels of cationic starch and minor quantities based styrene copolymers. Application of these size formulations followed by inkjet printing to analyse impact of size in terms of print quality. However, trials did not consider ink viscosity on print quality. Ivana Juriè et al. [7] took substrate surface properties viz., gloss and roughness at their different values and printed to analyse print quality. These experiments neither considered ink viscosity nor sizing amount. J. Lipponen e al. [8] also focused on testing sizing quality of two starch formulatons with different concentration keeping aside ink chemistry and printing inputs. Moutinho et al. [6], Ivana Juriè et al. [7] and J. Lipponen et al. [8] appropriately did not include print inputs such as screen ruling and dot shape. Study by Dragoljub N. et al [9] included printing troubles, but did not considered viscosity treatment and its effect on print quality. Dragoljub N. et al [9] studied effect of optical and surface properties of PVC during reverse side printing. Swati B. [10] conducted experiments to study aftermaths of screen frequency on visual appearance using 3 levels of screen ruling, 6 levels of dot shape without considering ink viscosity as a varying parameter. The present experiment is designed to assess print quality when ink with different viscosities is printed on ivory paper board which is a chemically modified with end users from packaging industry in mind.

The experimentation is spread over following sections.

Ink formulation, printability and runnability properties, rheological parameters of ink, ISO standard 12647-2 recommendation about tone value and applicability of screen frequency, dot shape related to offset printing are considered first. Secondly, experimental model is elaborated followed by collection of data for result analysis. The third section elaborates observation and subsequent results with the help of appendices and figures. In second last part, utility and limitations of model are presented. Conclusions and scope for up gradation is discussed in the end.

2. METHOD

Ivory card paper of 300 GSM and 18" x 23" was used as a substrate along with magenta process ink to print a lot of 1000 sheets on offset press wherein all important parameters are included. Main parameter being dot area scale from 0.0 to 100.0 % with increment of 10.0 %. Such control elements are printed with following parameters. Each plate i.e. image carrier is imaged with 12 different images for 12 trials. Measurement of dot area are carried out using densitometer at 2 deg viewer angle and D50 illuminant. Levels of parameter ink Viscosity: 150, 300, and 450 Poise are also considered for printing.

Each trial Ivory board is printed with three levels of ink viscosities. ANOVA is done only for screen ruling and dot shape treatments. Effect of viscosity on dot gain at 50% is tabulated separately and discussed in result section alognwith other observations.

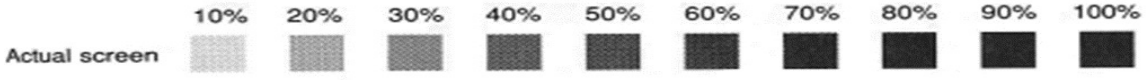

Fig.1: Representative Gray scale

Table 1: Parameters

Constant Parameter	Varying Parameter	Total Trials
Machine Speed- 2000 iph	Screen Ruling (LPI) (4) - 150, 175, 200, 240	12
Temperature 25 deg C	Dot Shape (3) - Round, Elliptical, Rhomboidal	
Relative Humidity- 60 %		

2. RESULTS

Observed dot area values are measured on dot gray scale for 12 trials and recorded in appendix A. Similarly the dot area values for all dot shapes are recorded for three levels of ink viscosity and recorded in appendix B. For ANOVA dot area value at 50% is treated as a response for all 12 trials.

In case of appendix B observed dot area of 50% dot is selected as response variable. The null hypothesis for screen ruling (factor A) and dot shape (factor B) and interaction effect of screen ruling and dot shape are stated below. Two sample ANNOVA is completed as random test and tested for F-distribution values.

The results of ANNOVA and F- distribution are shown in table 2. Figure 2 and figure 3 show required statistics for factor A and B respectively. Figure 4 is showing required statistics for interaction effect between factors A and B. Figure 5, figure 6 and are showing cell's average, residual plot and box plot respectively. Validation found the presented design balanced. As for screen ruling (factor A) the calculated p- value is 0.001658 i.e. less than 0.05, the null hypothesis Factor A (Screen Ruling): H0: $\mu1 = \mu2 = \mu3 = \mu4$ is not accepted and in case of dot shape (factor B) the calculated p- value is 0.2878 i.e. more than 0.05, the null hypothesis Factor A (Screen Ruling): H0: $\mu1 = \mu2 = \mu3 = \mu4$ is accepted. The p- value for interaction effect of A and B is 0.1252 and is higher than 0.05 hence null hypothesis is not accepted.

Hypotheses :

Factor (A: Screen Ruling):

H0: $\mu1 = \mu2 = \mu3 = \mu4$ (Difference: No)

Factor (B: Screen Dot Shepe):

H0: $\mu1 = \mu2 = \mu3$ (Difference: No)

H0: Interaction (AB)

Factor (B: Screen Dot Shepe):

H0: ì1 = ì2 = ì3 (Difference: No)

H0: Interaction (AB)

Table 2 : ANOVA Table

Factor/Interaction	Degrees of Freedom	Sum of Square	Mean Square	Value of F	Value of P
(A: Screen Ruling)	3	1079.5573	359.8524	19.676 (3,6)	0.001658
(B: Screen Dot Shepe)	2	56.4802	28.2401	1.5441 (2,6)	0.2878
Interaction AB	6	109.7332	18.2889	1.7113 (6,108)	0.1252
Error	108	1154.224	10.6873		
Total	**119**	**2399.9947**	**20.168**		

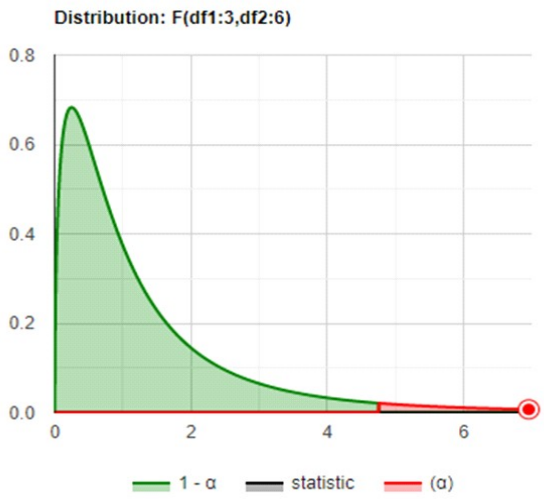

Fig. 2 : Distribution: F (df1:3, df2:6)

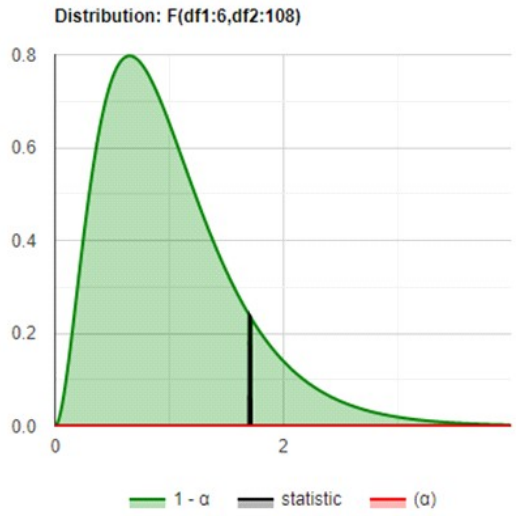

Fig.4: Distribution: F (df1:3, df2:6)

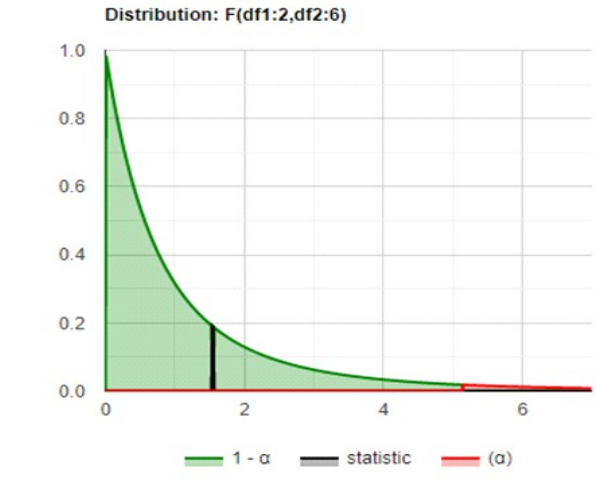

Fig. 3: Figure 2: Distribution: F (df1:3, df2:6)

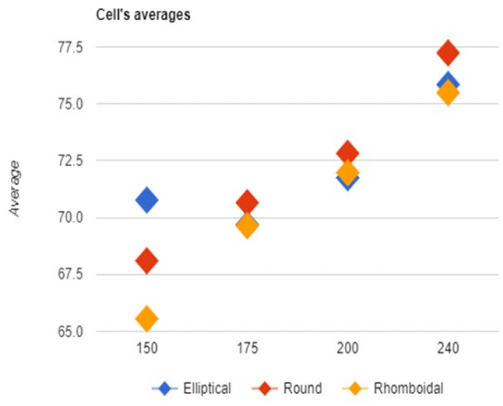

Fig. 5: Cell's averages

From table 2 and figure 2, 3 and 4 given above we see that for a Factor (A: Screen Ruling) since value of p is 0.001658 which is less than 0.05 H0 stands rejected. Also the value of F is 19.676 is validating rejection. For a Factor (B: Screen Dot Shepe) since value of p is 0.2878 which is more than 0.05 H0 is not rejected. Also the value of F is 1.5441 is validating non rejection. Finally in case of interaction of Screen Ruling and Screen Dot Shape since value of p is 0.1252 which is more than 0.05 H0 is not rejected. Also the value of F is 1.7113 is validating non rejection.

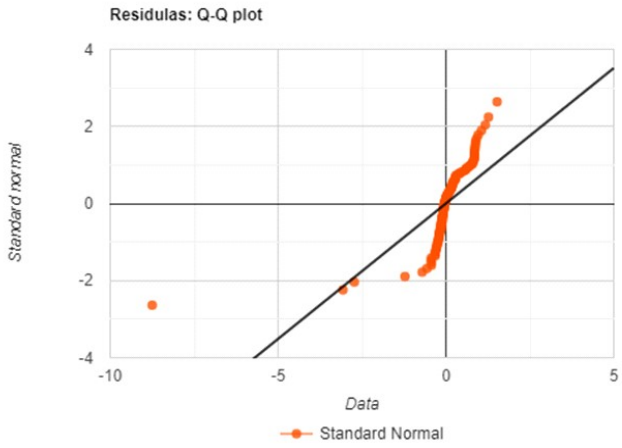

Fig.6: Residuals plot

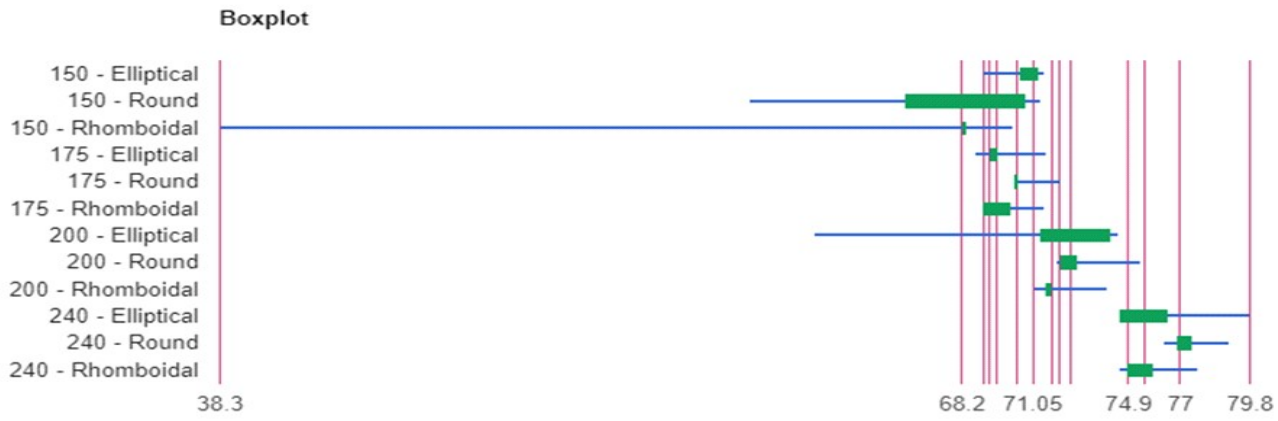

Fig. 7: Box Plot

Figures 5, 6 and 7 provide additional statistic related to validation of experimental model and mainly include detection of outliers, normality and balancing of design.

3. DISCUSSION

Print quality control in printing on Ivory paper, paper board is crucial as it has advantages of having manufactured with good optical, physical and resistant properties making it suitable choice for diverse applications including commercial, packaging and electronics on majority of printing processes. Identifying significance of influence of screen ruling and dot shape on tone value or other print quality parameters. Results shown in earlier section are suggesting that the screen ruling is a parameter of significance when it is about printing a full color graphic original. Variation in tone value with screen ruling can affect colour balance and gravy balance and can result in rejection proof or even job.

4. CONCLUSION

The higher screen ruling results in higher dot gain in process color, half tone printing even on ivory paper. Tone value increase is also more in high screen ruling. Dot shape is not found as influential as screen ruling hence offers flexibility to prepress and press operator. Ink viscosity too is showing considerable influence on tonal reproduction as dot gain is increasing with decreasing viscosity. This known behaviour is quantified and is showing that at higher viscosities the tone value variation is narrowing and opposite can happen when viscosity decreases. Furthermore, appendix B suggests that between dot shape and viscosity, the dot shape is less influential in affecting value increase i.e. dot gain.

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ZERO-KNOWLEDGE PROOF FOR ONLINE AUCTIONS

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ABSTRACT

Zero-knowledge proof is a special algorithm that ensures data integrity by letting the truth be known to the verifier (receiver) without the prover (sender) revealing all the confidential information. The proposed system aims at utilizing this mechanism to ensure transparency and privacy in data communication. In an online auction, multiple buyers and sellers worldwide participate in the bidding process via the internet. However, the security feature is at risk if each buyer and seller is not carefully monitored. Therefore, the zero-knowledge proof protocol provides a solution by using entity authentication and user anonymity. It helps to ensure that the users participate in the online bidding process without revealing their profile information.

***Keywords** : Zero Knowledge Proof (ZKP), Simple Certificate Enrolment Protocol (SCEP), Secure Hashing Algorithm (SHA), Online auctions, simple certificate enrolment protocol (SCEP) curve.*

1. INTRODUCTION

Modern technologies are reshaping the world by promoting less human dependency and efficiency in reduced manual workflow. However, these modern technologies challenge the three critical facets of data, i.e., confidentiality, integrity, and security.

Traditional auctions around the world involve the auctioneers and bidders being present at a physical place. However, with the digitization aspect put in place, online auctions are also becoming prominent. The concept of security, privacy, and confidentiality is essential in this domain.

Modern cryptographic mechanisms allow us to achieve the security, privacy, and confidentiality aspects of online auctions. One such cryptographic mechanism is called zero-knowledge proof. ZKP is a special algorithm that ensures data integrity by letting the truth be known to the verifier (receiver) without the prover (sender) revealing all the confidential information.

The project design and implementation are inspired by the eBay website[1]. The project will focus on secure online bidding to ensure two primary factors, i.e., entity authentication and anonymity. Entity authentication is the process of providing the identity of the two parties, i.e., verifier and claimant, in protocol participation. User anonymity is a feature in which the users participating in the bidding process are anonymous, i.e., their profile information is hidden.

This proposed system is motivated by the need to:

1. Implement ZKP protocol to ensure a fair and privacy-preserving e-auction between the participants, i.e., buyers and sellers.
2. Authenticate bidders and sellers against malicious and unauthorized adversaries.

The paper aims at utilizing a zero-knowledge proof mechanism to ensure transparency and privacy during data transmission. This project aims to authenticate bidders and sellers of auctions against unauthorized/malicious adversaries. This paper's scope is to create a secure online auction platform by implementing the ZKP protocol using a simple certificate enrolment protocol (SCEP) curve.

2. LITERATURE SURVEY

An efficient, secure two-party protocol, based on Yao's construction, is described in [2], which provides security against malicious adversaries. Cut and choose techniques are applied to the original circuit and inputs to support their construction. The work mainly concentrates on delivering efficient protocol against opposing parties along with Simulation-based proofs. The benefit of this encryption scheme is it uses private key encryption that has indistinguishable encryptions for more than onemessage. And an elusive, efficiently verifiable range and the protocol uses both unconditionally hiding and unconditionally binding commitments that need to use an oblivious transfer protocol which is secure according to the natural/ ideal model simulation definition.

Although the protocols for semi-honest adversaries are far more efficient, there are many cases where the security guarantees are not as effective as described in [3]. Thus, this work presents new protocols where any functionality included by an arithmetic circuit can be securely computed.

The work is supported by stating they are information-theoretically secure in the appearance of malicious adversaries assuming an honest majority. They present protocol variants for all fields (like small and large fields) and exhibit how to effectively instantiate them based on replicated secret sharing and Shamir sharing using multiparty computation protocol. The main advantage of this is it uses pseudo-randomness. The algorithms constructed for a given utility are used to determine optimal bidding policy as described in [4] for a single item and multiple items for multiple simultaneous online auctions. This paper suggests an optimization approach instead of a game theoretic approach to achieve the goal of a computationally feasible algorithm that can be used directly by bidders based on a given data. In addition, the bidding strategies that are formulated need to work in real-time along with the imposition of a few behavioral assumptions. The approach in this paper also incorporates other techniques, thereby suggesting that it works better when competing with different strategies.

The ZKP protocol's application in governmental auctions is described in [5, 6] that plays a vital role by selecting the winning bid based on the rules defined without leaking confidential information. The mechanism utilized for this purpose is the bulletproof system using a fiat-Shamir heuristic used to transform the interactive proof system into a non-interactive proof system. This system relies on Pedersen commitments to hide the secret inputs and provide computational

integrity checks. There are two implementations of bulletproof for building the prototype, i.e., calledhyrax and bulletprooflib. The bulletproof system is constructed to overcome the problem of public reverse auctions. This system is a good trade-off between the security assumption and the performance of the proof system.

The enhanced sha256 algorithm's performance is studied in [7, 8]. Nowadays, various operations are carried out digitally, i.e., e-mail, internet banking, document transfer, online shopping. Thus, the hash task in cryptography is essential as it helps to secure the data by mapping the message of varying length to a string of fixed size to generate a message hash or digest. The hash task guards function of purity and authentication. The paper also analyses the sha256 algorithm designed by choice, majority, and summing operations for its optimization. It computes 64 iterations over the block of 512- bit messages and hash values of 256-bits to interpret eight numbers of 32-bit words (a, b, c, d, e, f, g, h). The inner part is rearranged for achieving higher performance in the data dependencies.

In a traditional e-commerce environment, buyers and sellers participate in an auction where the seller publishes a price for a particular product. Depending upon the highest bid offered by a buyer, further negotiation of payment is carried out. Online auctions are the digital framework[9] in which both participants from across the world participate via the internet. However, online auctions can become vulnerable[10] if a malicious participant is unregistered on the website, i.e., the buyer tries to participate in the auction process. Thus, the purpose of this project is to authenticate bidders and sellers of auctions against unauthorized/ malicious adversaries.

3. PROPOSED SYSTEM

Online auctions are the digital framework in which both the participants, i.e., buyers and sellers worldwide, participate in online bidding. However, online auctions can become vulnerable if a malicious user intercepts the auction process. Thus, the purpose of this project is to authenticate bidders and sellers of auctions against unauthorized/malicious adversaries. This project intends to connect buyers and sellers from around the world for participation in a secure online bidding platform.

Sqlite3 database is used in this proposed system. The database storage will be controlled and maintained by the website administrator. It will include data about the list of buyers and sellers, profile information of buyers and sellers, list of categories and products. The administrator has the right to add/remove categories, products, buyers, and sellers.

- **Security features are as follows:**

i. Entity authentication – The process of ensuring buyers' and sellers' identities to enforce secure online bidding.

ii. User Anonymity – The process of protecting the identities of buyers and sellers participating in the online auction.

- **Software quality features are as follows:**

i. Availability: the data about the products must be available on the website to provide a seamless experience to the buyers.

ii. Correctness: the information regarding different products offered by sellers for auction must be correct such as the product's price.

iii. Maintainability: the information about users and products must be adequately maintained by the website administrator in a database.

iv. Usability: the website must be user-friendly and interactive for both buyers and sellers

4. SYSTEM DESIGN

The proposed system cosists of various web pages such as Home page, products page,categories page and registration page.The home page enlists the top products available for auction.The products page enlists the latest products offered by the sellers for auction. The product information such as category, no. of bids, total no. of hours available for auction can be viewed on this page. The categories page comprises the different categories. Each category encapsulates

a set of other products. The selection of a particular product in a variety will provide product information such as product description, total no. of hours available for auction, and the option to participate in the bidding process. The registration page is used to register users' information, i.e., buyers and sellers, to initiate secure online bidding.The login page is used for accessing the user account using the credentials provided by the users during the registration. When logged in as the buyer, he can participate in the online bidding and view the bids made on different products in the dashboard. When logged in as the seller, he can add new products for the auction. The information about these products can be viewed in the dashboard

6. IMPLEMENTATION AND PSEUDOCODE

6.1 Algorithm

Step 1: Service request:

The client sends a request to the server for participation in an online transaction. In an online auction, the clients, i.e., buyer and seller, send a request to the server where the buyer requests participation in the online bidding process. The seller sends a request for adding a new product into the database.

Step 2: Server signature generation:

The server's signature is generated using a sha256 hash value, including information about the buyer and seller. This information has been obtained from the registration form, and then the server will generate a token and send it to the buyer and seller. This token will be used for authentication.

Step 3: Client signature generation:

The clients, i.e., buyer and seller, receive the server token. The client signatures are generated by encrypting the seed phrase or password using sha256. This encrypted password is appended with the clients' profile information and server token to develop a new sha256 hash value. This hash value formulates the client's signature, which is sent to the server to ensure entity authentication for both buyer and seller by verifying their identities.

Step 4: Client & server signature computation:

The server receives the client's signatures. These client signatures would be used to compare with the server signature.

Step 5: Server verification of client signature:

If the server and client signatures match, a transaction id is generated, ensuring entity authentication using ZKP protocol. Therefore, the buyer can participate in the online bidding, and the seller can add a new product into the database. User Anonymity is ensured using the anonymous id, which is randomly generated using the information obtained from the buyers and sellers via the registration form. If the server and client signatures do not match, the subsequent requests of the buyer and seller would be rejected. Flowchart of the Online auction system is as shown in figure1.

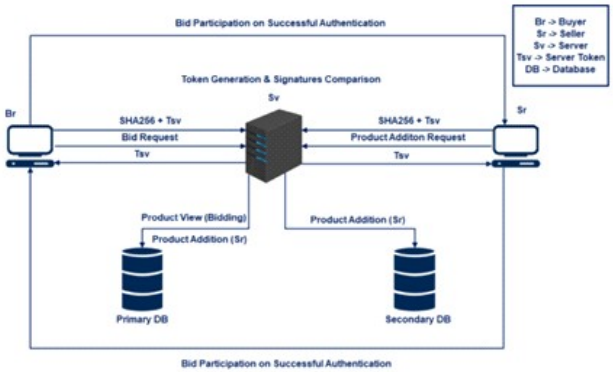

Fig 1: Flow chart of proposed online action system

A. SHA 256 algorithm:

Begin:

1. Initialise the values for hash constant values for first round.
2. Initialize array of round constants
3. Begin with the plaintext of length L bits.
4. Append a single '1' bit.
5. Append K with zero value bits, such that(L + 1 + K + 64) is multiple of 512 where k is a positive intergergraterthan 0.
6. L as a 64-bit big-endian integer, making the total post processed length a multiple of 512 bits such that the bits in the message are L 1

00..<K 0's> ..00 <L as 64 bit integer> = K* 512 total bits

End

B. Modified SCEP algorithm:

Begin:

1. customer_hash = get_customer_details() # Customer Hash Value
2. seed_value = generate_random_seed() # Any Random Number
3. final_server_value = sha(customer_hash + seed_value)
4. if(final_server_value == received_value)
5. #transaction is authentic
6. else
7. # transaction is a failure

End

7. RESULTS AND DISCUSSION

The list of different hash values is displayed under expected, and the outcome is about the anonymous id and transaction id in below Table 1. The anonymous id is used to ensure user anonymity by hiding the user's profile information. That is achieved using the modified SCEP curve. Zero-Knowledge Proof (ZKP) protocol is used to reveal the truth without specifying essential information. That is achieved using two primary factors, i.e., entity authentication and user anonymity.

Table 1: Hash values

Expected Outcome	Outcome
8e2e914344e4793fc16769763c4e9192fc991 bfecc9331f80e4aea40145278d2	8e2e914344e4793fc16769763c4e9192fc991b fecc9331f80e4aea40145278d2
240aa150573a4e2ca4a31055bbfd5afo299b9 4b2b1602ef3c656c8eda8c471af	240aa150573a4c2ca4a31055bbfd5afo299b94 b2b1602cf3c656c8eda8c471af
feb51cb614f6dc71140c76806cf42bf5162e95 b56d078a44229181824fd328c0	feb51cb614f6dc71140c76806cf42bf5162e95 b56d078a44229181824fd328c0
f259909799cb654f05da047b07352f637bf4fe 298b7COObc96556d57eb975f8d	f259909799cb654f05da047b07352f637bf4fe 298b7COObc96556d57eb975f8d
152235943ac2fec914e378803f1291e6fe0be2 e4fa6efb55358686942e582869	152235943ac2fec914e378803f1291e6fe0be2 e4fa6efb55358686942e582869

The limitation of the online auction system is trust. Since there are multiple buyers and sellers, it becomes challenging to ensure confidence because the identities of both buyers and sellers remain hidden. In a traditional online auction website, for example, eBay, the profile information of the seller is publicly displayed. In the case of this project novelty, the information of both the buyer and seller remain hidden to promote secure online bidding. Furthermore, entity authentication is used to verify both the buyer and seller's identities to ensure that both the parties involved in the bidding process are authentic.

8. CONCLUSION

The sole purpose of thisresearch project is to ensure secure bidding in an online platform. The front end is a user-friendly and interactive website that provides the users, i.e., buyers and sellers, a seamless experience. The presence of a database makes it easier to control and maintain the website administrator's data to ensure data security and availability. Zero-knowledge proof (ZKP) protocol using the SCEP curve is implemented to ensure secure online auctions. A simple certified enrollment protocol (SCEP) is a curve that follows a client-server model where multiple clients participate in online auctions based on the server authentication of these clients. SCEP curve is used to ensure entity authentication and user anonymity. The various types of testing such as unit, integration, and system testing for both positive and negative cases help determine the system's functionality. Identity verification is the future work that can be done on ZKP based online auctions. User anonymity is maintained based on the user's profile information in the form of a hash value. However, the user's profile is not verified for the details provided by the user.

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A STUDY ON THE ASPECTS OF HYPERINFLATION AND ITS IMPACT ON FINANCIAL RESULTS : A CASE STUDY OF SELECTED LISTED INDIAN PHARMACEUTICAL COMPANIES

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ABSTRACT

Basically the world's third largest industry by volume and value is the Indian Pharmaceutical sector. The study period for subprime crisis, covid -19 is from 2008 to 2017 and 2019 to 2022 respectively. With the objectives of studying the comparative analysis on the aspects of hyperinflation and its impact on financial results for both economic crisis the authors have employed ANOVA single factor and two factor without replication for the study. It is concluded that COVID crisis has been worst not only on the financial results but also on the economy. The worst impact is because of market volatilities which leads to overall reduction in the demand and production of the goods and further impact on the financial results of the company. The disastrous transmission of the covid crisis has not only led to loss of lives but also job lay off, unemployment and poverty. The impact of these 3 aspects also reflected on the decline in the Gross Domestic Product which caused hyperinflationary situation on the economy.

Key words: *Hyperinflation, Subprime Crisis , Covid-19 , Indian Pharmaceutical Industry*

1. INRODUCTION

In India pharmaceuticals and medical equipment are administered by the Central Drug Standard Control Organization which falls under Ministry of Health and Family Welfare.

To be more precise the Indian pharmaceutical sector ranks 3rdand 14th in terms of volume and value among all Indian industries. As per the estimates of Indian Economic Survey India's domestic pharmaceutical business is expected to grow to 65 billion US $ by 2024 and 120-130 billion US $ by 2030. It is predicted to increase at a annual growth rate of 12% in fiscal year 2022. In terms of employment, it has helped 29 million individuals find job. This is due to its international standard quality and low cost. To continue with meaning of the term hyperinflation. Basically, it is defined as a rapid increase in the price of products that leads the value

of local currency to devalue. The local currency will be affected when prices are quoted in a stable foreign currency and consumers value monetary amounts. Lack of funds and purchasing power, spurs inflation and more borrowing costs are some of the hurdles that are an obstacle to the pharmaceutical industry's growth.

Let us talk about the subprime crisis that took place in the year 2008. It had hit India by stopping capital inflows and causing a drop in both external and local demand. Despite the terrible monsoon weather economy grew at a slower pace from 9.0% to 6.7% in 2008-09 and was further projected to about 5.0% in the year 2009-10. Consumer demand and consumption declined lead to fall in output and unemployment to rise. It quickly spread to many other European and Asian countries, including India. For instance the covid crisis has not only been disruptive in terms of economic activity but also lead to loss of human lives. Almost all the sectors were affected because of the sharp decline in domestic demand and exports.

2. LITERATURE REVIEW

Dr Sharath AM (2021) [1] Impact of Covid-19 on the Indian Economy. The author studies the impact of covid-19 on Indian economy. The secondary data is used from the different sources like various periodicals, articles, reports, books, journals, literatures on the subject. As the author aims to collect updated information e-sources have been used for the study. The researcher has conducted study on eateries services, food, and agriculture, MSME and online business. At the end conclusion is drawn by mentioning the nation is facing an additional customary testing time in this money related year.

Oday Tamimi and Udik Orban (2020)[2] Hyperinflation and its financial implications. The authors wish to investigate the impact of hyperinflation, which is prevalent in wealthy countries, on financial performance. The effects of hyperinflation on financial results of multinational corporations (MNCs) operating in Venezuela is currently the first among the hyperinflation-affected economies is highlighted for the study. The finding of this paper is that hyperinflation causes financial results to be released in a misleading manner making decisions unclear. As a result, hyperinflation-affected economies should prioritize on finding a solution to the problem.

Sachs (2020)[3] Macro fiscal considerations in response to COVID 19 crisis. The author conveys about lockdown restrictions which caused weak circular flow of income. As the household tends to decrease the economy in an uncertain situation will lead to down fall in the demand and affecting the company's revenue. The other impact lead to unmatched capital outflow from emerging markets. This is also linked with the depreciation of domestic exchange rates that affects increase in prices of imported goods. The author concludes that in the long run economy fails to increase in aggregate demand but also tries to suggest ways that hikes demand. Here the importance of fiscal and monetary policy is also pointed out that leads to shift in the aggregate demand curve pre crisis.

Boissay and Rungcharoenkitkul (2020)[4] Macroeconomic effects of Covid 19: An early interview. The previous study identified reasons that lead to increase in economic costs. Some of the different channels are loss of labor productivity that leads to death and illness. Increase in economic costs leads to weak consumer sentiments high exposure to the service sector, impact of social distancing and potential financial expansion. All the channels that lead to increase in the economic costs is relevant even now for the disastrous COVID-19.

A Irawan, H Alamsyah (2020) [5] The covid 19's Economic crisis and its solutions: A literature review. The study focuses on the three questions. Firstly, it is about the dissemination from a pandemic to an economic crisis. The policies that help to improve the covid crisis. Lastly about the non-economic factors that must be considered in achieving macroeconomic targets. The author suggested that the measures for constraint of the virus spread, and the execution of fiscal and

monetary stimulus should not only coordinate internationally among countries but also territories.

Correia (2020)[6] Pandemics depress the economy public health interventions: Public health interventions do not: Evidence from the 1918. The author studied about the containment measures that were of relatively high medium-term growth. The study showed that the decline in the economic costs that was due to loss of lives. Different studies had also estimated the tentative cost of 1918 influenza pandemic in the modern era. For example about 5% of global GDP the less severe pandemics have shown milder economic costs. The economic effects of bird flu and ebola epidemics is relatively less and H1N1 pandemic came to 0.1% of GDP.

C. Giannitsarou, A Scott and E Leeper (2006)[7] Inflation Implications of Rising Government Debt. The writers focus on to answer questions concerning current fiscal policy its long-term viability, and the consequences of rising budget deficits due to inflation. Using this technique, the authors show that debt sustainability necessitates a balance between the market value of government debt, the stock of narrow money, and government revenue and spending levels. The authors also demonstrate how to quantify this link, construct a measure of sustainability for six OECD countries, and use our findings to characterize the fiscal adjustment patterns of the six countries. The authors have shown how deviations from the equilibrium relationship between debt, money, and the primary deficit must be handled. Using the vector autoregression (VAR) method, the authors examine the relative contribution of each channel to fund fiscal activity. The authors learn that there are minimal statistical interactions between fiscal imbalances and inflation which means that widely anticipated increases in fiscal deficits due to demographic factors are not always certain.

Arnold R (2006)[8] A potential influenza pandemic: Possible macroeconomic implications and policy issues. The author mentions that due to covid the workers confined over the social interactions causing decrease in labor supply and consumption. The similar study has also been executed related with SARS to study the demand side. The study infers that the COVID effects were disastrous in industries whose products required collected customers. It was also found that the overall demand side effect declined GDP by 2%.

3. OBJECTIVES

1. To study the comparative impact of subprime crisis on the financial results.
2. To study the comparative impact of covid crisis on the financial results.

4. HYPOTHESIS

H_0 : To reject that subprime crisis has not impacted on the financial results

Ha: To accept that subprime crisis has impacted on the financial results.

$H_{0:}$ To reject that covid crisis has not impacted on the financial results

Ha: To accept that covid crisis has impacted on the financial results

5. RESEARCH METHODOLOGY

The study executed is empirical in nature. The five selected listed Indian Pharmaceutical companies have been selected based on net profit. The selected sample companies are

1. Aurobindo Pharma
2. Cipla
3. Dr Reddy's Laboratories
4. Sun Pharmaceuticals
5. Divis Laboratories

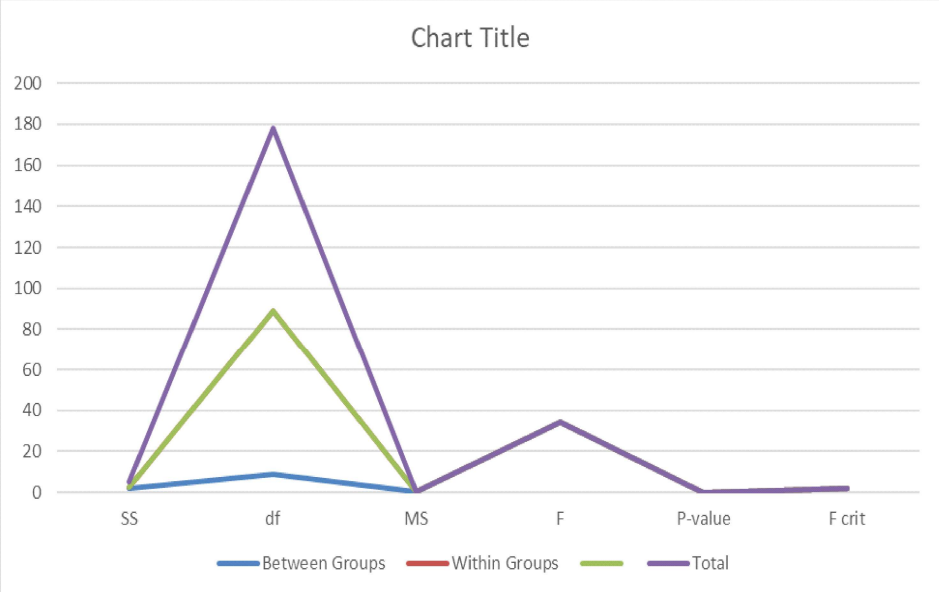
The study period of subprime crisis is from 2008-09 to 2016-17. The covid crisis is investigated from 2019-20 to 2021-22. The secondary data for net profit and total assets is collected from the annual reports of the sample companies website. ANOVA single factor and double factor without replication have been employed for the study.

7. Data Analysis and Interpretation

Table 1 : Computation of Anova Single factor for subprime crisis on the financial results

SUMMARY				
Groups	*Count*	*Sum*	*Average*	*Variance*
Net Profit	9	1.8453	0.205033	0.006785
Total Assets	9	0.0118	0.001311	1.96E-07
Net Profit	9	2.6041	0.289344	0.004767
Total Assets	9	0.0457	0.005078	3.21E-05
Net Profit	9	3.9263	0.436256	0.028918
Total Assets	9	0.0255	0.002833	4.94E-06
Net Profit	9	2.6423	0.293589	0.012326
Total Assets	9	1.5832	0.175911	0.004336
Net Profit	9	2.3514	0.261267	0.007381
Total Assets	9	0.0339	0.003767	4.66E-06

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.990522	9	0.221169	34.26075	6.89E-24	1.999115
Within Groups	0.516437	80	0.006455			
Total	2.506959	89				

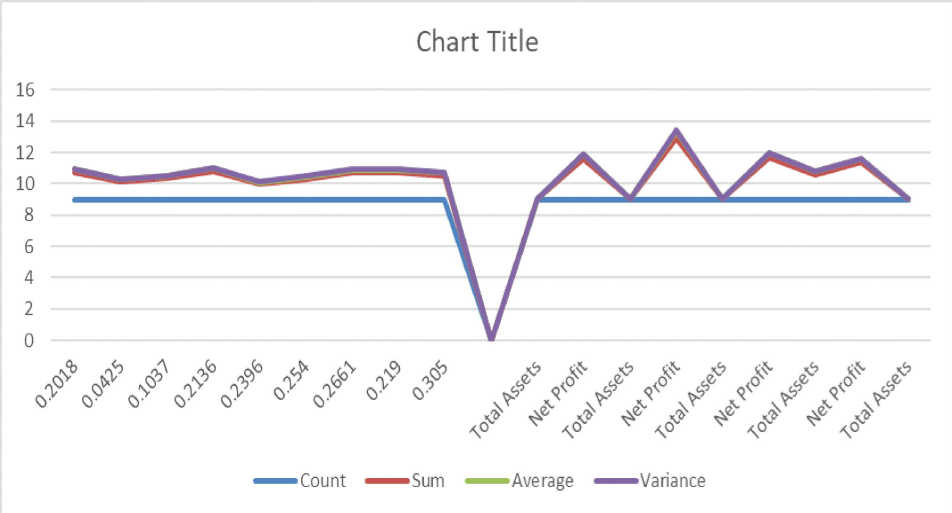


Source: Graph prepared is based on the values of ANOVA single factor

Table : 2 Computation of ANOVA: Two factor without replication for subprime cris on the financial results

Anova: Two-Factor Without Replication				
SUMMARY	*Count*	*Sum*	*Average*	*Variance*
0.2018	9	1.7412	0.193466667	0.040621915
0.0425	9	1.1326	0.125844444	0.015643408
0.1037	9	1.3488	0.149866667	0.033735833
0.2136	9	1.7793	0.1977	0.068101468
0.2396	9	0.9841	0.109344444	0.013081665
0.254	9	1.3129	0.145877778	0.021457762
0.2661	9	1.7051	0.189455556	0.034707343
0.219	9	1.7032	0.189244444	0.036629973
0.305	9	1.517	0.168555556	0.031528068
Total Assets	9	0.0118	0.001311111	1.96111E-07
Net Profit	9	2.6041	0.289344444	0.004766688
Total Assets	9	0.0457	0.005077778	3.20769E-05
Net Profit	9	3.9263	0.436255556	0.02891791
Total Assets	9	0.0255	0.002833333	0.000004935
Net Profit	9	2.6423	0.293588889	0.012326444
Total Assets	9	1.5832	0.175911111	0.004335691
Net Profit	9	2.3514	0.261266667	0.00738113
Total Assets	9	0.0339	0.003766667	0.00000466

Source: Values of ANOVA single and two factor is derived from the financial statements of the selected sample companies from the year 2008-09 to 2016-17



Source: Graph prepared is based on the values of ANOVA double factor.

The ANOVA single factor and two factor values of subprime crisis is computed based on net profit and total asset ratios of the selected sample companies. The period of the study is taken from 2008-09 to 2016-17 to examine the impact of the subprime crisis on financial results. It's crucial to think about inflation-affected aspects while evaluating the financial results from the financial statements. So, the impact of inflation must be taken into account by using general price indexes. This will assist professionals in inferring critical analysis based not just on historical costs but also on present inflated costs.

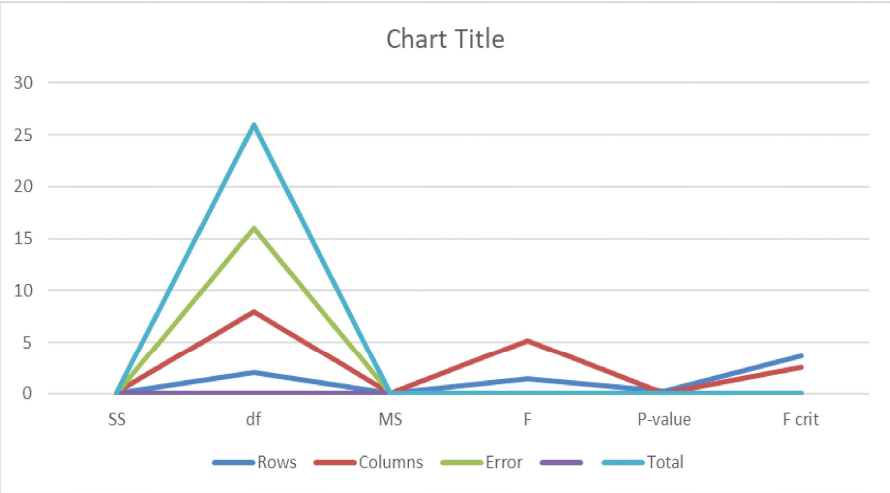
Table 3 : Computation of ANOVA single factor for covid crisis on the financial results

SUMMARY						
Groups	Count	Sum	Average	Variance		
Net Profit	3	0.527	0.17566667	0.005370333		
Total Assets	3	0.318	0.106	0.001404		
Net Profit	3	0.512	0.17066667	0.000577333		
Total Assets	3	0.307	0.10233333	0.000214333		
Net Profit	3	0.635	0.21166667	0.000310333		
Total Assets	3	0.342	0.114	0.001953		
Net Profit	3	0.776	0.25866667	0.021506333		
Total Assets	3	0.17	0.05666667	0.000105333		
Net Profit	3	0.739	0.24633333	0.000550333		
Total Assets	3	0.563	0.18766667	0.000720333		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.11979	9	0.01330996	4.068872245	0.004301	2.392814
Within Groups	0.065423	20	0.00327117			
Total	0.185213	29				

Source: Values of ANOVA single and two factor is derived from the financial statements of the selected sample companies from the year 2019-20 to 2021-22

Table 4 : Computation of ANOVA : Two factor without replication for covid crisis on the financial results

Anova: Two-Factor Without Replication						
SUMMARY	*Count*	*Sum*	*Average*	*Variance*		
0.188	9	1.328	0.1475556	0.00581228		
0.097	9	1.675	0.1861111	0.01096661		
0.242	9	1.359	0.151	0.00393875		
Total Assets	3	0.318	0.106	0.001404		
Net Profit	3	0.512	0.1706667	0.00057733		
Total Assets	3	0.307	0.1023333	0.00021433		
Net Profit	3	0.635	0.2116667	0.00031033		
Total Assets	3	0.342	0.114	0.001953		
Net Profit	3	0.776	0.2586667	0.02150633		
Total Assets	3	0.17	0.0566667	0.00010533		
Net Profit	3	0.739	0.2463333	0.00055033		
Total Assets	3	0.563	0.1876667	0.00072033		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.00819	2	0.0040968	1.40997414	0.27291	3.63372
Columns	0.11925	8	0.0149065	5.13031964	0.00269	2.5911
Error	0.04649	16	0.0029056			
Total	0.17393	26				



Source: Graph prepared is based on the values of ANOVA two factor without replication

Based on the table of computed ANOVA single and two factor values without replication it can be interpretated that COVID crisis has been worst not only on the financial results but also on the economy. The worst impact of covid crisis is inferred due to economic uncertainty which causes a significant impact on the financial results of the company. The disastrous transmission of the covid crisis has not only lead to loss of lives but also job lay off, unemployment and poverty. The impact of these 3 aspects was also reflected on the decline in the Gross Domestic Product which caused hyperinflationary situation on the economy.

6. LIMITATIONS

1. The study is confined to the secondary data collected from the annual reports of the selected sample companies
2. The study is limited to five selected sample companies of Indian Pharmaceutical Industry
3. The study does not incorporate primary data.

7. CONCLUSION

The values of ANOVA single factor and two factor without replication are derived based on the annual reports of sample companies. The subprime crisis, covid crisis is studied from the year 2008-17 and 2019-22 respectively. Based on the executed research study it is accepted and proved that COVID crisis has worst affected not only the financial results of the company but also the economy. This is inferred due to not only lead to loss of lives but also job lay off, unemployment and poverty. The impact of these 3 aspects has been also reflected on the decline in the Gross Domestic Product which caused hyperinflationary situation on the economy.

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NOVEL DESIGN OF CROSS-SHAPED RECTANGULAR SLOTTED MICROSTRIP ANTENNA FOR SUB-6GHZ 5G APPLICATIONS

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ABSTRACT

The design of a Microstrip slotted antenna for 5G applications is discussed in this paper. The antenna design brought forth is a cross-shaped rectangular slot on the patch. The fabrication of the antenna is done using FR4 substrate of width 8mm and depth 30mm and fed by a line feed of length 9mm and width 3mm. The parameters relative permittivity of the substrate, relative permeability, and dielectric loss tangent are 2.2, 1, and 0.02 respectively. The operative frequencies of the designed cross-shaped microstrip antenna are 3.66GHz, 4.80Ghz, and 7.44GHz with good radiation pattern, and the simulation is done using HFSS (High-Frequency Simulation Software) software. The antenna results in broader bandwidth (i.e.) 0.25GHZ or 250MHz and the maximum gain obtained is 4dB. The design, fabrication measurements, and simulation process are presented.

Keywords: *5G communications, 5G applications, mm-wave, microstrip antenna*

1. INTRODUCTION

In telecommunication, 5G is the fifth-generation network for cellular systems. 5G is said to be faster than 4G networks as it has a good speed, capacity, connectivity, and low latency. 5G frequency bands are categorized into sub-6GHz and mm-wave frequency. An antenna is one of the major components that is used to improve the performance of mobile devices. The antenna not only functions as a standalone device but also provides interaction with the rest of the mobile components. A good antenna design can be obtained by having an efficient flow in simulation and analysis. Mobile devices are becoming smaller

and thinner day by day which requires much smaller components it. So, the antenna should be minimized to fit these small devices. In 5G technology, a microstrip antenna is used which is an electrically small antenna with half wavelength, smaller footprint, and wider bandwidth. It has a low profile and good performance characteristics because of its small size. It is more suitable for the applications like cell phones and RF (Radio Frequency) devices. Thus, the Microstrip antenna is more suitable for integrating with 5G systems than any other antenna type.

Researchers around the world have designed, fabricated and simulated PIFA (Planar Inverted-F Antenna) antennas for 5G applications. In [1], a dual-band PIFA antenna is designed for 5G devices. It covers frequency bands of 28GHZ and 38GHz. The design is fabricated on an ISOLA FR406 substrate and simulated using HFSS software. A gain of 3.75dBi and 5.06dBi is obtained in the proposed paper. In [2], a PIFA array with MIMO (Multi Input Multi Output) configuration is designed. It is a 4 element MIMO system with 8 PIFA antennas per system. The obtained gain is 12dBi for 28GHz. In [7], the design proposed by the author is a microstrip patch antenna with a frequency range of 28GHz to 50GHz. The gain is 2.6dBi. In [8], a microstrip patch antenna is designed with a T-slot for Wi-Fi networks. 60GHz frequency is covered with a high gain of 6.34dB. In [13], a fractal antenna with multiband is presented by the researcher which is fabricated on an FR4 substrate. HFSS software is used for simulation. In [14], a Fractal antenna is designed in a star shape from17.22GHz to 180GHz on a Rogers RT5880 substrate. The mentioned papers are proposed to meet the requirements of 5G applications.

In our proposed paper, a cross-shaped rectangular slot microstrip antenna has been designed for 5G applications at sub 6GHz and more. The designed antenna covers frequencies of 3.66GHz, 4.8GHz, and 4.91GHz with a broader bandwidth of 0.25GHz or 250MHz. The antenna is printed on an FR4 substrate and fabricated at a low cost. The simulation is done using HFSS software. The design process is discussed in the next section.

2. DESIGN

The aerial view of the antenna is shown in fig (1). The proposed cross-shaped rectangular slot microstrip antenna is fabricated on an FR4 substrate. The relative permittivity and permeability of the substrate are 2.2 and 1 respectively. The dielectric loss tangent of the designed antenna is 0.02.

One of the major limiting factors in the design of a microstrip antenna is the ground plane's size that is if the ground plane is increased in size, then there will be a reduction in the gain of the microstrip antenna which is undesirable. The increase in the size of the ground plane will not only reduce the gain but also lowers the resonance frequency, but here the reduction of frequency is negligible. Resonance frequency, bandwidth, and gain of the microstrip antenna mainly depend on the length and width of the substrate, thereby increasing the height of the ground plane these factors can be improved. In order to meet the required efficiency of the desired 5G application, it is essential to have an accurate measurement of the ground plane.

The positioning of the antenna on the substrate is important as it determines the performance of the microstrip antenna where even a small change in position may decrease the performance drastically. Thus, proper designing is required before placing the microstrip antenna on the selected FR4 substrate.

The impedance matching can be achieved by moving the feed pin towards or away from the short pin. If the feed pin is moved towards the short pin, the impedance decreases, and if it is moved away from the short pin, the impedance increases. The transmission line calculations are done for 3.6GHz.

In the proposed paper, we have designed a cross-shaped rectangular slotted microstrip antenna for 5G applications that are designed to work at sub 6GHz frequency and more. Microstrip patch antenna consists of a ground plane, substrate (dielectric material), and a metal plate (microstrip patch). A metal microstrip radiation patch will be mounted on a substrate that is a dielectric material with a ground plate on the other side. A patch

antenna which is mounted on a dielectric material is given a feed through the microstrip transmission line. When we are using lumped components, we are going to get a wide-band response, whereas in the microstrip patch we will be getting a narrow band response. For RF and microwave, we need narrow band response only. A dielectric material called a FR4is used as a substrate in this proposed design, whose width and length are considered to be 3mm and 9mm respectively. The substrate is placed on the ground plane which is required in the design to support the antenna mechanically and it must be made up of dielectric material to improve the performance of the circuit and transmission line. FR4 material used in designing the substrate for the proposed antenna is well suitable for broadband applications. The ground plane over which the substrate is placed is '36mm in width and 26.6mm in length.

A rectangular sheet called patch is built upon the ground plane where the width and depth of the patch are calculated before mounting it on the material and the calculated width of the patch is 26.5mm and length is 17mm. A cross-shaped rectangular slot is printed on the patch where the length and width of the first rectangular slot are 2mm and 8mm respectively and the length and width of the second rectangular slot are 8mm and 2mm respectively and a stub is used to connect the ground and patch. The feed used in the proposed design is the line feed which is a transmission line that connects the antenna with the transmitter and transmits the RF current from the transmitter to the antenna. The microstrip antenna which is mounted on an insulating material is being fed by a microstrip transmission line. The dielectric material is held up by the ground plane. The impedance matching can be achieved in two ways. One is by shifting the position of the microstrip line. By moving the transmission line, impedance matching is done. The second one is by having inset feeding. In insert feeding, we insert lines inside the patch antenna. By using insert feed line techniques, we can have impedance matching between the patch antenna and microstrip transmission line (feed line). Since we are inserting, the substrate raises the surface and spurious feed emission.

The advantages of the line feeding method are simple to manufacture, easy to match (impedance matching), easy to create a replica. It has a disadvantage of shallow bandwidth (less than 2%). Since we are shifting the feed line for impedance matching, the axis point changes and it becomes asymmetric. Because of this cross-polarization occurs.

After the completion of the design with the accurate measurements, the simulation can be done where HFSS software is used here for the simulation purpose. The parameters along with the measurements are mentioned in tabulation [1].

Table 1 : Parameters alongwith Measurements

PARAMETERS	WIDTH	LENGTH	HEIGHT
Ground plane	36mm	26.6mm	
Feed	3mm	9mm	5.513m m
Slot1 and slot2	(2mm and 8mm),	(8mm and 2mm)	
Patch	26.5m m	17mm	
Substrate	45mm	35mm	
Stub	2mm	5mm	4mm

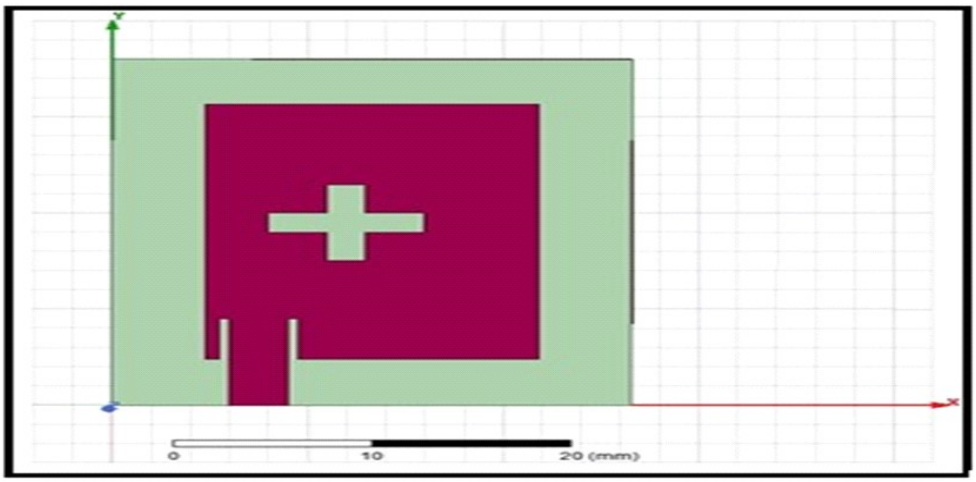

Fig.1 : Top view of the design

3. RESULT AND DISCUSSION

The complete results of the proposed antenna's simulation and the calculated measurements are discussed in this section. The simulated frequency response was presented with respect to the performance characteristics like VSWR (Voltage Standing Wave Ratio), bandwidth, return loss, gain, and reflection coefficient of the microstrip antenna for 5G using different ground planes techniques. From the obtained 3D pattern, it is clear that the antenna radiates more in the forward direction and low in the backward direction. The design results with a good performance, high gain, broader bandwidth, and clear radiation pattern, and the simulation of the design is carried out using HFSS software. The return loss of the antenna is the S_{11} parameter which is mentioned in fig [2] and the base value of the return loss is considered to be -10dB. The simulation results at 3.6GHz, 4.8Ghz, and 7.44GHz, and these frequencies are suitable for 5G applications which provide a maximum gain of 2.5dB and the 3d diagram of the gain is shown in fig [3]. The obtained return loss at 3.6GHz is -14.36dB, at 4.8Ghz is -16.6dB and at 7.44Ghz is -24.53dB and the resulting bandwidth is 0.25GHz or 250MHz. The VSWR of the obtained frequencies are 1.4731, 1.3465, and 1.1261 respectively which is shown in fig [4].

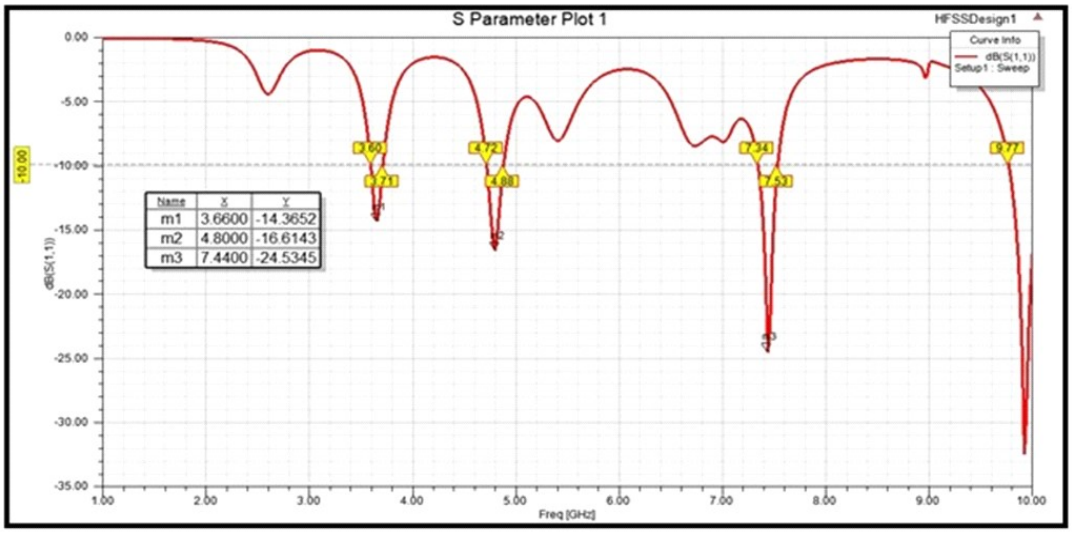

Fig.2 : S_{11} parameter

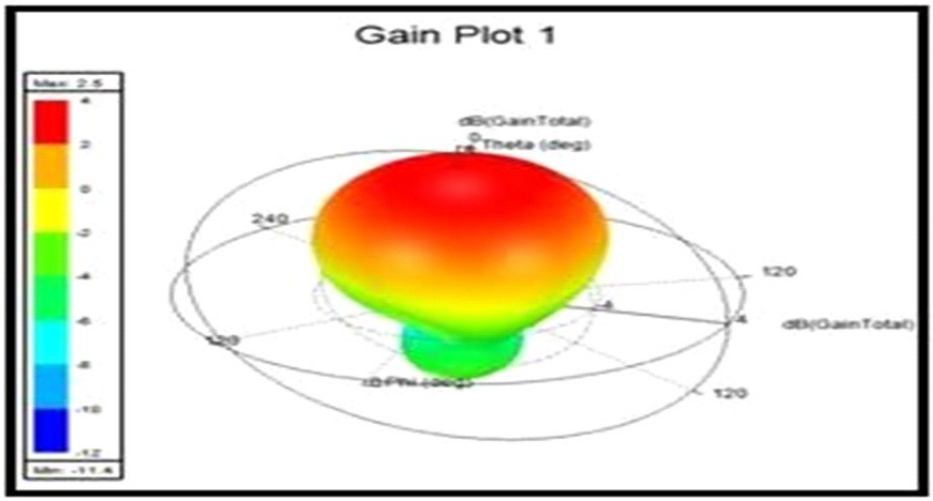

Fig.3 : Gain

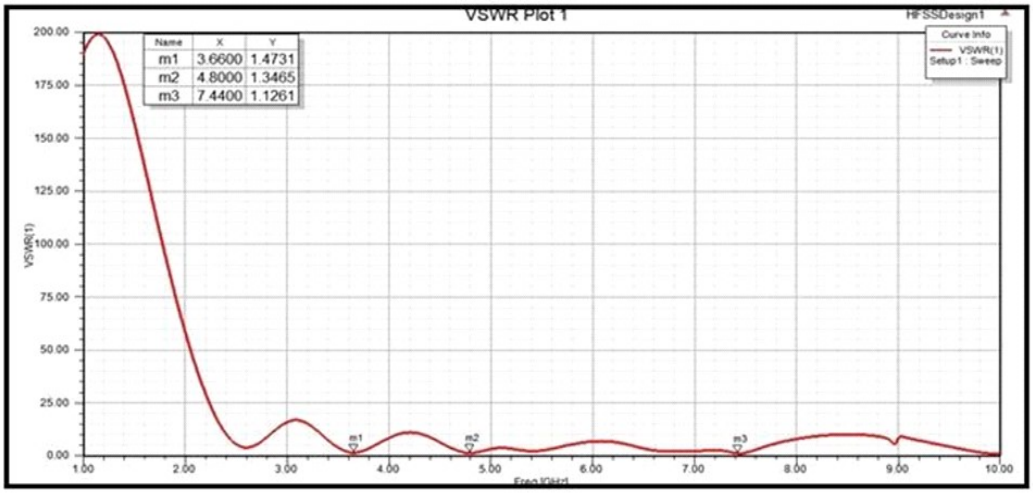

Fig.4 : VSWR measurement

4. CONCLUSION

A cross-shaped rectangular slotted microstrip antenna has been designed at sub 6GHz and more. The proposed antenna design is used for 5G applications and the covered frequency bands are 3.66GHz, 4.8GHz, and 7.44GHz. Accurate measurements are made to obtain a compact antenna. The designed antenna results with broader bandwidth and good radiation pattern and the performance is analysed using S-parameter and hence a good gain of 4dB is obtained.

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SCREENING OF LUNG CANCER CHEMOPREVENTION : CLINICAL TRIAL BASED SIGNAL TRANSDUCTION PATHWAYS AND EMERGING TREATMENT STRATEGIES WITH SPECIAL FOCUS ON NCOVID19 DISEASE

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ABSTRACT

Lung cancer is the highest problems related to health associated with uncontrolled development of cells inside the body. The use of standard treatment has become limited due to toxicity, poor bioavailability, cell specificity and poor therapeutic outcome. Recently, research has been focused on bioactive materials for the lung cancer treatment and focused on clinical trial-based work. To summarize the screening of lung cancer chemoprevention with clinical trial-based signal transduction pathways with special reference to nCOVID19 disease was the main purpose of the study. Extensive studies showed that chemoprevention and novel therapeutically approaches may inhibit the lung cancer through signal transduction target pathways via reduction of free radicals, oxidative stress but for some advanced stages unwanted adverse effects were found. The significance of this study was elucidating the research gap of the biology of lung cancer and also summarize the emerging aspects of lung cancer treatment which involved nCOVID19 disease complications arises to the lung cancer patients which also utilized for future research design and development.

Keywords: *Lung Cancer, nCOVID19 disease, Chemoprevention*

1. INTRODUCTION

Lung cancer, the highest healthcare problem at men and women in global scenario based on epidemiological studies. Abnormal growth of cells in lungs are termed as lung cancer and this disease starts from lungs and may spread to brain, lymph nodes and vice versa cancer may develop from other organs to lungs. The common cause of lung cancer include tobacco smoking (carcinogens), *cannabis sativa* and other factors are excessive radiation exposure such as chest radiotherapy or industrial hazards; industrial exposures such as asbestos, radon, arsenic, methyl ether, chromium, nickel, cadmium; ionizing radiation and rubber production; lung diseases and poor diet etc. [1] Electronic nicotine delivery systems (battery

operated heating coil electronic device) may also responsible for lung cancer which also act as a nicotine containing aerosol vapour. Genetic factors and chromosome regions 5p15, 3q28, 15q25-26 and 6q21 are also enhance the risk factor of lung cancer. Non-smoker's lung cancer caused by adenocarcinoma, EGFR mutation and ELM4-ALK fusion protein. Non-small cell lung carcinoma (NSCLC) and small cell lung carcinoma (SCLC) are two important groups of lung cancer which showed Table 1. [2, 3]

The common sign and symptoms include weight loss, fatigue, chest pain at initial stage and advance stage includes bronchitis or repeated pneumonia, coughing up blood, breath shortness, wheezing or hoarseness, a persistent cough that gets worse over time. The suggested common treatments are surgery, radiotherapy, chemotherapy, systemic therapies, radiofrequency/ microwave ablation, computed tomography etc.[4-7] Chemoprevention based treatment strategies includes natural products like pterostilbene, β-escin, cucurbitacin B, diosein, alantolactone, curcumin, honokiol, emodin, piperine, custonolide, plumbagin, TXA9, picropodophyllin, epigallocatechin-3-gallate (EGCG) etc. [8]The complication arises between the nCOVID19 disease and lung cancer disease due to their same sign and symptoms at preliminary stage. Enhancement of immunosuppression of some patients of lung cancer may also higher risks of nCOVID19 disease than the general hospitalized patients. It is also concluded that when patients of lung cancer infected with nCOVID19 disease, worst situation occurred than the lung cancer patients. [9] Nano based liposomal approach has been used to treat lung cancer disease which is known as oldest method and some associated problem includes low loading capacity of the drug, sterilization and stability. Now a days, novel compounds quinazoline, taxane, cytidine analog, benzodiazepine, nitrobenzamide etc. for NSCLC and piperidine, piperazine, picoplatin, arsenic trioxide etc. for SCLC are used. [10]

Table 1 : Types, subtypes, damaged area and stages of Lung cancer disease

Types	Subtypes	Damaged Area	Stages
Non-small cell lung cancer (80%-85%)	a) Adenocarcinoma (40%) b) Squamous cell carcinoma (25%-30%) a) Large cell carcinoma (10%-15%)	a) Outer parts of the lungs b) Grows from the cells that line the inside of the airways/develops at lungs c) Grows any part of the lungs	Stage 1: Development of tumor (single lung) and not scattered any other areas. Stage 2: Size greater 3 cm, spread the lymph nodes Stage 3: Size greater 7 cm, spread to the lymph nodes Stage 4: Spread to the other lung and lymph nodes
Small cell lung cancer (15%)	No subtypes	a)Chest one side and lung single area, lymph nodes or both b) Opposite side of the chest/outside the chest	a) Limited stage b) Extensive stage

2. SIGNAL TRANSDUCTION PATHWAYS OF THE LUNG CANCER WITH CLINICAL TRIAL ASPECTS

Genetic mutations via formation of DNA adduction mainly caused by polycyclic aromatic hydrocarbon (PAH) and nitroso-aminoketone derived by nicotine. Enhancement of oxidative stress occurred by tobacco carcinogenesis. Lung cancer risks increased by some polymorphisms at GSTM1 homozygous and cytochrome P4501A1 gene deletion. At the stage of nicotine addiction and high risk cancer patients, polymorphism nicotinic receptor was found. Lung cancer also associated with DNA repair gene (polymorphism). In chronic obstructive pulmonary disease (COPD), the cholinergic signalling act as a pro-inflammation which also established the pathways between COPD and lung cancer. DNA adduct formation pathways initiated by P450 chromosomes via glutathione-S-transferases (GST) and gene belongs to CYP family whereas adducts repaired by ERCC1 and XRCC. [11]Oncogene addiction (mutated oncogene proteins) caused by an abnormal functions of tumor cells which also termed as overexpressed oncogene (malignant phenotype) caused by proliferation and temporarily distraction from apoptosis.

This influenced termed as pharmacogenic signalling pathways. PI3K pathways including PIK3CA mutations, anaplastic lymphoma kinase fusion proteins (ALK), epidermal growth factor receptor signalling pathways (EGFR), the serine/ threonine kinase 11 gene, death receptor deregulation, immortalization of cell and telomerase activation, epigenetic modification (histone code, DNA methylation, miRNA, mitochondrial mutations), proto-oncogene, VEGF neutralizes bevacizumab known as monoclonal antibody, immune responses (expressing FAS ligand), stem cells, genetic factors also influenced the lung cancer signalling pathways.[12, 13] For FAP, PDGFβR, α-SMA fibroblast markers are used for clinical cross-sectional study of NSCLC. [14]The molecular targets of lung cancer signalling pathways (clinical trial based) mainly divided into three categories i.e. receptor tyrosine kinases, emerging targets and mediators. In receptor tyrosine kinases (RTK), fortargets EGFR/EGFRvIII, Her2 the abnormality is overexpressed in NSCLC specimens and for EGFR/EGFRvIII the agents used eefitinib, erlotinib. The other RTK targets are VEGF which also overexpressed in NSCLC and SCLC specimens. The GPCR target abnormality include autocrine loop in SCLC cells (Bombesin/GRP) and the agents are BsMol (Anti GRPR antibody for preclinical stage), small molecules/peptide inhibitors (GRPR antagonists for preclinical stage). Now, emerging targets includes nAChR, Ras, PI3K, Akt. The target of nAChR activation through components of tobacco, the agents used mecamylamine, bungarotoxin (both are nAChR antagonist for proposed stage).The mechanism involves HRas ASO for preclinical stage, R115777/Zarnestra agent used for FTI mechanism.The agents used are Wortmannin, LY294002 (both are PI3K inhibitor for preclinical stage). Perifosine agent used for AKT inhibitor mechanism at Phase I and phosphatidylinositol ether lipids agent used for AKT inhibitors mechanism at preclinical stage). The mediator target includes mTOR, PKC, Raf, MEK. mTOR target activated in SCLC specimens, NSCLC cells, agent used CCI-779/RAD001. NSCLC cells andthe agents involved LY90003/ISIS 3521, mechanism involved PKCαASO for Phase III NSCLC. [15]

3. SCREENING OF THE LUNG CANCER IN CHEMOPREVENTION ERA

Chemoprevention may be the process of inhibition or suppression of carcinogenesis with dietary pharmacological active agents (interventions) which may be natural or synthetic compound. Clove, fennel, cinnamon, cardamom, black tea, black pepper, black cumin, capsaicin, turmeric etc. have chemopreventive activity against lung cancer due to their chemical constituents and pharmacological effects. Evidence suggests that fruits and vegetables intake minimize lung cancer risks through inhibition of free radicals, ROS, mitochondrial toxicity and oxidative stress. [16] Screening of biomarkers may be helpful for high-risk patients. [17, 18] Potential targets for lung cancer chemoprevention includes EGFR (tyrosine

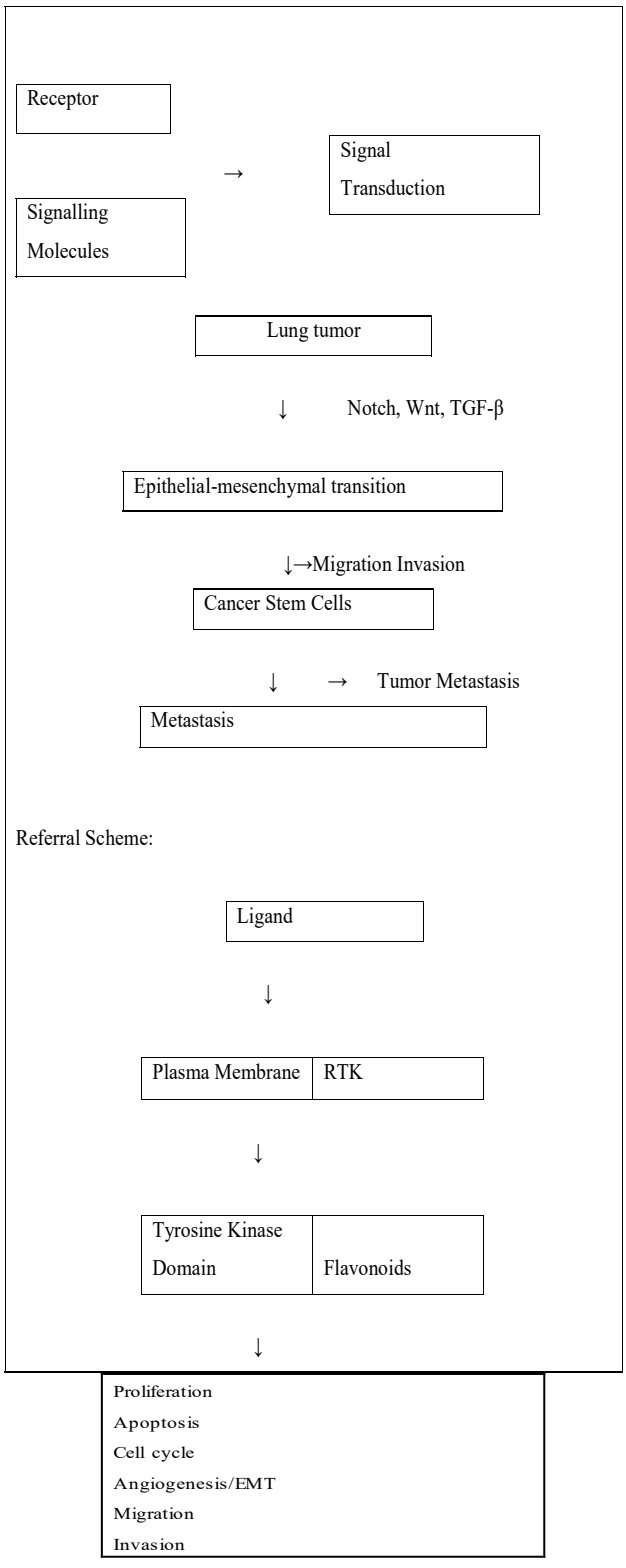

Fig.1 : Schematic Pathways overview of Signal Transduction with Lung Cancer disease

kinase inhibitors), akt/mTOR, PPARγ, protein kinase C inhibitors, isothiocyanates, farnesyltransferase inhibitors, cyclooxygenase, prostacyclin, histone deacetylase, 5-,12-lipooxygenase, epidermal growth factor receptor. The data also suggested that the patients have above twenty years smoking history with a lung cancer history, β carotene supplement not recommended whereas the patients of lung cancer history; retinoids, isotretinion, vitamin E, inhaled steroids are strictly prohibited. The patients with the NSCLC history, selenium may not be given whereas patients with lung cancer history; cyclooxygenase-2-inhibitors, prostacyclin analogs, anethole dithiolethione may not be given. In individual with lung cancer risks; extraction of tea, metformin or pioglitazone or myoinositol may not be given.[19, 20]Pioglitazone may not be improved endobronchial histology.[21] Corticosteriod is used to treatment of asthma and the chemopreventive compound is budesonide which also responsible for inhibition of progression of lung cancer induced by carcinogenesis in the mouse model. In human double blind randomised trial also initiated of inhaled budesonide on peripheral lung nodules and it's detected by LDCT screening. NSAIDs and aspirin may have anti-inflammatory role against lung cancer through COX inhibition which also established NSAIDs are COX independent but the mechanism of aspirin reduces lung cancer risks still not clear. However, screening of chemoprevention trials of microRNA markers in aspirin showed 80% accuracy with early stage of NSCLC patients. [22]

4. NOVEL APPROACHES AND EMERGING STRATEGIES OF THE LUNG CANCER TREATMENT

EGFR mutations therapy includes afatinib, dacomitinib, erlotinib; NTRK rearrangement therapy includes entrictinib, larotrectinib, LOXO-01; BRAF mutations targeted therapy includes vemurafinib, dabrafenib/trametinib; PDLI expression levels targeted therapy includes immune checkpoint inhibitors. The emerging biomarkers also associated with investigational targeted therapies [23,24]. This may be the promising segregation

method of malignant nodules. [25] In Germany, the CRISP registry is used for random data collection, results and interpretations for biomarker screening. [26] KRAS inhibitors showed promising results with advanced NSCLC patients (KRAS mutation and G12C mutation) and CRISP registry was used for this purpose. [27] It may be stated that pembrolizumab with chemotherapy provided prominent result for OS, PFS and PFS than other combinations. [28] In Asia, phase III trial showed that dacomitinib played prominent role compared by gefitinib.[29] It may be stated that the metastatic non-squamous NSCLC may be treated as pemetrexed/pembrolizumab/platinum or pemetrexed plus platinum with pembrolizumab may have lower toxicity for long duration treatment and the results indicates the clinically safe uses of the KEYNOTE-189 regimen. [30] KRAS-mutant based NSCLC disease, the data recommended that the immunotherapy may be the potential therapeutically strategies with the other co-mutations presence. [31]

The survey showed that the time-based psychological behaviour of an abnormal lung cancer CT scan screening patient. No relationship was found between diagnostic groups and psychological considerations whereas statistically four parameters were identified out of nine parameters namely harm of smoking, focus on airway symptoms, self-blame, sense of dejection. [32] When platinum treated advanced NSCLC patients taken with avelumab and docetaxel, avelumab showed good activity and the JAVELIN Lung 200 trial (Phase III). [33] Advanced NSCLC patients, expression of PD-LI predictive biomarker showed emerging potent activity than anti-PD-1/PD-L1 monotherapy. Combination of immunotherapy may also useful for the tumor PD-L1 expression of lower levels. [34] Pulmonary/respiratory medicine used for high risks lung cancer patients (chronic bronchitis, COPD, intestinal lung disease) for the diagnosis (histological and molecular confirmation) through bronchoscopy, EBUs/EUs and lung cancer disease treatment via surgery and radiotherapy/ radiation/medical oncology/interventional radiology. Molecular pathology played a crucial role for MDT through tissue management, diagnosis, predictive biomarkers and histology with provided molecular

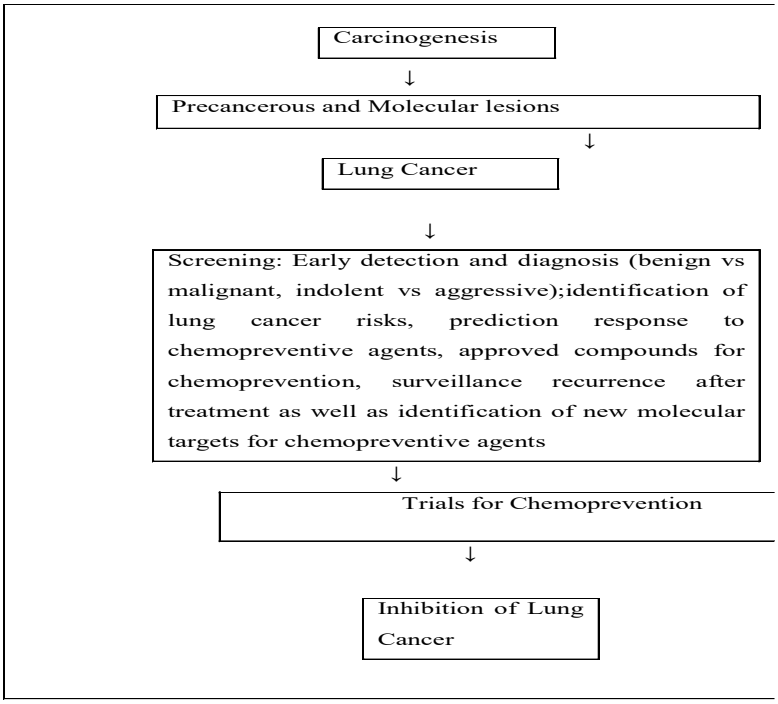

Fig.2 : Schematic Chemoprevention design & Lung Cancer disease

data for taken therapeutic decisions. In the MDT (CT of the chest, MRI to detect brain metastases), radiology via radiation therapy may be used. In the nuclear medicine and thoracic surgery, evidence-based efficacy also reported for NSCLC lung cancer patients. [35] For advanced NSCLC patients, data recommended that retreatment is maintained with a PD-1 inhibitor followed by treatment of an initial nivolumab which also indicates it's a valid therapeutic protocol and routine clinical practice. [36] For minimization of SPLC risks; tumor immune microenvironment, tumor genomics, metabolomics, molecular profiles may be validated and evaluated to extract better outcomes. [37]

As per clinical aspects, the SCLC and NSCLC patients have expression of DLK1 (possible therapeutic target) and the result indicated that for the radio immunotherapy with 211At, the progression of anti-DLK1 antibody occurred.[38] In Netherlands, for NSCLC Stage I –III patients the surgery, chemotherapy, radiotherapy, combination of radiotherapy& chemotherapy may be given case to case basis whereas in clinical practice era treatment variation also occurred based on hospitals and regions. [39] In India, advanced NSCLC treatment outcomes study not frequent. The report indicated that the development of the survivals when treated with chemotherapy. [40] The novel approach of lung cancer includes nano-based particle therapy for the primary and metastatic tumors treatment via diagnosis, imaging and screening. Instead of this, chemotherapeutics drug delivery, anticancer gene therapies to the targeted sites, nanocarriers including lipid or metal based, polymeric, magnetic or mesoporous silica used to treatment of lung cancer disease.[41] Synthetic (organic) nanoparticles (synthetic polymer nanoparticles like spherical polymer micelles, worm like polymer micelles, polymersomes; dendrimers, carbon nanoparticles); proteomics, immune nanoparticles are used. [42, 43] USFDA approved drugs used to treat non-small cell lung cancer.[44] Some examples of nanomedicines (nanoparticles) and chemotherapeutics which includes polymeric micelles (paclitaxel); liposomes (paclitaxel, cyclosporine A); dendrimers (doxorubicin); polymer-drug conjugates (cisplatin); magnetic nanoparticles (quercetin); NLC (Cxb); solid lipid nanoparticles (paclitaxel, epirubicin doxorubicin); polymeric nanoparticles (telmisartan and losartan, doxorubicin and cisplatin, NeutrAvidinFITC, cisplatin). [45] Nano-liposome encapsulating drugs are used for the treatment of adenocarcinoma, lung cancer stem cells, NSCLC. SLNPs encapsulating drugs, bberberine (BER) and rapamycin (RAP), artemether (ART), gemcitabine (GmcH), erlotinib (ETB) which also used. Polymeric nanoparticles encapsulating drugs includes NU7441—radiosensitizer and gemcitabine, erlotinib, paclitaxel (PTX), cisplatin (CDDP) and metformin, gemcitabine (Gem) which are used for the lung cancer recovery. [46]

5. RELATIONSHIP WITH LUNG CANCER AND nCOVID 19 DISEASE

The main symptoms of nCOVID 19 disease includes fever, cough, sore throat, headache, shortness of breath, loss of taste or smell and persistent pain or pressure in the chest, sensation of pneumonia and testing belongs to RT-PCR assay of nasal & pharyngeal specimens and serology tests. Main findings of lung CT scan are pulmonary ground-glass opacities and consolidations. The sign and symptoms of lung cancer may be mostly similar with nCOVID19 disease. The nCOVID19 disease causes respiratory problems continuously which affects the lungs and lung tumor/cancer patients recover very slowly. Lung cancer have identified the common cancer in nCOVID19 patients. Molecular biology of lung cancer and nCOVID 19 disease correlates with the ACE2 and TMPRSS2 gene expression which involves in lung adenocarcinoma (ACE2 act as higher factor whereas TMPRSS2 act as down regulated factor). SARS-COV2 infection also involved an inflammation of the patients and pro tumor inflammation (PTI) may be harmful to NSCLC patients.[47] Studies recommended that the nCOVID19 infected cancer patients may be highly affected than the normal cancer patients under the clinical characteristics.[48] Chest computed tomography (CT) belongs to nCOVID19 pneumonia which is based on Ground glass opacities (GGOs) and it is also used in lung cancer patients for mimic

treatment induced pneumonitis or viral pneumonial disease.[49] The main approaches of NSCLC patients including nCOVID19 disease is to minimization of exposure to reduce transmission of risk. Chronic pulmonary inflammation is common for nCOVID19 and lung cancer patients where immune checkpoint inhibitors (ICIs) act as a pro inflammatory immune responses which also increased the cytokines production from phagocytes and T cells.

Lung cancer with nCOVID19 patients should be maintained by safety, efficacy, dose and toxicity of each drug; maintain protocols of personal protection, observation of lung cancer patients with SARS-CoV2, minimization or temporarily stop of surgery or adjuvant therapies in targeted areas. Immuno pathophysiology includes biopsies, lobectomies, autopsies, radiography, leukocytosis with lymphopenia techniques also suggested for some cases. [50] Nanocarrier based design and target oriented drug delivery may be the novel approach for lung cancer and nCOVID19 disease where the main challenging aspects are the reducing of adverse side effects, appropriate nano particle size (when synthesis) etc. However, these formulations overcome the poor lung penetration and mucus barrier. [51]

As reported from South Africa dated 24th day of November 2021, omicron (known as B.11.529) is a new variant of SARS-CoV-2. No study was found related to new omicron variant of corona virus with lung cancer.

6. CONCLUSION

Lung cancer (heterogeneous disease) is a serious threat in present scenario. In this worldwide pandemic situation, instead of lung cancer, studies on nCOVID19 disease and/or omicron variant with lung cancer complications may be a need of hour. Presently, expensive chemotherapy drugs and novel therapeutic approaches, conventional approaches such as surgery, radiation therapy, photodynamic therapy etc. are used for treatment of lung cancer which may affects cancerous and non-cancerous cells. But nano based poly herbal formulation approaches include cost effective and improving the efficacy and safety of the dosage form which should be filled up the research gap of conventional therapies. Development of dosage form and drug bioavailability also explored for future.

At the present scenario, nano-based formulation not only establish of the novel therapy for cancer chemoprevention approach but also helpful for epidemiological and clinical studies. These formulations may be inhibiting of lung cancer cell proliferation at minimum (low) dose with reduced unwanted adverse effects and also provided future scope to the development of formulation and research.

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CONTENTS

			Page
•	Editorial		
•	Comparative Study Between Ancient Methods and Modern Methods of Education	D. ANANTHAPADMANABAN T.R. VIJAYARAM	1
•	Sequel of School Environment on the Self-Esteem of Adolescents	K.B. RUBY SUNITA RANI	4
•	Artificial Intelligence in Education	ISHFAQ MAJID Y. VIJAYA LAKSHMI	11
•	Plant Disease Detection using Deep Learning	PINAL J. PATEL NIYATI PANDYA MANISHA CHAUDHARI KINJAL GANDHI HARDIK MAHENDRABHAI PATEL	17
•	Innovation Approach Among Aphonic, Amaurosis People Using Hand Gesture Recognition With Electromyography Signals	VAISHALI M. GULHANE AMOL KUMBHARE	27
•	Traversing Serverless Architecture	MEENA RAO KAVITA SHEORAN GEETIKA DHAND SHAILY MALIK/ NISHTHA JATANA	34
•	Print Quality Evaluation in Paperboard Printing Induced by Changes in Viscosity and Screen Parameters	RAMESH R. DENDGE	39
•	Zero-Knowledge Proof for Online Auctions	S. RAJASHREE R.B. MADHUMALA R. SUNITHA / M.D. SWETHA	45
•	A Study on the Aspects of Hyperinflation and Its Impact on Financial Results : A Case Study of Selected Listed Indian Pharmaceutical Companies	GARIMA KANERIA KHUSHALI A. MEHTA	51
•	Novel Design of Cross-Shaped Rectangular Slotted Microstrip Antenna for Sub-6GHZ 5G Applications	J. SILAMBOLI THANGADURAI N. T. SOFIA KAMALI	59
•	Screening of Lung Cancer Chemoprevention : Clinical Trial based Signal Transduction Pathways and Emerging Treatment Strategies with Special Focus on NCovid19 Disease	DIBYAHYOTI SAHA SATISH KUMAR SARANKAR	65

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