Design and Development for patient monitoring system using Fog Computing

Dr. Banita[1], Vaishali Sehrawat[2]

[1]*Associate Professor, C.S.E Department, B.M.U, Asthal Bohar Rohtak, Haryana, India*
[2]*Research Scholar, C.S.E Department, H.No-120, Asthal Colony Bawana Delhi-39, Bawana, Delhi, India*

Abstract - **The study is strictly based on COVID-19 and Health Care techniques which are widely used and Implementation of Fog Computing using IOT placed Smart Health Care facility. There are various methods and techniques that had been introduced to control COVID-19 With the help of IOT. Status Assurance Fog Computing which is placed IOT for health Monitoring System. Study focuses on the automatic diagnosis for smart healthcare system with the use of IOT as well as including Fog Computing. This Smart healthcare system includes COVID-19 AFFECTED person (pandemic). wave1 (COVID-19),wave2 (Corona virus), and 3 wave (Omicron) so on.**

Index Terms - **Fog Computing, IOT, Health Care, COVID-19, Mobile Ad hoc network.**

1.INTRODUCTION

The study is based on COVID-19 or pandemic. COVID-19 Cases was noticed in 2019 and its Third Wave ended in May 2022. During this whole pandemic, total number of cases surfaced were 484,179,897 and the Death count reached 6,153,536 and the recoveries were 418,262,782 and a person remain untraceable 59763589. COVID-19 lands in the category of S.A.R.S (severe acute respiratory syndrome)due to which its Spreads by Coming in Contact with another infected person or a Contaminated Object, it also Spreads when another infected person Sneezes or even by normal breathing so that why minimum distance of 1 meter because it was a communicable disease. Strictly advised to be maintained. As it is in the category of SARS(severe acute respiratory syndrome). It is highly recommended not to touch either your face or eyes, when in a public place the reason behind this is that a SARS can enter a living Organism body by eyes, nose, mouth or any open cuts or wounds.
In most of the waves COVID-19 Specifically targeted Respiratory System such as pulmonary tissues and facts due to which these infected tissues and facts get filled up with water like discharge. Due to which it Causes a Pneumonia like situation ,which makes it harder to breath and the patient suffocates and it serious cases causing Death.

In this paper, Mobile AD hoc techniques are used with the help of fog computing using IOT and smart health care techniques used to control COVID-19. There are various health care techniques used like vaccination, social distancing, mask, hand sanitize and the most important was lockdown.

Table 1: Analysis of covid-19 till 2020

Total number of cases	484,179,897
Death	6,153,536
Recovered	418,262,782
Untraceable	59763589

Table strictly analyse in a precise manner the actual outcome from COVID-19 Disease. Out of which 59763589 are remain untraceable.
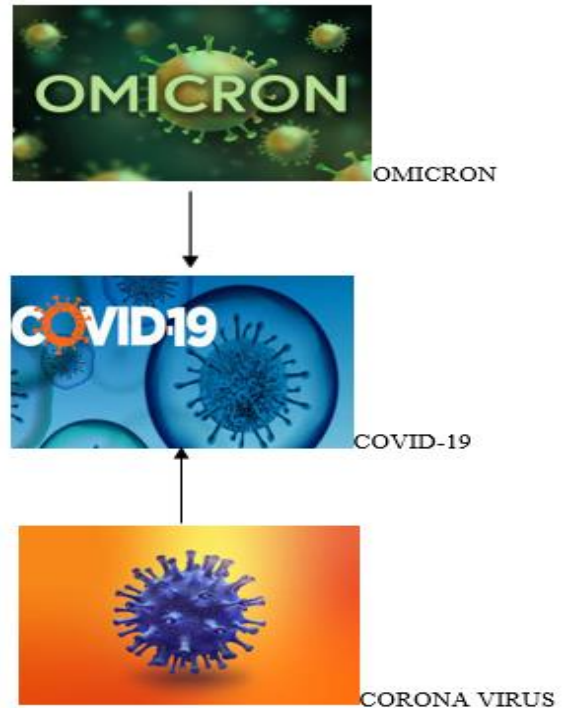

Figure:2 Different types of Waves

2.PANDEMIC

Is a virus that comes from the family of viruses. This virus comes in category of SARS which is also known as severe acute respiratory syndrome this is moderately dangerous and highly contagious which makes it very difficult to control once it starts to pickups pace. So it is highly advised to wear mask to control the further control the spread of virus for better protection against this virus vaccinations have been developed and even now better and better vaccines are appearing in market this virus took the whole world by shock severe lockdowns were set by the government's all over the world which led to severe crashes of economy of most of the countries all around the world which led to increased prices of most and all of the daily use products even till now signs of this pandemic can be seen and felt.

Is large family of viruses these viruses are spread in many categories in ways of spreading to different sorts of mediums to infecting all sorts of living beings out of which there are seven of them known to infect and affect human species in different ways most of them didn't needed any vaccine to get immunity against them until COVID- 19 came into existence or we can say was encountered or however it came in to contact with patient zero it's still not found out accurately that if this virus was being weaponised by some countries against the other countries to be used later as bio weapon in if any future wars or conflict to happen this virus family was named after crown because the virus when observed under microscopes in observatories it appeared as thorns like tentacles on its surface which appeared like a crown he it got it's name corona all the virus with the same appearance are placed to be under corona family.

As I mentioned in the explanation of COVID-19 and corona virus omicron is a modified version of COVID-19 and is also the part of corona family but it did not had that high fatality rate as COVID-19 first version but omicron had a very fast spread rate it is one of the most fastest spreading rate ever recorded in the history of human kind but difficulty with these viruses is they keep on changing their genetic makeup so any vaccine developed for them won't be sufficient for them all alone so it needs the booster shots every six to twelve months all depending on the brand and variety of vaccine used all the vaccines have some ups and downs benefits and downside's but due to the term herd immunity tossed slowly even with or without the vaccine most of the population is becoming immune to the virus fatality rates dropped exponentially soon this virus will not be even considered as a virus anymore

3.LITERATURE REVIEW

Jagdeep Singh and Parminder Singh (2021). Taxonomy has been proposed to Analyzed Performance & matrices. Various methods are used Fog &Edge Computing, SLR based approach and data extraction. In future work, Survey process.[1]

Wenyu Zhang and Zhenjiang Zhang (2017)Dec. It introduced CFC-IOV Architecture. Various methods are used IOT &VANET and SDN Approach. In future work, discussed the essential simulation request.[2]

Fatemeh Jalali and Kerry Hinton (2016). The result of this work Power saving using NDCs and IOT. Various methods are used Energy Consumption, NANO Servers and it centralized DCs cloud computing. In future work, Time-based energy consumption model based upon the amount of time spends dealing with cloud service.[3]

Mehdi Sookhak and F. Richard Yu .The result of this work Reducing the latency. Various methods are used Fog computing ,cloud computing & vehicular cloud computing. As future direction, Requirement to improve the efficiency of FVC.[4].

RANESH KUMAR NAHA (2018). In this study, it has been proposed to Analyzing the requirement of Fog infrastructure. Various methods are used fog computing ,IOT & Fog Devices. In future work, IOT application execution for a Fog computing.[5].

Khaled Matrouk and Kholoud Alatoun (2021). In this study, it has been proposed to Implement the proposed approach using the i Fog Sim tool. Various methods are used IOT & Fog computing. In future work, proposed scheduling algorithm &Energy consumption in fog lump[6].

QingQingChang and Iftikhar Ahmad (2021).The result of this work Approaches in fog computing in e-healthcare. Various methods are used IOT,Fog computing& DAQ. In future work, Fog computing based on IOT in healthcare frameworks[7].

Ashwin Muniyappan and Poongodi Manoharan (2022) Jan. In this study, it has been proposed most approximate analytical expression. Various methods are used COVID-19,Omicron variant & HPM. In

future work Homotopy perturbation method used to solve analytical solution. [8].

Rajesh Chand Arya and Gurpreet Singh Wander (2019).It Focused on the health care aspects for heart patients by proposing a novel fog placed smart health care structure. Various methods are used IOT, Fog computing, Healthcare, deep learning ,Heart patient analysis & Ensemble learning. In future work, Robotic Diagnosis of heart patient using deep learning and IOT used[9].

Amit Kishor and Wilson Jeberson (2020). In this study, it has been proposed the quality of aid in E-health care and suitable for heterogeneous network. Various methods are used cloud computing, fog computing, IOT, Multimedia Health care & Machine learning. In future work, The aid of services in E-smart health care and remission for high risk data can be better by using 5G as higher internet connectivity[10].

Ghufran Ahmed and Arif Ali khan (2020).In this study, it has been proposed VM Performs a dedicated function. various methods are used fog computing, IOT & Health care. In future work, assorted medical sensor and IOT implement are used in Smart health care system [11].

Mirjana Maksimovic (2017).In this study, it has been proposed on Applying technology based on IOT & fog computing. various methods are used fog computing, cloud computing and smart health care aid. In future work, Fog computing as the result of a constant need for better, faster and more secure computing with its features for implementing IOT Based health care approach.[12].

Hayat khaloufi, and Karim Abouelmendi (2020). It Use of diverse IOT and sensor. Various methods are used fog computing, IOT & Health care.In future work, Privacy of medical big data in a IOT health care cloud.[13].

POOYAN HABIBI and SEPEHR KAZEMIAN (2020). In this study, it has been proposed on Survey of different architectural perspectives in fog computing. various methods are used cloud computing, Edge computing, Fog computing, IOT & Advanced internet architecture. In future work, survey can help the research community.[14]

Prasenjit Maiti and Jaya Shukla. It focused on Efficient and in time scheduling and management of resources, minimum energy consumption and service latency. Various methods are used Edge computing, fog computing & IOT. In future work, design and architecture & structure placed on efficient resource utilization.[15].

Saurabh Shukla and Mohd Fadzil Hassan (2019). In this study, it has been proposed on cloud services are extended to the edge of the network to decrease the latency and network congestion. Various methods are used IOT, Fog computing, cloud computing & Fuzzy inference system. In future work, Improved performance of the proposed hybrid method in respect to network and service latency.[16].

Muhammad Ijaz and Gang Li (2021). In this study, it has been proposed on Efficient in the increase of the smart healthcare quality services. various methods are used home hospitalization, Fog computing, cloud computing & IOT. In future work, IOT-based structure for enhancing the communication between doctors and patients and Advanced Tele health services[17].

PeiYun Zhang and Meng chu Zhou (2018).It discovered to Analyzes the architectures of the Fog. various methods are used fog computing, cloud computing, trust & Security. In future work, Implementation of security mechanisms for data-centric integrity and improve the security and trust of the Fog.[18].

Kazi Masum Sadique and Rahim Rahmani proposed Research gap in a specific research area. various methods are used IOT, Fog computing, Authentication, Authorization Security and privacy. In future work, fog layer of IOT for better governance.[19]

Tian Wang and Yuzhu Liang (2019). In this study, it has been proposed on Method can solve the coupling resource management problem. Efficiently to realize sustainable smart city system. Various methods are used Edge Computing, IOT, fog computing. In future work, Analysis show this method can solve the coupling resource management problem.[20].

Tian Wang and Guangxue Zhang (2018). It provides to solve resource consumption problems in WSNs. various methods are used SCS,WSN and IOT. In future work, Data analysis in the fog layer.[21].

Jose Moura and David Hutchison proposed. It provides SDN-based theoretical model algorithms can be used. There are various methods are used IOT, fog computing and SDN. In future work, Energy efficiency, computation and data offloading, management of flow quality, and IOT.[22].

Sabireen H and Neelanarayanan V.(2021). It provides Less processing and storage capacity and Failure of

networks and increase latency. various methods are used Edge computing, IOT devices and cloud computing .In future work, Analysis of fog with IOT.[23].

Flavio Bonomi and Rodolfo (2012).various methods are used WSAN, IOT, cloud computing , fog computing. In future work, the future IOT applications, and illustrates the role of Fog Computing.[24]

Onkar Nath Sinha and Dr. Tulika(2021). It focused for specialized disappointments and resultant harms and the security factor. Various methods are used IOT, fog computing cloud computing and Agriculture. In future work ,proposed design adequacy.[25].

Gollaprolu Harish and S.Nagaraju (2019). It provides Management authority. various methods are used sensor, Bigdata, cloud computing, fog computing and IOT. In future work ,this autonomy implies that production will continue whereas with an exclusively cloud-based approach.[26].

4. METHODOLOGY

1.Health care- Home hospitalization.
2.Edge computing for utilization of healthcare centre.
3.Manual Analysis--Civil hospital.

3.1 Mobile Ad hoc network based on Fog Computing using IOT health care Architecture
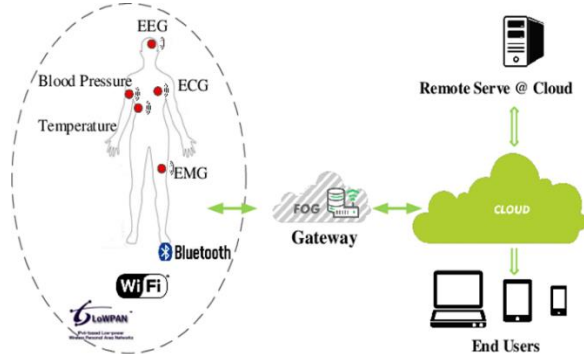
In Fog Computing architecture, this topic is based on IOT and health care system
1.Health care with the use of Mobile Ad Hoc network enabling patient monitoring system has introduced [1]

5. PROPOSED WORK

1. Enabling patient monitoring (using Mobile Ad hoc network).
2.Delivery of care.(using IOT).

3.Fog Computing.
IOT-Additional layer processes the data like ADHAR CARD NO, PAN CARD, DRIVING LISCENCE.

There are various ways to deliver care through Mobile Ad Hoc network. patients can share their symptoms and problems via images, real-time, text or by sending their previous prescriptions to continue their treatment or follow up appointments on call/ Video Calling or messages after this procedure medical faculty or experts can guide them accordingly.

These procedures are very helpful in delivering prescriptions and medical information to patients at faraway places where it becomes very difficult and time consuming for the patients to reach medical support in time of emergencies just in fractions of second's patient will be able to see live and talk to medical team and crucial information gets delivery in time in case of life-threatening emergency so that fatalities can be minimise as much as possible. This is by far our medical science has reached

5.1. FOG COMPUTING

FOG Computing is also known as fog networking or fogging. Decentralization and flexibility are most important difference between fog computing and cloud computing.
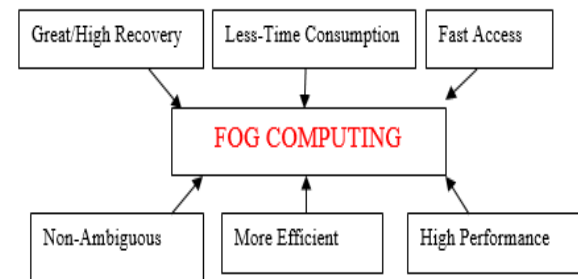
1.Less-Time Consumption
It takes less time. Reduce the response time of the system.
2.Great/High Recovery
It improves the high & great recovery of the system.
3.High Performance
It gives high performance of the system.
4.More Efficient
It is very effective and more efficient of the system.
5.Fast Access
It's speed very Fast. It improves the speed of the system.
6.Non-Ambiguous
It has one obvious meaning

6.CONCLUSION

Mobile Ad Hoc technique used in the study, with the help of fog computing IOT. Various methods of applications are used in Mobile Ad Hoc network. Patient may consult to any expert for medical personnel Disease, injuries etc. Through this network, we can analyse in real time so that the expert can diagnose our problems and analysis the data Visual and Vocally provided by us and can prescribe us with the medicine according to our individual needs.
We further concluded that using fog computing it results in more accurate data with high performance.

REFERENCE

[1] Wenyu Zhang and Zhenjiang Zhang: December (2017).Cooperative Fog Computing for Dealing with Big Data in the Internet of Vehicles: Architecture and Hierarchical Resource Management.

[2] Khaled Matrouk , Kholoud Alatoun:(2021) The Authors. Published by Atlantis Press B.VScheduling Algorithms in Fog Computing: A Survey.

[3] QingQingChang , Iftikhar Ahmad: 23 April (2021). Evaluation and Quality Assurance of Fog Computing-Based IoT for Health Monitoring System.

[4] RANESH KUMAR NAHA1, SAURABH GARG 1, (Member, IEEE): September 21, (2018). Fog Computing: Survey of Trends, Architectures, Requirements, and Research Directions.

[5] Researc Gollaprolu Harish, S.Nagaraju, Basavoju Harish: April (2019). A Review on Fog Computing and its Applications.

[6] Jose Moura 1* and David Hutchison 2 ; Fog Computing Systems: State of the Art, Research Issues and Future Trends, with a Focus on Resilience.

[7] Flavio Bonomi, Rodolfo Milito, Jiang Zhu; August(2012). Fog Computing and Its Role in the Internet of Things

[8] Tian Wang a,b, Yuzhu Liang a, Weijia Jia; 25 February (2019). Coupling resource management based on fog computing in smart city systems

[9] Muhammad Ijaz 1,2, Gang Li 1,2, Ling Lin 1,2; : 2 May (2021). Integration and Applications of Fog Computing and Cloud Computing Based on the Internet of Things for Provision of Healthcare Services at Home

[10] PeiYun Zhanga, MengChu Zhoub*, and Giancarlo Fortinoc; 8 May (2018). Security and trust issues in Fog computing: a survey

[11] Tian Wang, Guangxue Zhang; 21 May (2018). A novel trust mechanism based on Fog Computing in Sensor–Cloud System

[12] Sabireen H.∗, Neelanarayanan V; 20 May(2021). A Review on Fog Computing: Architecture, Fog with IoT, Algorithms and Research Challenges

[13] Fatemeh Jalali, Member, IEEE, Kerry Hinton, Robert Ayre, Tansu Alpcan, Senior Member, IEEE 2016 IEEE. Fog Computing May Help to Save Energy in Cloud Computing

[14] Kazi MasumSadique, Rahim Rahmani, Paul Johannesson ; Fog Computing for Trust in the Internet of Things (IoT): A Systematic Literature Review

[15] Onkar Nath Sinha1*, Dr. Tulika2 , Amit Kishor3; 16 April (2021). Fog Computing Approach for Data Driven in Smart Agriculture

[16] Su-Hwan Jang1, Jo Guejong1 , Jongpil Jeong1; (2019). Fog computing architecture based blockchain for industrial IoT

[17] Saurabh Shukla1(&), Mohd Fadzil Hassan1, Low Tan Jung1 , and Azlan Awang2; Architecture for Latency Reduction in Healthcare Internet-of-Things Using Reinforcement Learning and Fuzzy Based Fog Computing

[18] Ali Shakarami a , Hamid Shakarami a, Mostafa Ghobaei-Arani a*, Elaheh Nikougoftar b, Mohammad Faraji-Mehmandar; 2 December (2021). Resource provisioning in edge/fog computing: A Comprehensive and Systematic Review

[19] Jagdeep Singh, Parminder Singh and Sukhpal Singh Gill;(2021). Fog Computing: A Taxonomy, Systematic Review, Current Trends and Research Challenges

[20] POOYAN HABIBI 1, (Student Member, IEEE), MOHAMMAD FARHOUDI; April 23, (2020). Fog Computing: A Comprehensive Architectural Survey

[21] Mohammed Al-khafajiya, Thar Bakera, Muhammad Asimb, Zehua Guoc; November 2, (2019) COMITMENT: a Fog Computing Trust Management Approach.

[22] Mirjana Maksimović; December (2017). IMPLEMENTATION OF FOG COMPUTING IN IOT-BASED HEALTHCARE SYSTEM

[23] Ashwin Muniyappan 1*, Balamuralitharan Sundarappan 2, Poongodi Manoharan 3*, Mounir Hamdi 3; 24 January (2022). Stability and Numerical Solutions of Second Wave Mathematical Modeling on COVID-19 and Omicron Outbreak Strategy of Pandemic: Analytical and Error Analysis of Approximate Series Solutions by Using HPM

[24] Amit Kishor1*, Chinmay Chakraborty2 , Wilson Jeberson1; d 21 December(2020). A Novel Fog Computing Approach for Minimization of Latency in Healthcare using Machine Learning

[25] Shreshth Tuli1,2, Nipam Basumatary1,3, Sukhpal Singh Gill; November 15, (2019). HealthFog: An Ensemble Deep Learning based Smart Healthcare System for Automatic Diagnosis of Heart Diseases in Integrated IoT and Fog Computing Environments

[26] Kamran Sattar Awaisi, Shahid Hussain, Mansoor Ahmed, Arif Ali Khan, and Ghufran Ahmed; June (2020). Leveraging IoT and Fog Computing in Healthcare Systems

[27] Hayat KHALOUFI, Karim ABOUELMEHDI, Abederrahim BENI-HSSANE; -April 2, (2020). Fog Computing for Smart Healthcare data Analytics: An Urgent Necessity