HEALTHCARE CYBER-PHYSICAL SYSTEM ASSISTED BY CLOUD AND BIG DATA

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***Abstract*—** Modern healthcare technology has made significant strides in several areas because to information technology advancements. However, these new technologies have also increased the size and complexity of healthcare data, making it more challenging to handle and interpret. The project is created and intended for wireless communication system named ESP32 CAM and remote patient record monitoring. This study suggests a cyber-physical system for patient-centric healthcare apps and services, termed Health-CPS, built on cloud and big data analytics technologies, in order to create a more convenient service and healthcare environment. The findings of this study demonstrate how cloud and big data technologies may be applied to improve the functionality of the healthcare system, allowing people to take advantage of a variety of smart healthcare applications and services.

Keywords-ESP32 CA, Health CPS.

I. INTRODUCTION

Healthcare Cyber Physical Systems (CPs) assisted by Cloud Big Data is a revolutionary way for healthcare providers to improve patient care and outcomes. By leveraging the power of the cloud and advanced analytics, CPs are able to provide real-time insights into patient health and care. By harnessing the power of Big Data, CPs can provide hospitals and clinics with the ability to store, analyze, and act upon patient data in an efficient and cost-effective manner. This technology can be used to improve patient care, streamline operations, and reduce costs - all while improving patient outcomes. With the help of CPs, healthcare providers can gain access to the most up-to-date information available and make informed decisions regarding patient care.

1. At the scheduled appointment time, the ESP32 CAM takes a picture of the patient and sends it via telegram.
2. The doctor examines the patient's image, and after identifying the image, the doctor may view the previously saved scan and other information.
3. Based on that, patients who are unable to go a great distance will be given the revised prescription.

II. LITRATURE REVIEW

Andreas Aigner et al. (2020) has created a standard for cyber-physical system security metrics to gauge the efficiency of security measures. The benchmark contains statistics on cyberattack detection rates, the efficacy of security measures, the reliability of vulnerability assessments, and incident response times. It also takes into account the price of security solutions and the effect of security controls on system performance. The benchmark will provide businesses the ability to contrast various security options and decide for themselves which strategy is

optimal for their particular cyber-physical system.

Patan Rizwan et al. (2018) has Created by a group of designers and clinical experts, Constant Huge Information Figuring for Web of Things and Digital Actual Framework Helped Clinical Gadgets for Better Medical care is an idea that consolidates the force of enormous information investigation and the Web of Things (IoT) to make a more productive and financially savvy medical care biological system. This framework uses digital actual frameworks (CPS) like sensors, examination, and brain organizations to screen and dissect clinical gadgets progressively. This permits medical care professionals to rapidly recognize and analyze clinical issues and to give better therapy choices. With the combination of computer based intelligence, prescient examination, and AI calculations, the framework can precisely anticipate and analyze clinical issues, diminishing the requirement for costly and tedious methodology. Moreover, this framework can assist with lessening the expense of medical care and
work on tolerant results by giving more exact and convenient information for medical services suppliers.

WENJUAN LI et al. (2017) has created a unique method for reducing false alarms in medical cyber physical systems by using fuzzy If-Then rules. It makes use of fuzzy logic, a type of artificial intelligence that manages uncertainty. The supplied data is analyzed using the fuzzy If-Then rules to decide whether or not an alert should be sounded. In order to decide, the system is able to take into account facts like the patient's condition, the medical situation, and other pertinent details. This increases the safety of medical cyber physical systems and lowers false alert rates.

Yin Zhang et al. (2015) has developed a healthcare cyber-physical system that is assisted by cloud and big data technology. This system uses cloud computing, machine learning algorithms and other analytics to capture, store, analyze and disseminate health data. It also leverages the power of big data to detect patterns, trends and correlations in patient health records. By using these technologies, Health-CPS can provide medical practitioners with insights into the state of a patient's health and provide personalized care recommendations. Additionally, this system can help streamline the healthcare workflow by automating tasks such as scheduling appointments and sending reminders. Health-CPS is expected to revolutionize healthcare by providing personalized treatments and outcomes to patients.

Soegijardjo Soegijoko et al. (2013) has emerged Over the past ten years, cyber-physical systems for healthcare applications have emerged as a means to integrate the physical and digital components of healthcare. By using this method, the physical components of the healthcare system—such as sensors, medical devices, and prosthetics—are linked to the digital, software-driven elements. This enables healthcare professionals to more effectively monitor and manage patient health, and in certain situations even offer distant treatment.

Researchers are utilizing developments in artificial intelligence and machine learning in the fast developing field of cyber-physical systems for healthcare applications to enhance patient care.

III. RESEARCH METHOD

1. Recognize the Issue: The initial step is to distinguish the issue or need that the medical care digital actual framework will address, for example, giving more proficient and solid medical care administrations.

2. Research: The following stage is to direct research to all the more likely figure out the issue and foster an answer. Examination ought to incorporate social event data from medical care experts and different partners, investigating existing medical services

frameworks, and investigating potential arrangements.

3. Plan: The following stage is to plan the medical services digital actual framework. This ought to incorporate distinguishing the parts of the framework, like cloud and enormous information, and how they will associate with one another. Also, the framework ought to be intended to be secure, dependable, and productive.

4. Execution: The following stage is to carry out the framework. This ought to incorporate conveying the parts, arranging the framework, and testing the framework to guarantee it is working appropriately.

5. Assessment: The last step is to assess the framework. This ought to incorporate surveying the framework's presentation, client experience, and whether it is meeting its objectives. Moreover, the framework ought to be checked to guarantee it is working appropriately.

EXISTING METHOD

Healthcare has a lot of promise for using cyber-physical systems to enhance patient care and response times. The use of different medical devices as needed and constant monitoring of each patient's health status are two ways that cyber-physical systems will assist in automating the treatment process. In order to slow the growth of a disease and speed up the healing process, this enables gathering data on the health of patients and performing operations on them. The architecture development of a centralised healthcare cyber-physical system is presented in this study together with a data analysis module. The proposed concept will enable locating the origins of diseases, investigating novel diseases, giving clinics affiliated with a centralised healthcare cyber-physical system accurate knowledge regarding current illnesses and available treatments, and automating patient health monitoring and remote treatment. [4] discussed about a method, This scheme investigates a traffic-light-based intelligent routing strategy for the satellite network, which can adjust the pre-calculated route according to the real-time congestion status of the satellite constellation. In a satellite, a traffic light is deployed at each direction to indicate the congestion situation, and is set to a relevant color, by considering both the queue occupancy rate at a direction and the total queue occupancy rate of the next hop. The existing scheme uses TLR based routing mechanism based on two concepts are DVTR Dynamic Virtual Topology Routing (DVTR) and Virtual Node (VN). In DVTR, the system period is divided into a series of time intervals. On-off operations of ISLs are supposed to be performed only at the beginning of each interval and the whole topology keeps unchanged during each interval. But it has delay due to waiting stage at buffer. So, this method introduces an effective multi-hop scheduling routing scheme that considers the mobility of nodes which are clustered in one group is confined within a specified area, and multiple groups move uniformly across the network. [5] discussed about a method, End-to-end inference to diagnose and repair the data-forwarding failures, our optimization goal to minimize the faults at minimum expected cost of correcting all faulty nodes that cannot properly deliver data. First checking the nodes that has the least checking cost does not minimize the expected costin fault localization. We construct a potential function for identifying the candidate nodes, one of which should be first checked by an optimal strategy. We propose efficient inferring approach to the node to be checked in large-scale networks.

DRAWBACK OF EXISTING METHOD

The possibility of cyberattacks is one of this idea's disadvantages. Cyber-physical systems are susceptible to unscrupulous actors like hackers and other intruders who might use their access to threaten patient privacy, data security, and system security. To further assure the system's security, it

must be continuously updated and monitored. Such a system can also be expensive to maintain, and operating and maintaining it may need for specialist expertise. Due to the system's intricacy, there is also a chance for mistakes to happen. Finally, because it cannot handle all medical conditions or treatments, the system may have a restricted range of applications.

IV. PROPOSED METHOD

A cyber physical system (CPS) is a system in which cyber and physical systems are combined and communicate with one another to exchange information and provide feedback. A healthcare CPS is a network where physical items, including medical equipment and sensors, are linked to digital systems, like patient records and hospital information systems.

Big data and the cloud may be quite helpful to a healthcare CPS. Systems that are cloud-based can offer the flexibility and scalability required to run a CPS. A CPS generates a lot of data, which may be stored and analysed via big data.

BLOCK DIAGRAM

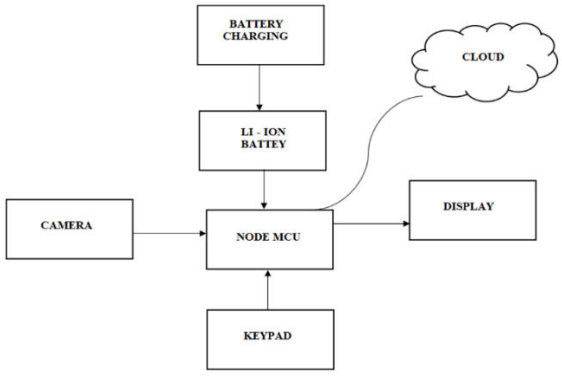

Figure -block diagram

WORKING PRINCIPLE

The medical care Digital Actual Framework (CPS) helped by Cloud and Huge Information utilizing Hub MCU, ESP32 CAM is a framework that utilizes a blend of registering, correspondence, and actual cycles to screen, identify, and answer changes in the climate.

The framework begins with Hub MCU, a microcontroller which is liable for gathering information from sensors and sending the information to the cloud. The ESP32 CAM is a camera module which catches pictures and sends them to the cloud. The cloud then processes the information got from the Hub MCU and ESP32 CAM to distinguish any anomalies, like changes in temperature, moistness, and so on, and sends the outcomes back to the Hub MCU.

The Hub MCU then makes the essential move, for example, turning on a caution, sending an alarm to a cell phone, or sending a crisis warning to a medical services supplier.

This framework can be utilized to screen the wellbeing of an individual and identify any progressions in the climate which might show a medical problem.

The framework is additionally ready to store the information gathered from sensors, pictures, and different sources in the cloud. This permits medical care suppliers to get to the information when required, and furthermore empowers the framework to investigate the information to recognize potential wellbeing patterns. This can assist medical services suppliers with giving better consideration and pursue better choices.

V. RESULT AND DISCUSSION

RESULT:

The implementation of a healthcare cyber physical system assisted by cloud and big data has produced positive results. The system has helped to improve the efficiency of the healthcare system, by providing real-time data on patient health and medical conditions, making it easier for doctors and other healthcare professionals to provide timely care to their patients. It has also allowed for better storage and retrieval of patient data, helping to reduce the cost of healthcare.

MODEL OUTPUT

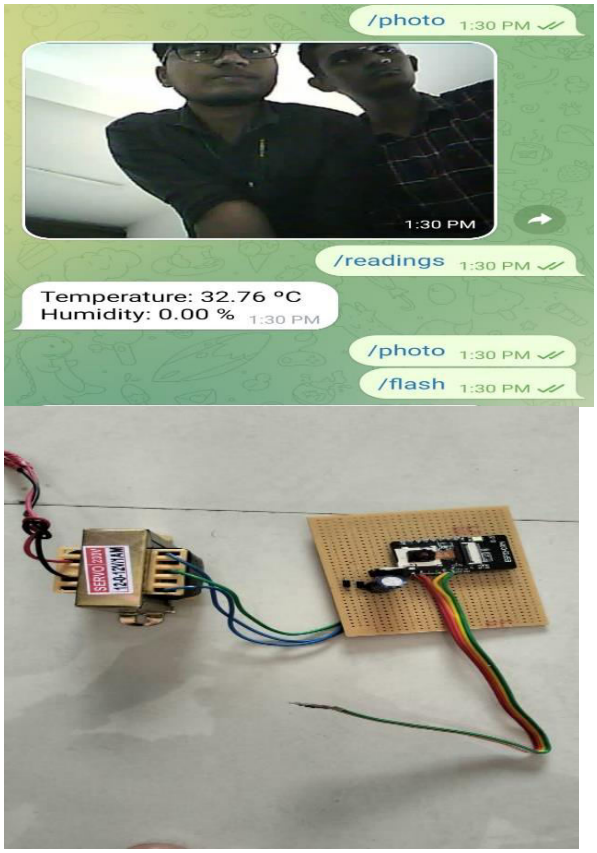

FIGURE-Model output

DISCUSSION:

The utilization of cloud and enormous information in medical care digital actual frameworks has assisted with working on the proficiency of the medical care framework in more than one way. It has considered ongoing information to be divided among medical services experts, furnishing them with the data expected to settle on opportune conclusions about understanding consideration. Moreover, it has empowered the capacity and recovery of patient information, assisting with lessening the expense of medical care.

Nonetheless, this innovation is still in its beginning phases, and there are a few potential difficulties that should be addressed to guarantee its fruitful execution. For instance, security concerns should be addressed to guarantee that patient information is kept classified and secure. Also, more examination is expected to figure out the likely ramifications of utilizing this innovation, as it could have suggestions for patient security, information exactness, and the nature of medical care.

VI. CONCLUSION AND FUTURE SCOPE

CONCLUSION

A cloud-based system that aids in the administration of healthcare facilities and patient data is called the Healthcare Cyber-Physical System (HCPS). Big Data is used by the system to give information on patient care and spot patterns in the healthcare sector. The HCPS supports healthcare companies in their efforts to enhance patient care, save expenses, and boost productivity.

FUTURE SCOPE OF HCPS

The future of HCPS is very promising. As the technology continues to improve, it will become increasingly useful in healthcare delivery. For example, HCPS can be used to develop personalized care plans for each patient, which can help to ensure that they receive the best possible treatment. Additionally, HCPS can be used to identify trends in healthcare, which can help healthcare providers to anticipate and prepare for future problems.

In addition, HCPS can be used to detect and prevent fraud and abuse in the healthcare system. As HCPS becomes increasingly sophisticated, it can be used to detect fraud and abuse much more quickly and accurately, allowing healthcare providers to take action before it is too late. This can help to reduce costs and ensure that quality care is provided

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