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Health Care Monitoring Using IoT during Covid19

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ABSTRACT: In present days, taking care of Health is that the most vital thing in our survival. Awareness about diseases and their precautions are going to be helpful for us to return out from the problems we face. During COVID'19 pandemic situation, each and each one among us was unaware to fight with the virus. For that, Government takes major effort to regulate virus spreading and provides treatment the maximum amount as possible to fight against the virus. Now a day, we are using internet for therefore many purposes. With the assistance of IoT we will easily monitor patients' health remotely. within the present scenario, we are using cloud storage for various purposes. By sensing the small print of patient using IoT devices, we will monitor them from their places. This avoids spreading of viruses from one person to a different. This paper aims to supply the varied techniques we will use for health care monitoring using IoT in every situation.

KEYWORDS: COVID-CORONA Virus Disease, IoT-Internet of Things, AI- AI.

I. INTRODUCTION

In older days, we'd like to satisfy a doctor face to face for any medical complications. In emergency situations we cannot avoid treatment delay thanks to distance, doctors' unavailability and other factors. But, advancements in Information & Communication Technologies cause the emergence of Internet of Thing (IoT). Internet of Things allows many physical devices to sense data, transmit that through the web, providing more data interoperability methods and also because it stores & displays. But, Now-a-days IoT plays a crucial role not only in communication, but also in monitoring, recording, storage and display. Hence the newest trend in Healthcare communication method using IoT is tailored.

IoT is transforming the healthcare industry by redefining the space of devices and other people interaction in delivering healthcare solutions. IoT has applications in healthcare that benefit patients, families, physicians, hospitals and insurance companies. [1]

IoT for Patients – Patients' using Wearable devices like fitness bands and other wirelessly connected devices like vital sign and pulse Monitoring cuffs, Glucometer etc., senses and provides personalized attention to stay their health in great way. These devices are often wont to remind calorie count, exercise check, appointments, and vital sign variations.

IoT for Doctors – Wearable devices or other home monitoring equipments embedded with IoT which are employed by patients are helpful for the physicians to stay track of their health in very effective manner. Data collected from IoT devices can help the physicians to spot the simplest treatment process.

IoT for Hospitals – Hospitals plays an important role to implement this type of facilities to watch the patient's health. IoT devices tagged with sensors are used for tracking real time location and availability of medical equipment like wheelchairs, defibrillators, nebulizers, oxygen pumps and other monitoring equipment. Deployment of medical staff at different locations also can be analyzed real time.

Health Insurance Companies using IoT – Insurance companies can leverage data captured through health monitoring devices for his or her underwriting and claims operations. This data will enable them to detect fraud claims and identify prospects for underwriting. IoT devices bring transparency between insurers and customers within the underwriting,

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pricing, claims handling, and risk assessment processes. IoT devices also can enable insurance companies to validate claims through the info captured by these devices.

II. ARCHITECTURE OF IoT IN HEALTH MONITORING

IoT has four-step architecture for getting input data; process it and storage & retrieval. All four stages are inter-connected in order that the info captured or processed at one stage is send to next stage.

Step 1: within the initiative, deployment of interconnected devices that has sensors, actuators, monitors, detectors, camera systems etc., are present and these devices collect the info.

Step 2: Generally, data received from sensors and other devices are in analog form, which require be aggregating and converting to the digital form for further processing. this will be done by data acquisition system.

Step 3: Once the digital data is aggregated, pre-processed, standardized then it are often moved to the info centre or Cloud.

Step 4: Final data is managed and analyzed at the specified level whenever it's necessary. Advanced Analytics are applied to the present data; it'll bring actionable business insights for effective decision-making.

IoT is redefining the healthcare by ensuring better care, improved treatment outcomes and reduced costs for patients, and better processes & workflows, improved performance and patient experience for healthcare providers.

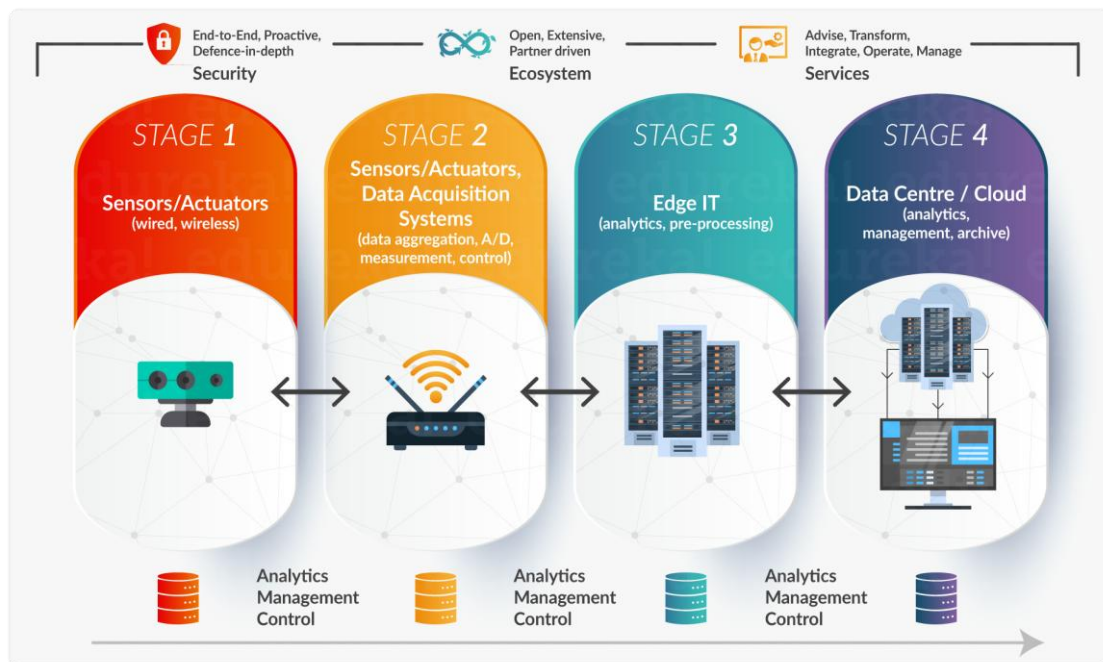


Figure 1: The four stages of IoT solutions

The major advantages of IoT in healthcare include:

- **Minimal Cost:** IoT enables patient monitoring in real time that significantly reduces unnecessary visits to hospital, doctors' fees, hospital stays and re-admissions.
- **Better Treatment:** this permits the physicians to form evidence-based informed decisions and brings absolute transparency for each treatment process.
- **Superfast Diagnosis:** Continuous patient monitoring and real time data helps in diagnosing diseases at an early stage or maybe before the disease develops supported symptoms is a unique advantage of this technique.
- **Proactive Treatment:** Continuous health monitoring provides proactive medical treatment to all or any quite people.



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- **Equipment, Drugs Management:** Management of medicine and other medical equipment may be a major challenge in healthcare industry. Through the connected devices, these are managed and utilized efficiently with minimal costs.
- **Reduction of errors:** Data generated through IoT devices ensure smooth healthcare operations with reduced errors. This provides proven reliability for needy one.

Challenges in IoT Health Monitoring:

IoT-enabled connected devices capture huge amounts of knowledge, including sensitive information, protecting those data was a really big threat in health monitoring. Suitable security mechanisms are critical to implement. IoT explores new dimensions of patient care through real-time health monitoring and access to patients' health data.

III. INTERNET OF MEDICAL THINGS (IOMT)

Primary function of an IoMT is monitoring patients' conditions and therefore the doctors are going to be notified just in case of any emergency. In hospitals, spreading of infections rate is high. But, IoT-enabled hygiene monitoring devices help to stop patients from infection. We will maintain individual record for patients those that are all using IoT enabled devices. IoT devices also help to manage pharmacy internal control, and environmental monitoring, as an example, checking refrigerator temperature, and humidity/temperature control.

IoT in medical and healthcare fields can include wearable devices, drug tracking system, medical supply chain, remote patient monitoring, and more methods to research the health. IoMT can increase the accuracy of diagnoses thanks to constant monitoring of changes in health. They create working processes more efficient for healthcare workers.

Major Benefits of IoT in Healthcare

1. **Monitoring Health-** Smart devices can track health conditions of individuals. IoT applications for healthcare can send an emergency signal if the patient has an asthma, coronary failure, or any another medical issue.
2. **Patient's Better Experience** - Hospitals with well equipped IoT devices improves healthcare system, improves patient experience and gaining customer loyalty. The hospital from ny, USA using Auto Bed software. the first task of Auto Bed is matching available beds with new patients.
3. **Managing Drugs** - one among the web of Things healthcare benefits is best drug management. IoT technology allows controlling the quantity of taken medicine. Doctors can monitor the dose and track effectiveness of treatment. Also, the web of Things allows sending reminders to patients or their relations for, once they should take their drugs.
4. **Automatic Healthcare-** IoT devices can help by automating administrative, manual tasks. Internet of Things medical applications can analyze a big amount of data and make different metrics to ascertain any changes within the patients' health conditions. Automated processes of collecting data can reduce the amount of errors in making diagnosis.
5. **Prevention** - Tons of individuals die from chronic diseases like heart condition, diabetes, and more. Using the analytic capabilities of IoT, it's possible to supply patients with more personalized sorts of treatment and care. Smart, Connected or Wearable devices can monitor health conditions of elderly or patients with chronic diseases.

Challenges of IoT in Healthcare

- Security and Privacy
- Integration of Protocol is tedious
- Data overload

IV. COVID 19 PANDEMIC SITUATIONS

FACTS ABOUT COVID-19

COVID-19 is communicable disease caused by corona virus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease. Formerly, this disease was mentioned as '2019 Novel Corona virus' or '2019-nCoV.' The COVID-19 virus may be a new quite virus linked to an equivalent family of viruses as Severe Acute Respiratory Syndrome (SARS) and a few sorts of cold.

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Symptoms of COVID19 - Symptoms include fever, cough and breathe difficultness. In additional severe cases, infection can cause pneumonia or breathing problems. These symptoms are almost like the Flu (Influenza) or the cold, but these are more common than COVID-19. This is often because the testing is required to verify if someone got suffering from COVID-19.

Spreading of COVID19 - The virus is transmitted through direct contact with respiratory droplets of an infected person (generated through coughing and sneezing). Individuals also can be infected through touching the surfaces which are contaminated with the virus and also touching their face or other body parts (e.g., eyes, nose, and mouth). The COVID-19 virus may survive on surfaces for several hours, but simple disinfectants with alcoholic content can kill it.

Awareness about COVID19 - Whenever the situations become pandemic we must aware of that. By taking some precautionary measures we will avoid infections and also control spreading. We've to try to the subsequent measures;

- Maintain Social Distancing
- Wearing Masks and Gloves
- Washing and sanitizing hands before Eating
- Washing Hands, Face and Legs after reached home
- Self Quarantine

HEALTH CARE MONITORING DURING COVID19

Role of IoT in Health Care Monitoring:

Technologies like AI and IoT can help to trace the spreading of the virus, to spot high-risk patients, predict deathrate, and control the infection in real-time. They will also minimize the necessity for physical human interaction and stop the spreading of viruses by means of enabling quicker recovery. In these unprecedented times, healthcare technologies have pushed themselves in innovative manner.

A. Tracking the Corona Virus Pandemic

Study made at Massachusetts Institute of Technology (MIT) stated that, by superimposing geographic information systems (GIS) on IoT mobile data, it can assist epidemiologists to spot people that have encountered the infections. The technology also can assist in monitoring patients who are at high-risk and may provide useful helpline to the healthcare workforce.

B. Connected Thermometers

At hospitals, auto connected thermometers are getting used to watch the blood heat and notify any differences at real-time. With the assistance of an IoT Access Controller, these devices receive and transmit real-time patient data from the sensors to a nurse's station for continuous monitoring.

In India, a team of product experts engineered a contactless fever detection system that uses AI based thermal imaging to remotely read skin temperature of a person passing through the camera range.

C. Smart Wearable

Researchers have designed sensor enabled suits which will observe physical body parameters and alerts users when their blood heat has elevated quite 37.5 degrees. In China, bracelets and rings synced with AI platforms are getting used that provide constant monitoring of important signs, including temperature, pulse and blood oxygen levels.

D. IoT Buttons

Recently, the primary Internet of Things buttons was designed which are getting used by hospitals. It addresses the necessity for rapid deployment during a facility of any size and sends rapid alerts to management notifying of any cleaning or maintenance issues which will pose risks to public safety.

E. Effective uses of AI

AI is demonstrating its capabilities through diagnosing risks and assisting in medical advancements to tackle the pandemic. Within the current domain, AI is getting used for timely notifications, data dashboards, group action, and diagnosis & therapy.

F. Hospital Visitors and Patients Monitoring using AI

Hospitals across the planet have implemented AI (AI) to support medical professionals and treat infected patients to effectively monitor and manage the Corona virus pandemic. Some AI powered solutions like camera-embedded facial

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scanners that screen hospital visitors & analyze facial attributes and thermal scans to work out a visitor's temperature conditions. of these solutions are extensively adapted and are ready to deliver look after thousands of infected patients at an unprecedented rate

G. Remote monitoring

Another AI technology is remote monitoring, which may be investigated by medical facilities to guard the workforce and thoroughly monitor patients even in hospital's dormitories, also as reception. This sensor technology once placed under the patient's mattress, can analyze the patient's pulse, rate of respiration, and body movement under observation for taking care of high priority COVID patients.

V. PROPOSED METHODOLOGY

METHOD OF IMPLEMENTATION:

From the researches made so far, we can agree that health care monitoring using IoT will be helpful for all kind of people around the world. But the major bottleneck of the solution is that we need to buy expensive sensors or wearable devices to monitor the affected people. So, our proposed method will define with the help of normal mobile phones we can monitor the people's health parameters. Sensing human heart rate, blood pressure, body temperature using sensors built-in with the chipset of mobile devices can be easily made by adding a sensor in the chip set of mobile device. This sensor senses the humidity of sweat in the body. If the humidity decreases, automatically body temperature will be high. Then the sensor sends an alert message to the human being as SMS. And from the human's breath we can sense the humidity present in the air. This implementation will be affordable to everyone.

The relay module sends the sensor signals to mobile device as programmed, if the sensed value reached beyond the normal value. Then, the mobile module sends SMS to the helpdesk to notify the infectious person. It also helps to monitor the patients' remotely at anywhere else. The device may be an Android smart phone or may be an ordinary keypad phone, the sensor and relay built within the mobile module will track the information of patients. It sends that information to IoT Gateway/ Framework for Cloud storage. Figure 2 shows the Architecture for Proposed Method.

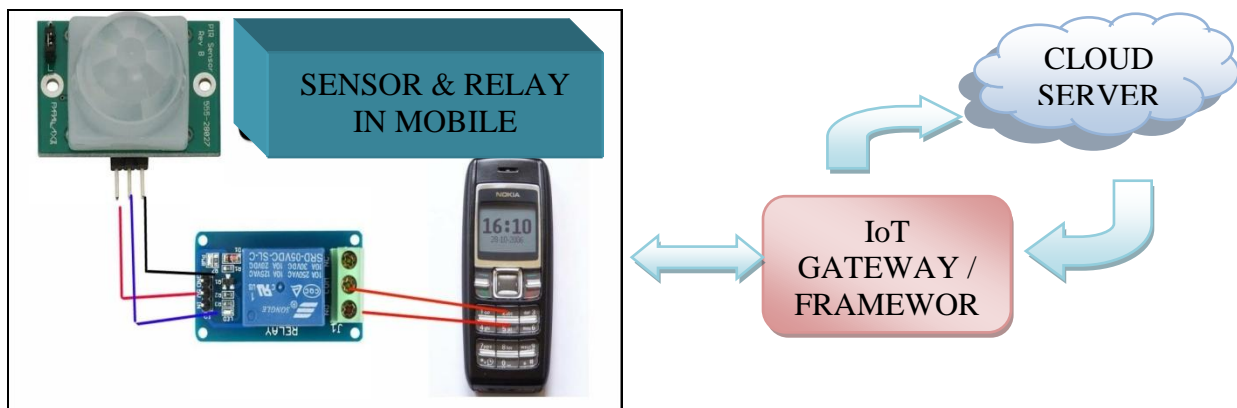


Figure 2: Mobile module & IoT Framework

VI. CONCLUSION

With the help of IoT we can easily monitor patients' health remotely. In the present scenario, we are using cloud storage for various purposes. By sensing the details of patient using IoT devices, we can monitor them from their places. This avoids spreading of viruses from one person to another. The proposed method provides the architecture for simple sensor cum relay module to build within the mobile device. This can be achieved by implementing the method with cheaper components so that it can be easily embed with an ordinary keypad mobile. So everyone can be affordable with a simpler device to connect with IoT sensors for tracking health parameters of the people. This also provides contactless monitoring.



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