LITERATURE SURVEY

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1. Sharma, A., Choudhury, T. and Kumar, P., 2018, June. Health monitoring & management using IoT devices in a cloud based framework. In *2018 international conference on advances in computing and communication engineering (ICACCE)* (pp. 219-224). IEEE.

The study proposed Textile based Wearable System Technology, Unobtrusive Biosensors, Intelligent Medical Boxes, and a Cloud Computing Architectural Framework amongst other technologies and advancement that would pitch the HealthCare Industry to unparalleled heights in terms of efficiency and Patient Comfort. The paper proposes to revolutionize the industry by real time exchange of data to seamlessly and proactively offer prediction, diagnosis and remedies. The framework this paper proposes is aptly called the Internet of Medical Things (IoMT) which opens a whole new avenue for the Patient-HealthCare provider Interface (PHI) and Wearable Health Technology (WHT).

Advantage

An alert is sent to emergency contacts and respective healthcare providers in case the Health Indexes exceed the normal values thereby leading to better prognosis thus preventing the illness before it takes an extreme form. Real Time Data is being provided to the hospice care specialists which enables them to make informed decisions and provide prediction-based remedies.

But the **limitations** related to this study are Security and Data Theft is an issue which persists even after the inclusion of the unique API key. Also, for more patients, big data

handling might be required to handle the enormous amount of data that is generated. For IoMT to become commercially and publicly available, a more user-friendly UI is desirable.

2. **Balakrishnan, L., 2021, May. An Internet of Things (IoT) Based Intelligent Framework for Healthcare–A Survey. In *2021 3rd International Conference on Signal Processing and Communication (ICPSC)* (pp. 243-251). IEEE.**

The study focuses on a brief survey of overall use of IoT-based frameworks in medical services, starting with an early medical care monitoring design based on wearable sensors and progressing to a discussion of the most recent fog/edge computing technologies for smart healthcare framework.

Advantages

This research indicates that the guidance is flexible based on a couple of approaches.

Ambient Assisted Living (AAL), Internet of m-health Things (m-IoT), Adverse Drug Reaction (ADR), Community Healthcare (CH), Children Health Information (CHI), Wearable Device Access (WDA), Semantic Medical Access (SMA), Indirect Emergency Healthcare (IEH), Embedded Gateway Configuration (EGC). Researchers have applied DL to Wearable body sensor information and E - Health Records are two examples of medical Big Data. The handling of an enormous amount of information requires escalated preparing capacities. In the writing for continuous IoT frameworks, a few major information examination procedures were recommended and the requirement for QoS was not effectively replied.

Limitations

Since personal and sensitive information is used in medical care frameworks and also information security and preservation is a key objective in a smart healthcare framework. Furthermore, edge-based frameworks have yet to address local storage and information processing management, especially in the context of a dynamic health environment.

3. **Alshehri, F. and Muhammad, G., 2020. A comprehensive survey of the Internet of Things (IoT) and AI-based smart healthcare. *IEEE Access*, *9*, pp.3660-3678.**

A comprehensive survey of IoT- and IoMTbased edge-intelligent smart health care, mainly focusing on journal articles published between 2014 and 2020. The survey has undergone literature by answering several research areas on IoT and IoMT, AI, edge and cloud computing, security, and medical signals fusion. The systematic review process PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to identify studies and narrow down results for this review. In the review process, there are three sequential steps, which are identification, scanning, and eligibility testing.

Challenges

The major challenges of IoT and AI-based smart healthcare include sensors' interoperability, device communication, security and privacy, device management, information management barrier, and efficient use of AI. In some health care environments, the bulk of IoMT devices can be used to identify and diagnose an illness, and the data collected from heterogeneous sensors contains a variety of issues, such as hardware glitches, drained batteries, or connectivity problems [106]. There are certain basic problems that are normal and unregulated. In particular, there are sometimes unexplained errors in the usage of popular medical sensors, such as mobile phones and smart watches. There are also regular complexities, such as battery power, distinctions between particular physical characteristics, and variations in the environment.

4. **Kumar, M.P. and Nelakuditi, U.R., 2019, December. IoT and I2C protocol based Mhealth medication assistive system for elderly people. In *2019 IEEE 16th India Council International Conference (INDICON)* (pp. 1-4). IEEE.**

   IoT based Medication Assistive System was proposed and developed to facilitate medication adherence. The proposed system incorporates features such as sending a message to a medical practitioner one week ahead to remind the status of medicines and also buzzer beep to ensure the attendance of a candidate which is not available in existing software remainders. It can perform the task even though internet is not available physically by using NodeMCU and Blyank app. The proposed system assists older people in reminding medication timings as well as selection of medicines. It also reduces the dependency of old people on younger generations. Design can be realized at a lower price due to the availability of intelligent programmable hardware at an affordable cost.

   Advantages
   Medication assistive system for elderly people was implemented in a cost effective manner using Aurdino, RTC, EEPROM etc, which helps them in a better way in their medication process. It facilitates in reminding timings, taking proper medicines for a specific slot, and also obtaining medicines from medical shop automatically. They can even read the status from time to time. This system is very helpful for independently living older people. It is thoroughly tested and accuracy observed is 97%.

5. **Ranjana, P. and Alexander, E., 2018, December. Health alert and medicine remainder using internet of things. In *2018 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC)* (pp. 1-4). IEEE.**

   The study proposed medicine box would help people who are under medication mainly for old persons to take the medicine on time without forgetting. It also continuously monitor

the people's health condition like Blood pressure, ECG through the tensors kept at home and inform them to take necessary action. A person's life can be saved by this system. Human effort can also be decreased by this health alert and medicine remainder. This systems can easily detect the abnormalities in the body condition and also remands of medicine to take through the buzzer and the LCD display. The user relatives or doctors were also informed about the abnormal conditions.

Advantages

The advantage of this is it is a convenient way to use by people of any age and people busy with their work will not forget to take medicine. It also takes care of the people health by alerting during abnormalities.

6. **Ayshwarya, B. and Velmurugan, R., 2021, March. Intelligent and Safe Medication Box In Health IoT Platform for Medication Monitoring System with Timely Remainders. In *2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS)* (Vol. 1, pp. 1828-1831). IEEE**.

   The intelligent medication box proposed in this work have specialized features including six sub boxes which helps to organize six different pills, provides timely remainders for the patient or caretaker in an android application like hand-held devices like smart phone. This intelligent medication box contains bio-sensor for monitoring of temperature and heartbeat. Over dosage and improper intake of medicines may lead to serious issues in health of elderly people to avoid mis-usage of medicines a simple authentication process either by the care taker or the patient himself is performed. The proposed medication is much safer as it clearly intimates about time, dosage, stock of medicine and sorts out different pills in correct sub boxes during the next fill by caretaker.

7. **Amin, R., Saha, T.S., Hassan, M.F.B., Anjum, M. and Tahmid, M.I., 2020, November. IoT Based Medical Assistant for Efficient Monitoring of Patients in Response to COVID-19. In *2020 2nd International Conference on Advanced Information and Communication Technology (ICAICT)* (pp. 83-87). IEEE.**

   The researchers had developed a complete model of monitoring patients at regular intervals through an interconnected network among the doctors, nurses and patients with a view to minimizing the workload of the doctors and nurses, reducing the chances of medical professionals being infected by COVID-19 type of contagious disease and increasing the overall efficiency of patient monitoring in hospitals. Bio-medical sensors interfaced with microcontroller are used to collect the data of heart beat rate, body temperature and body movement to get an overview of the present health condition of the patient. The recorded data are stored in an excel file and updated automatically to the internet via OneDrive in every 30 seconds. In case of any large deviation from the normal condition, an automated alarm system will notify the assigned doctor about the condition of the patient. A medication reminder system is added in our designed android app to notify the patient to

take the medicine prescribed by the doctor at proper time. The patient can also call the nurse in case of emergency and there is also scope for the patient to control the position of the bed according to his comfort. The level of saline or blood injected into the vein of the patient can also be monitored in our system to inform the nurse at the time of being finished.

8. **Kumar, S.B., Goh, W.W. and Balakrishnan, S., 2018, October. Smart medicine reminder device for the elderly. In *2018 Fourth international conference on advances in computing, communication & automation (ICACCA)* (pp. 1-6). IEEE.**

This paper discusses in detail a proposed IoTBased Smart Medicine Reminder Device that will be designed for the elderly based on the issues faced by the elderly. The paper explains the background of the study and the main aim is to ensure that the IoT-Based Smart Medicine Reminder Device will be solving problems faced by the elderly. The issues that have been identified are targeted very much to the elderly and are aimed to solve the issues faced by the elderly on a daily basis, especially with the consumption of medicine. The paper will also explore the similar implemented devices/systems to identify strengths and weaknesses of other relevant devices/systems so that a better device can be developed.

Advantages

- Keep track of their medication
- consumption patterns, receive reminders to
- consume their medications
- Pill restock alert will alert close contacts
- Added level of security
- Multiple methods of reminding use

Limitations

- Lack of health apps integration
- Absence of voice reminder
- Not cross-platform
- Absence of self-deployed cellular connection

9. **Alkandari, A. and Almutairi, N., 2019. Smart medicine drawers using IOS application and Arduino board. *International Journal on Perceptive and Cognitive Computing*, *5*(2), pp.59-65.**

This paper proposed an application running on the iPhone connecting with smart drawers through the Arduino Board. The primary purpose of this application is to organize and remind patients to take their medicines on the accurate time. Drawers can be opened and closed through the application.

Advantage

It reduces workload of doctor and nurses.

Very handy for elder peoples

10. **Al-Mahmud, O., Khan, K., Roy, R. and Alamgir, F.M., 2020, June. Internet of things (IoT) based smart health care medical box for elderly people. In *2020 International Conference for Emerging Technology (INCET)* (pp. 1-6). IEEE.**

The proposed medicine box helps the patient to take the right medicine at the right time along with an email which will help the patient to take the medicine. A laptop is used as a server where detailed information about doctor and patient are stored along with prescription and appointment date. Both doctor and patient have IDs' and password for accessing the server. Also, the data of medication and temperature of patient are stored on the server for doctor's ease. The Doctor can change the patient's prescription if necessary, which will also be notified via email. Moreover, the doctor can take immediate steps in case of an emergency. Older people who need regular monitoring of their medication will be benefited through this project. Server for storing medication time and other information, mail transferring protocol, temperature sensor for proper monitoring of patient body temperature has been integrated in this project.

11. **Bhatia, H., Panda, S.N. and Nagpal, D., 2020, June. Internet of Things and its Applications in Healthcare-A Survey. In *2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions)(ICRITO)* (pp. 305-310). IEEE.**

The paper also presents a comparison between various sensors used in the field of healthcare and their types, the IoT architecture, tools and technologies used to develop IoT systems, and m-Health apps. The objective of the paper is to clarify the concept of IoT to the reader and to make the reader aware of the present trends used in IoT healthcare. Basic Three-level architecture and Five-level architecture for IoT based systems have also been discussed. The commonly used sensors in IoT-enabled or IoTbased healthcare systems have also been discussed. Then, the various tools and technologies used in the development of IoT systems such as hardware platforms like Arduino, Raspberry Pi, Intel's Galileo, BeagleBone, etc. have also been discussed. In the end, various m-health healthcare applications that are available for use to the general public based on IoT have been discussed.

12. **Lu, D. and Liu, T., 2011, December. The application of IOT in medical system. In *2011 IEEE International Symposium on IT in Medicine and Education* (Vol. 1, pp. 272-275). IEEE.**

The study defines concepts of IOT (the internet of things) ,including the structure of IOT and the implementations of IOT functions .It also introduces the telemedicine ,including the advantages of telemedicine and the telemedicine in China . And the paper illustrates the technologies of IOT used in medical system. The application of IOT in medical system

includes clinical care is in-need of the information management in hospital are as follows: identification, sample identification, medical record identification. Using the RFID technology, the doctor can take the bedside sample easily. They can identify the patient's identification; if there are some errors the alert will call the doctor automatically. Secondly, Remote real-time ECG monitoring Mobile communications technology from the current 2.5- generation CDMA and GPRS to the third generation mobile communications development, with the 3G communication technology and promote the use of increasingly sophisticated, 3G mobile communication technology in cardiovascular. Remote areas of health care play a huge role.