INTERNET OF THINGS IN HEALTH CARE

UFCFVK-15-2_Jan 2021

SHIMAZ SHIHAB
S1802025

IoT in Health Care

Abstract

The Internet of Things (IoT) is a computing process in which each physical object is equipped with sensors, microcontrollers, and transceivers to enable communication and is built with appropriate protocol stacks that allow them to interact with one another and communicate with users. Diverse distributed devices aggregate, analyze, and communicate real-time medical information to the cloud in IoT based healthcare, allowing for the collection, storage, and analysis of large amounts of data in a variety of new forms, as well as the activation of context-based alarms. This novel information acquisition paradigm enables continuous and ubiquitous medical information access from any Internet-connected device. Because the battery power of each IoT device is limited, it is best to reduce power consumption to extend the life of the healthcare system. This paper describes the development of an IoT-based in-hospital healthcare system based on the ZigBee mesh protocol. The implementation of a healthcare system can monitor the physiological parameters of in-hospital patients on a regular basis. Thus, IoT-enabled devices simultaneously improve care quality through regular monitoring, lower care costs, and actively participate in data collection and analysis.

Introduction

Healthcare is one of the most important uses, as there is a growing interest in people wearing smart watches to monitor their movements during exercise or athletics. This type of machine not only monitors the various readings but additionally maintains track of everyday routine by continuously observing and tracking the various physiological parameters. Since regular routine information is provided, this type of experience assists doctors in identifying the various conditions causing the illness. As these readings area unit on the market inside the data, call support systems can be used for care, as early identification may be in hot water up the level of health in accordance with the lifestyle embraced. A slew of wearable patient monitoring devices has hit

the market; they have no impact on the practitioner's need for expertise for classification. Throughout this work, an effort is made to identify the various patient health criteria that are acceptable to medical practitioners. An element in IOT may be a mobile vehicle outfitted with sensors to warn the driver, or another computer that could be linked, and would be given a science discipline address in order to transmit data across a network.
IoT has grown to collect knowledge from items all over the world. Most people have little time, energy, and precision. IoT collects information without the user's assistance. IoT needs natural philosophy engineers and technology developers to work on products and programs.

Health Care with IoT

In medical applications, data is obtained from different sensors, analyzed by a microcontroller, and transmitted to Wi-Fi-enabled computers, allowing machine-to-machine connectivity, which is the foundation of IOT. In this job, IOT devices are connected to a cloud network through thing view web services, where captured data can be processed and analyzed using Mat lab analytics. Around 2015 and 2020, the healthcare IOT market will expand by 37.6 percent. IoT allows users to get personalized care for their health needs; the machines may be programmed to remind them about their appointments. During a nurse's change, the data gathered by the other party is out of reach, making it impossible to check up on the patient's condition until the doctor arrives. Medical devices such as nebulizers, pumps, wheelchairs, weights, defibrillators, or testing equipment may be linked to sensors, allowing IOT to accurately identify the equipment. Clinicians can locate patients who are recovering from post-anesthesia treatment thanks to the intervention of IOT. The patients can be tracked in real time. As long as the patient's knowledge is stored in the cloud, medical personnel can view it.

Why is IoT a big deal for healthcare?

To all intents and purposes, IoT in healthcare has begun to pave its way and is now being used as a practice among caregivers and patients, changing the way patient care was defined in previous decades. The healthcare industry has almost given up hope due to higher-than-ever healthcare costs,

an aging global population, and an increase in the number of chronic diseases. The Internet of Things in healthcare is coming to its rescue, from X-ray machines to patient monitoring units and hospital meters that help improve operations and patient care. Although the use of the internet and technology does not prevent the population from aging or help eradicate chronic diseases, it does significantly contribute to making healthcare services more accessible, better, and less expensive.

IoT in healthcare has been embedded in current procedures and systems, primarily in the context of real-time remote patient monitoring, health data collection and transfer, end-to-end connectivity that aids in patient flow automation at the organizational level and helps to enable interoperability, data movement, vital information analysis and exchange, and machine communication. In the case of medical diagnostics, IoT has aided in the transformation of routine medical check-ups to be more patient and home centric rather than hospital-centric. IoT in healthcare has thus helped to re-define monitoring, diagnosis, treatments, and therapeutics from traditional healthcare perspectives, reducing costs and errors.

National healthcare departments in almost every country around the world are under duress from increasing user demands for their services as well as appalling underfunding. The Internet of Things is likely to contribute to more efficient and accessible HealthCare. National healthcare departments in almost every country around the world are under duress from increasing user demands for their services as well as appalling underfunding. The Internet of Things is likely to contribute to more efficient and accessible healthcare. Equipping objects with sensors to monitor their surroundings and including a communicative internet connection are likely to provide the greatest ability for organizations to collect data and report back in real time. On a more practical level, IoT allows for more effective tracking of vital and expensive equipment, indicating an increasing appetite for IoT devices in the healthcare industry.

IoT devices used in HealthCare:

Temperature sensor-DS18b20

The temperature sensor DS18b20 is used, which has three input pins: VCC, field, and DQ. Maxim created a digital sensor with a single cable. Temperature can be measured in degrees Celsius or Fahrenheit with a resolution of 9 to 12 bits. This sensor exchanges temperature readings through a single wire interface, which was designed by Dallas Semiconductor. This sensor has a serial code of 64 bits. This code allows a temperature sensor to be attached to a single wire bus, allowing data to be accessed via Arduino This temperature monitor measures temperatures ranging from -55°C to +125°C. Power is supplied to this sensor in two ways: one via an external power supply to the VDD pin, and the other via parasite power mode, in which the DQ pin is pulled high, allowing the temperature sensor to draw power. The sensor's DQ pin is connected to the Arduino's 12th pin. The sensor can be conveniently interfaced with Arduino and programmed using the Dallas temperature libraries and one cable.

Heart rate monitor

When light is dispersed or discovered, there may be a power difference in its course through the blood as the pulse changes; therefore, a scanner tracks the heartbeat. The amount of sunlight absorbed is proportional to the amount of blood present in the skin. The vital sign is assessed by a victimization clip type detector during this job. It operates on the basis of an image measuring system. On either side of the clip, the detector has an infrared LED (IR) and a lightweight based resistance (LDR). Throughout the contraction and expansion of the guts, blood flows inside the finger. The clip is wrapped around the patient's finger. Lightweight is sent to the LDR from the IR detector as blood flows through the arteries. There is no lightweight released to LDR as blood flows into veins. This blood flow is counted every ten beats. Arduino has a built-in timer that runs indefinitely. That the timer reading is noted after the pulse begins and that the count is measured for ten beats. For one beat, the speed is calculated as follows:

Rate (1beat) =rate / 10

Generally, doctors calculate heart rate for one minute. So using the formula

1 min= 60*1000 /rate

This is how the system obtains a one-minute heart rhythm. The heart rate sensor, along with VCC and field, is attached to the Arduino's eighth pin.

Remote Medical Assistance

Remote medical assistance, in which connected devices monitor a patient's conditions at their home, is one of the largest and fastest growing areas of healthcare and IoT. Smart devices take readings, observe behavioral patterns (often automatically), and can notify medical professionals if there is an anomaly. This is especially true for elderly patients, as well as vulnerable patients or those suffering from long-term chronic conditions. It cuts down on in-person visits and allows patients to manage their care from home.

Smart Glucose Monitoring

Diabetes affects one out of every ten adults, necessitating ongoing monitoring and treatment. A Continuous Glucose Monitor, which takes readings at regular intervals, assists diabetics in monitoring their blood glucose levels. The data is then transmitted to a smart phone app, allowing for remote monitoring – ideal for parents of diabetic children or relatives, as well as the elderly or vulnerable patients. Smart insulin pens record the time, amount, and type of insulin dosage automatically and store long-term data on a smartphone app.

Hospital Operation

Optimizing a hospital or healthcare center can take many forms; for example, cutting unnecessary costs and streamlining daily functions are just two examples of how IoT can add real value to a medical facility.

Millions of dollars are lost each year as a result of lost or stolen equipment, which has a significant impact on patient care and resources.
By attaching sensors to equipment, hospital staff can track any piece of equipment in real time, which not only reduces theft but also allows tracking of overall equipment use.
Furthermore, by tracking usage, administrators can better understand when to replace or perform maintenance, avoiding downtime.

Research

Much of today's medical research lacks critical real-world information, instead using controlled environments and volunteers. IoT opens up a sea of valuable data and information through analysis, real-time field data, and testing, delivering far superior, more practical, reliable data. This, in turn, yields better solutions and discovery of previously unknown issues.

The main health benefits of IoT include:

- Cost reductions: IoT enables patient surveillance in real time, thereby substantially reducing unnecessary doctors, hospital stays and re-admittances
- Improved treatment: it allows physicians to make informed decisions based on evidence and provides complete transparency
- Quicker Fault Diagnosis: Continuous patient monitoring and real-time data help diagnose disease early, or even before symptoms develop.
- Proactive treatment: Continuous monitoring of health opens doors for proactive treatment
- Management of drugs and equipment: Management of medicines and medical supplies in the healthcare industry is a big challenge. These are efficiently managed and used with reduced costs by connected devices
- Reduction of errors: Data generated by IoT devices not only help to take effective decisions, but also provide for smooth healthcare with lower errors, waste and system costs.

Conclusion

IoT is a combination of various technologies that facilitate interaction between a diverse array of appliances, devices and objects using various networking technologies. To date, people provide a large proportion of the information available on the Internet. Provide information for IoT smart objects. The main focus of this work is the broad range of IoT-based applications including medical services. Healthcare systems use interconnected smart devices to create an IoT network to analyze, monitor the patient and automate situations in which a medical involvement is required.

Reference

- Mars, M., 2018. 22nd Conference of the International Society for Telemedicine and eHealth and Moroccan Society for Telemedicine and eHealth 2017 - Casablanca 2017. *Journal of the International Society for Telemedicine and eHealth*, 6.
- Busdicker, M. and Upendra, P., 2017. The Role of Healthcare Technology Management in Facilitating Medical Device Cybersecurity. *Biomedical Instrumentation & Technology*, 51(s6), pp.19-25.
- Busdicker, M. and Upendra, P., 2017. The Role of Healthcare Technology Management in Facilitating Medical Device Cybersecurity. *Biomedical Instrumentation & Technology*, 51(s6), pp.19-25.
- O.O, O., K, Z., O.A, R. and T, Z., 2013. Ubiquitous Healthcare Monitoring System Using Integrated Triaxial Accelerometer, Spo2 and Location Sensors. *International Journal of UbiComp*, 4(2), pp.1-13.
- Mars, M., 2018. 22nd Conference of the International Society for Telemedicine and eHealth and Moroccan Society for Telemedicine and eHealth 2017 - Casablanca 2017. *Journal of the International Society for Telemedicine and eHealth*, 6.
- Alareqi, M., Al-Wesabi, F., Zahary, A. and Ali, M., 2018. A Survey of Internet of Things Services Provision by Telecom Operators. *EAI Endorsed Transactions on Internet of Things*, 4(14), p.155571.
- Mars, M., 2018. 22nd Conference of the International Society for Telemedicine and eHealth and Moroccan Society for Telemedicine and eHealth 2017 - Casablanca 2017. *Journal of the International Society for Telemedicine and eHealth*, 6.
- Alareqi, M., Al-Wesabi, F., Zahary, A. and Ali, M., 2018. A Survey of Internet of Things Services Provision by Telecom Operators. *EAI Endorsed Transactions on Internet of Things*, 4(14), p.155571.
- Alareqi, M., Al-Wesabi, F., Zahary, A. and Ali, M., 2018. A Survey of Internet of Things Services Provision by Telecom Operators. *EAI Endorsed Transactions on Internet of Things*, 4(14), p.155571.
- Alareqi, M., Al-Wesabi, F., Zahary, A. and Ali, M., 2018. A Survey of Internet of Things Services Provision by Telecom Operators. *EAI Endorsed Transactions on Internet of Things*, 4(14), p.155571.