

PROJECT WRITEUP

Group ID:			
Register No.	Name	E-mail:	Telephone No
AM.EN.U4CSE14030	HARITHA H	haritha.h20@gmail.com	+918281981806
AM.EN.U4CSE1428	H CHAITHANYA	chaitanya7991@gmail.com	+919746150526
Name of Guide: Ramya R			

Research Area of the Project:

Research Area: Development of healthcare data analytics tools for IoT based monitoring

The project is based on design a prototype application that interfaces multiple IoT devices to collect the patient's health data and help doctors to visualize the patient's data in an web/mobile interface. We basically aim to collect the vital data from a remote patient. The project is part of a healthcare research work being carried out at Amrita Center for Wireless Networks and Applications for developing remote patient monitoring systems.

Topics Covered: IoT devices, IoT data interface using iHealth OpenAPI v2, implementing and pilot deployment of scalable server program using Tornado framework, implementing RASPRO severity detection using python backend analytics (Anaconda) framework and a responsive web front-end using Python and Bootstrap.

Relevance of the Area:

Internet of Things being the concept of everyday objects - from industrial to home appliances, tops among the latest innovations is making our life really simple. Medical field is one such field where technology has drenched well, thereby helping mankind. This project focusses on the emerging digital health field with the help of IoT.

IoT plays a significant role in broad range of healthcare applications from managing chronic diseases at one end of the spectrum to prevent the other..It has opened up a gateway for us to collect, record and analyse data that was not accessible before. The following are the some elementary advantages of IoT in the field of digital health.

1. *Remote Monitoring*: With the advantage of connectivity of health care solutions patient monitoring can be done on real time basis thus significantly cutting down the unnecessary visits by the doctors.
2. *Improved Disease Management*: This provides us with a improved disease management where they are continuously monitored on a regular basis and thereby reducing the chances of the disease getting out of hands.
3. *Minimisation of Errors* : With a wider use of internet we get to fetch more accurate data and automatic workflow thereby reducing the dependency on humans and the errors.

Literature Survey:

Paper 1 Title: **Health Care Applications of Internet of Things**

Author1 Name: Alok Kulkarni

Author1 Name: Sampada Sathe

Authors Affiliation: Department of Electronics and Communication, Computer Engineering,
Pune University, Maharashtra

Summary: Connectivity from just telephones to objects have introduced us to the world of IoT, which was introduced to us by Kevin Ashton. With wide variety of applications like in enterprise, utilities, mobile etc, health care ranges as one of the most important field. One of the motto of health care via IoT is to implement *personalised health care* i.e right healthcare for right person at the right time. Basically there are two types of IoT based health cares which are Clinical and Remote where we would be focusing on implementing the Remote health care. The paper has focussed on explaining the different technological frameworks involved here. The use of wireless sensor networks with the help of gateways have been explained in all the three different ways like Independent Network, Hybrid Network and Access Point Networks. Intelligent systems provide the clinicians with easier access to health informations, streamline costs. We have exciting applications like Monitoring aging family member using the ultrasound based technology. Similarly we can get to monitor heartbeat rates, ECG, respiration rate, blood pressure and additional vitals so we can understand the cardiac arrest due to unexplained roles.

Paper 2 Title: **Discovering Vital Trends for Personalised Health care Delivery**

Author1 Name: Rahul Krishnan

Author2 Name: Eknath Rangan

Authors Affiliation: Amrita Center for Wireless Networks and Applications

Summary: Remote Monitoring of Patients commonly called as RPM or the homecare telehealth is digital health care to get routine data with the help of wearable IoT sensors and send to the test

data to health care professional in real-time. RASPRO or RAPid Summarization of effective PROgnosis is a framework, developed by the Amrita Center for Wireless Networks and Automation. One of the main problem the current gadgets undergo is summarization of the voluminous sensor data and present them in a meaningful way. Another evident factor is that it is not just enough to compare the data to medically accepted threshold but also to the variations in the previous records of the patient or to others. RASPRO is a framework which involves the implementation of simple and smart algorithms for summarization for large medical time-series data. It converts the continuous signals of the patient's vital to medically accepted severity bands and later on compares with the respective thresholds.

Paper 3 Title: **Health Monitoring and Management using Internet of Things (IoT)**

Author1 Name: S M Riazul Islam

Author2 Name: Daehan Kwak

Authors Affiliation: UWB Wireless Communication Center, Inha University, Incheon, Korea

Summary: Medical care and health care represent one of the most attractive application areas for the IoT. Compliance with treatment and medication at home and by healthcare providers is an important potential application. IoT-based healthcare services are expected to reduce costs, increase the quality of life, and enrich the user's experience. From the perspective of healthcare providers, the IoT has the potential to reduce device downtime through remote provision. In addition, the IoT can correctly identify optimum times for replenishing supplies for various devices for their smooth and continuous operation. Further, the IoT provides for the efficient scheduling of limited resources by ensuring their best use and service of more patients. Ease of cost-effective interactions through seamless and secure connectivity across individual patients, clinics, and healthcare organizations is an important trend. Up-to-date healthcare networks driven by wireless technologies are expected to support chronic diseases, early diagnosis, real-time monitoring, and medical emergencies. Gateways, medical servers, and health databases play vital roles in creating health records and delivering on-demand health services to authorized stakeholders.

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