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Internet of things based Smart Watch for Health Monitoring of Elderly People

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Abstract

The Internet of Things (IoT) has developed quickly during late years, asking its clients tomake utilization of different in-line anyplace and whenever. Part of (IoT) is the smartwatchand other wearable innovation gadgets. The boundless utilization of these gadgets enablestheir clients to have quick admittance to various medical information and proactive tasks. The particular highlights of smart watches encourage numerous clients to take on this technology; these features incorporate matching with cell phones to uncover different phonefeatures, giving notice, giving watch countenances and timekeeping capabilities. Wearable gadgets have showed up as a critical instrument that can assist with estimating physiological boundaries, for example, pulse and blood vessel circulatory strain to reach thefinal objective, which improves medical services effectiveness.

Keywords: Internet of Things (IoT),Internet of Medical Things,IFTTT

I. Introduction

The health of older patients can be checked over the internet by their kids or specialists. In smart urban communities, the hospitals are smart with the end goal that patient healthcare can be checked from a distance by utilizing Internet of Medical Things (IoMT).An embedded medical equipment associated with the internet is called Internet of Medical Thing (IoMT) gadget. The IoMT model are X-Ray Machine, Electrocardiogram (ECG) machine, Heartbeat pacemaker PC, PC, smart telephone or camera all associated with the internet. Modern smartphones also, related gadgets currently contain more sensors than any other time in recent memory. Information from sensors can be gathered all the more effectively and all the more precisely [1]. In 2021, it is assessed that 46 million individuals are utilizing IoT-based health and wellness applications. As of now, the dominating IoT-based health applications are in sports and wellness. In any case, sickness the board or preventive consideration health applications are turning out to be more common. For instance, the ongoing preventive consideration applications, for example, those for distinguishing falls in old patients is one of the dynamic examination regions because of the maturing populace [14]. Past work in fall identification required specific equipment and software which is costly to keep up with. The sensors sense different actual healthcare boundaries like, glucose level, pulse, heartbeat checking, and internal heat level and so on. The sensed information is shipped off the e-health gateway [2].

From the door switch the patient healthcare information is shipped off the internet. From internet the patient health care information can be gotten to universally for medical services. The patient healthcare information can likewise be put away in enormous cloud server farms like Amazon AWS, Google Distributed storage and so on. This is called internet of medical things (IoMT) technology. The IoMT can likewise be fueled by energy gathering methods has shown sun based energy collecting for IoT hubs which can be utilized in IoMT to broaden the organization lifetime[3].

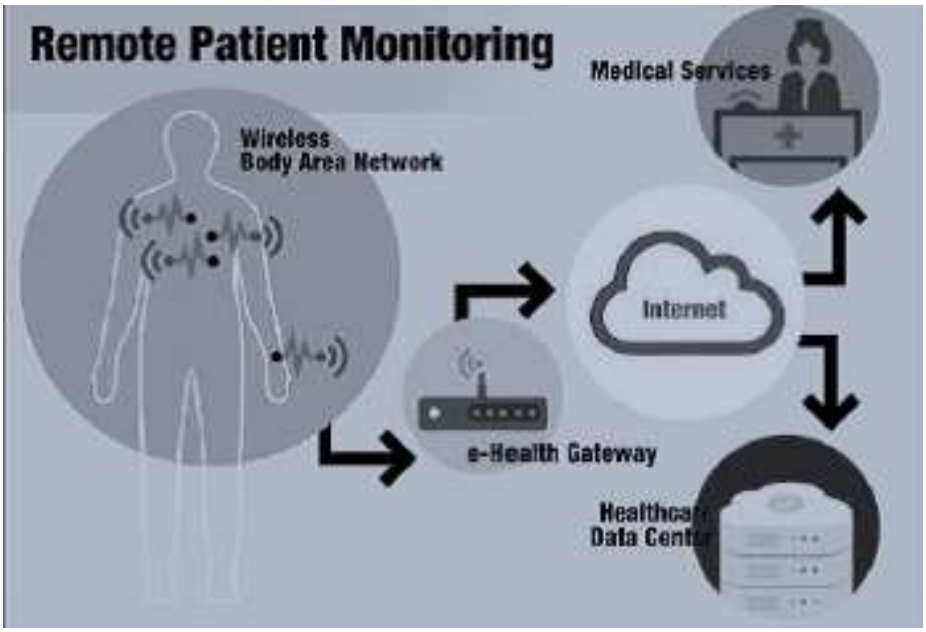

Figure 1: Remote Patient Monitoring

II. System Architecture

The Microsoft Band 2 was picked as the wrist worn gadget over different choices because of its unrivaled rundown of sensors. While most wrist worn health gadgets today have accelerometers, for example, the Apple and Rock smart watches, the Microsoft Band 2 has the ability to likewise follow pulse, galvanic skin reaction, barometric strain, skin temperature, UV beam intensity. The essential block outline of Arduino based patient health care observing. Here, the three actual health boundaries of the patients are estimated utilizing sensors for example heartbeat sensor, Temperature sensor, and humidity sensor [4]. The deliberate health information is shipped off the Arduino microcontroller. The Arduino sends the healthcare information to the LCD show, Bell and Wi-Fi module. From the Wi-Fi module information is sent over the internet to the specialist for observing and control actions. The parts are Arduino UNO Board, WSP8266 Wi-Fi Module, Heartbeat Sensor, 16*2 LCD Show, Resistor 1k ,2k, Drove, Breadboard and Wires. The Arduino UNO board is associated with the framework and the android applications. The program code is set on the Arduino studio which measure the beat pace of the patient utilizing beat sensor. Notwithstanding, the smartphone has a restricted stockpiling limit and there is subsequently a need to occasionally eliminate the sensed information or move the sensor information (with assent from client) to a cloud server safely for nonstop refinement of the fall location model furthermore, for the long haul recorded[5]. The internal most layer fills in as the cloud stage which comprises of different services including a web server to have applications that can picture collected sensor information for general health training, a sensor data set for documenting sensed information from the smart watch of the client who has given the assent, and machine learning services for examination of the chronicled information for nonstop refinement of the fall recognition model.

III. Methodology

Our underlying technique for gathering mimicked fall information was work escalated and had the risk of missing some basic fall signals. In that methodology, the accelerometer information was gathered by means of a smart watch through the information assortment administration we fostered

that sudden spikes in demand for an Android telephone. The information was gathered at the examining recurrence of 250 Ms.

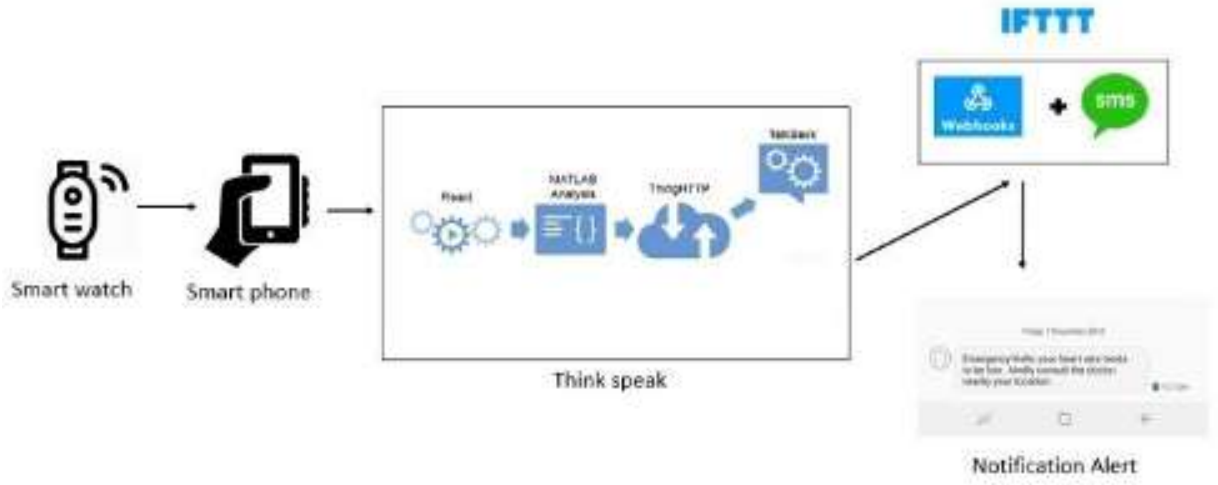

Figure 2: Block Diagram & Connections

A stopwatch was utilized to record the time stamp of each fall movement from the selected worker as it happened so the fall information can be physically marked subsequently by synchronizing stopwatch's experience with the recorded timestamp on the data of interest. This marking was clearly very tedious [6]. we found that the information inspecting recurrence of 250 ms missed such a large number of basic fall signals inside the basic period of a fall, which makes sense of incompletely the low precision pace of 44.7% we got with real-world reproduced falls utilizing the SVM model prepared with this dataset. Then again, the utilization of the least examining recurrence of 16 ms given by the watch was flooding the application with a lot of information and caused a high calculation cost which is unfeasible for constant expectation of falls. Figure 3 portrays fall information gathered utilizing testing recurrence of 250 ms refrains 32 ms. It is obvious from this representation of the accelerometer information that fall information gathered at 32ms inspecting rate has plainly isolated fall signals with the spikes[7].

Figure 3: Patient ECG & Blood Pressure Monitoring on Smart Watch

Next to making changes to the testing recurrence, we additionally changed the information assortment administration to have a button that, when squeezed, marks information as "Fall" and in any case "Not Fall". This disposed of the relentless manual marking of the information. Information was marked in real-time as it was gathered. Seven subjects of good health with various levels and loads were enrolled and played out the falls and Movement of Day to day existence (ADLs). Their ages went from 21-55, level went from 5 ft to 6.5 ft. furthermore, the load from 100 lbs to 230 lbs. Each subject was told to wear the smart watch on his/her left hand and played out a pre-decided set of ADLs comprising of: running, plunking down, tossing an item, also, and waving their hands [8].

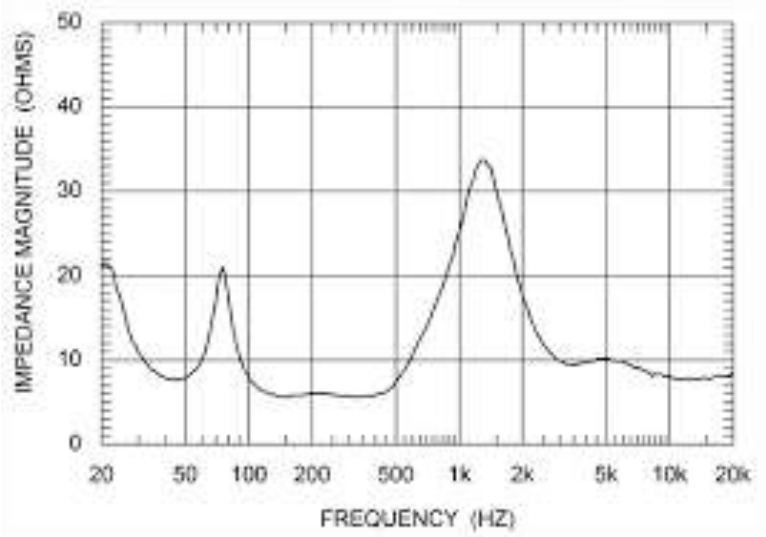

Figure 4: ECG Results in Thing speak

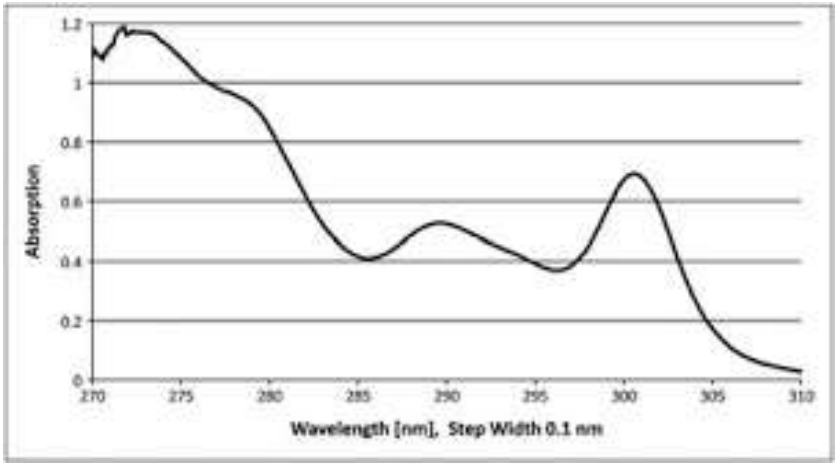

Figure 5: PPG Results in Thing speak

1. Thing Speak

Internet of things or IOT is one of the cutting edge advancements which are as a team with the healthcare and medical applications to convey out the suitable outcomes. IOT will be a soaring in impending a long time to smooth out the whole cycle. This driving innovation has improved on the undertaking of the guide professionals. This assists with getting to information and information through smart gadgets which must be worn in human body to screen the patient's

fundamental boundaries reliably [9]. There are different cloud servers which can be utilized for investigation. In this venture we utilized Thing speak IOT cloud which is the Matlab examination cloud in which the information's can be gathered, deciphered put away and broke down under different circumstances. In cloud part we are dissecting the heart, whether it is in cardio, ordinary and unusual condition which is based on tolerates pulse and age factor.

2. **IFTTT**

This is the web-based service supplier which can be utilized for server-to-server correspondence. It assists with making basic restrictive proclamation which is called as applets. There are numerous applets in this IFTTT server. These applets spring up when there is a trigger in that associated stage like cloud or other online entertainment and different channels; here we are interfacing the thing talk cloud with this IFTTT for trigger. It can robotize the web application errands there are different computerization applets are there for different cases.

IV. Experimental Results

We can easily find whether the individual is in typical or abnormal condition. Made an algorithm for finding the ordinary as well as abnormal heart rate on the off chance that the condition bombs the trigger has been given to IFTTT. This will advance an emergency alert to concern patient's connection as displayed in the Figure 3.

The recorded signals can be saved as a log utilizing this application. This application constantly screens the heart boundaries with next to no postponements. In this application we had connected the Thing speak cloud API for pinging the savvy and Thing speak cloud for data communication. At last, crude data are shipped off cloud for additional examinations in Thing speak analytics cloud.

V. Conclusion

This smart framework consistently screens patient's health by procuring imperative boundaries through particular sensors embedded in wearable devices (Smart watch). Devices are associated with smartphone through application and smartphone to IoT cloud thing talk where patient's sensored information investigating is finished. On the off chance that found any irregularities a notice alert is sent by IFTTT to patient's PCP and relatives. The smart healthcare observing framework is intended to deal with an android Smartphone or windows computer. If the ECG and BP arrives at the typical worth, then, at that point, the specialist promptly cautions the emergency clinic staff by call and the patient’s life can be saved.

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