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IOT BASED HEALTH CARE SERVICES USING IMEDBOX

R .Aarthi, B. Mythili, S.Sangeetha
Department Of Computer Science and Engineering,
Cheran College of Engineering
Dr.S.Selva brunda, **Professor of CSE**
Ms.K.Kalaivani, **Assistant Professor of CSE**

ABSTRACT:

The rapid development of internet of things (IOT) technology makes it possible for connecting various smart objects together through the Internet and providing more data interoperability methods for application purpose. Recent research shows more potential applications ofIOT in information intensive industrial sectors such as healthcare services. This project proposes an IOT architecture which depicts the modern healthcare IOT platform with an Intelligent Medicine Box [IMEDBOX] contains monitor heart rate, intake medicines timings, checking the correct medicines andfindingpatient's locations where the patient along with sensors for health monitoring and diagnosis is proposed here. Health care services based on Internet of Things have great potential in medical field. AnIMEDBOXwith wireless connectivity along with an android application (Health-IOT) that helps patients and doctors to be in a more close communication. The box is wirelessly connected to internet to make timely updates about medicines which will be notify in the android application with in patient's smartphone. This IOT application in the health care involvessensors for reading the human heart rate in digital format and checks the pulse rate. Another IOT application is to find the patient's locations using internet and GSM modem. This IMEDBOX contains an which is used for emergency purpose. In case of emergency, if the patient presses key an automatic message will be sent to the area ambulance.

Keywords:IMEDBOX, Health IOT, sensor, GSM modem, smart phone

1. INTRODUCTION:

The concept of the Internet of Things first became popular in 1999. If all objects and people in daily life were equipped with identifiers, computers could manage and inventory them. Nowadays, a promising trend in healthcare is to move routine medical checks and other health care services from hospital to the home environment .The Internet of Things (IOT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure creating opportunities for more direct integration between the physical world and computer based systems, and resulting in improved efficiency, accuracy and economic benefit. The Internet of Things is the idea of everyday objectswith network connectivity. So rather than just phonesand computers being connected to the internet itwould also be cars, washing machines, thermostats,televisions, street lights and just anything else. Thisconnectivity would not only allow controlling themfrom afar but also allow them to communicate andshare data with one another.

2. EXISTING METHOD:

A specific works measures at frequent period of time. What this means is that the individual is psychologically and physically fit and leading a frequent life. This informs us that the overall well-being of the individual is at a certain standard. If there is decrease or change

in the frequent activity, then the health and fitness of the individual is not in the normal state. Older individuals desire to lead a private lifestyle, but at old age, individuals become vulnerable to different accidents, so residing alone has high risks and is repeated. Growing amount of research is revealed these days on development of a system to monitor the actions of an seniors individual residing alone so that help can be provided before any unexpected situation happened. Existing continuous monitoring systems (e.g., Holter system)are usually uncomfortable and inconvenient for long-term use,due to their physical limitations, e.g., large size, rigid package,and twisted wires.

3. PROPOSED METHOD:

A brilliant house tracking program centered on Iot has been designed and made to keep track of and evaluate the well-being of older people living alone at your house environment. Wellness of seniors can be evaluated for forecasting unsafe situations during tracking of regular actions. The designed product is brilliant, robust and does not use any digital camera or perspective receptors as it intrudes privacy. With different survey among seniors we find that it has a huge acceptability to be used at your house due to nonuse of you or perspective centered receptors. The brilliant software, along with the electronic program, can observe the usage of different household appliances and recognize those actions to determine the well-being of the elderly

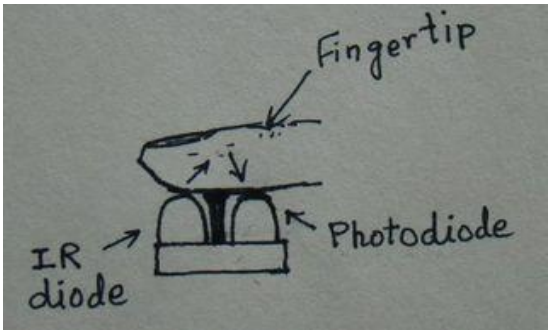
4. HEARTBEAT SENSOR:

The Heart Beat Sensor provides a simple way to study the heart's function. A person's heartbeat is the sound of the valves in his/her's heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heart beat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse.

Heart rate is a very vital health parameter that is directly related to the soundness of the human cardiovascular system. This project describes a technique of measuring the heart rate through a fingertip using a PIC microcontroller. While the heart is beating, it is actually pumping blood throughout the body, and that makes the blood volume inside the finger artery to change too. This fluctuation of blood can be detected through an optical sensing mechanism placed around the fingertip. The signal can be amplified further for the microcontroller to count the rate of fluctuation, which is actually the heart rate.

4.1 SENSOR ASSEMBLY:

The sensor unit consists of an infrared light-emitting-diode (IR LED) and a photo diode, placed side by side, and the fingertip is placed over the sensor assembly.The IR LED transmits an infrared light into the fingertip, a part of which is reflected back from the blood inside the finger arteries. The photo diode senses the portion of the light that is reflected back. The intensity of reflected light depends upon the blood volume inside the fingertip. So, every time the heart beats the amount of reflected infrared light changes, which can be detected by the photo diode. With a high gain amplifier, this little alteration in the amplitude of the reflected light can be converted into a pulse.



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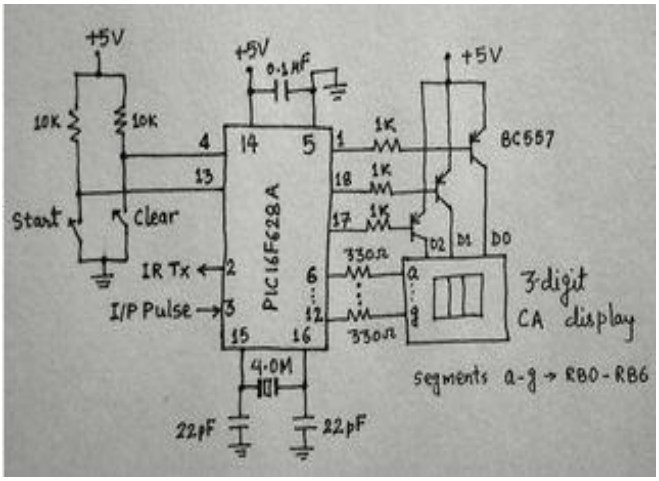
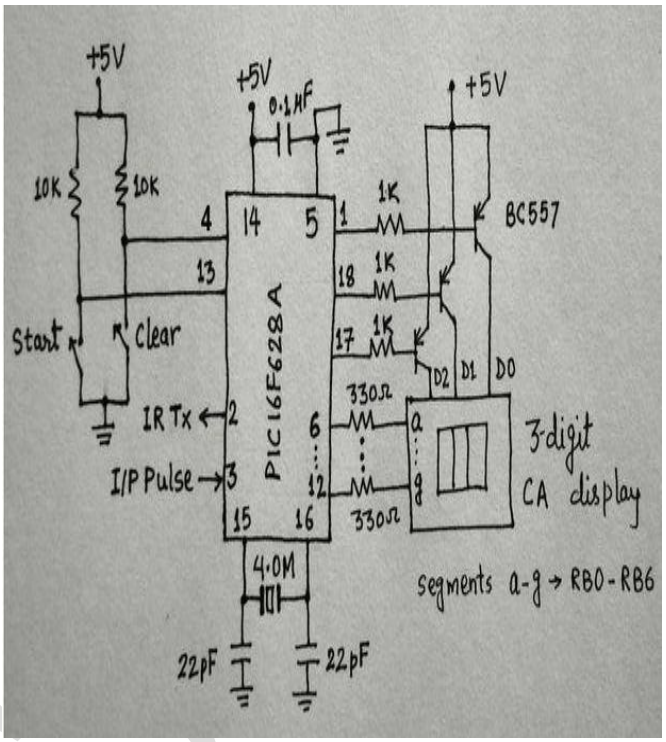
4.2 SIGNAL CONDITIONING CIRCUIT:



The reflected IR signal detected by the photo diode is fed to a signal conditioning circuit that filters the unwanted signals and boost the desired pulse signal. The circuit diagram above shows the IR LED (D1) and the photo diode (D2) along with the signal conditioning circuit made of two stage operational amplifiers configured as active low pass filters. The cut-off frequencies of both the filters are set to about 2.5 Hz, and so it can measure the pulse rate up to 2.5*60 = 150 bpm. The gain of each filter is about 100, which gives the total 2-stage amplification of 10000. This is good enough to convert the weak pulsating signal into a TTL pulse. Note that at the input of each OpAmp filter stage, there is a 1 uF capacitor to block any DC component in the signal. At the output is connected a LED that will blink with heart beat. The cathode of LED gets the ground path through the collector of BC547 transistor. In order to save the battery life, the transistor is turned on for 15 seconds by PIC16F628A microcontroller while the measurement is going on. The number of pulses counted within this interval is multiplied by 4 to get actual beats per minutes (bpm).

4.3 MICROCONTROLLER AND DISPLAY CIRCUIT:



The PIC16F628A runs at 4.0 MHz using an external crystal. The two tact switches are used for Start and Clear functions. You should rest your fingertip on the sensor assembly before pressing the Start button. You can use fore finger or middle finger for this. Once the Start button is pressed, the microcontroller turns on the BC547 transistor (in the signal conditioning circuit). This turns the IR LED on, and the LED starts blinking with the fluctuation in the blood volume inside finger arteries. After 15 seconds, the measurement is completed and the result is displayed on a 3-digit seven segment LED display.

5. MEDICATION REMINDER:

Peoples are often forget to take their medicines because of some work and tension. Memory loss is common in old aged people so they forget to take medicines on correct time. Poor eyesight is one of the main problems in elder people. Medicines are kept in Intelligent medicine box (IMEDBOX). The IMEDBOX is

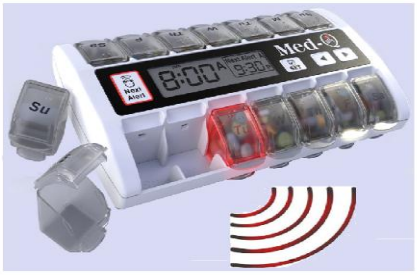
connected to the internet and doctor can view immediately.

There are less chances for taking the medicines at correct time. If patient take the wrong medicine means buzzer will be ringed. In that IMEDBOX speaker module is connected if the patient take wrong medicine means speaker will be activated.

In that IMEDBOX tablets are placed that are sensed by IR sensor. If tablets are there the radiations are passed and emitted. Suppose if we take the medicines at 8 AM the buzzer and speaker module will be activated. If we not take the medicines on that time means the messages is sent to the doctor. If we taken the medicine means it is correct or not the message is also send to the doctor. If patient take wrong medicine, message is send to the doctor, immediately the doctor can prescribed the correct medicine. The interesting functionality is the chat application which helps in doctor and patient communication. When there is a change in the dosage of medicine it will be updated through the application. The app also provides alerts when its time to take medicine. The message is not only send to the doctor also the message or call can be send to the doctor's assistant.

The patient which tablets ate to take and how much to take is indicated in speaker module. If we take too much or less medicine means the message is sent to the doctor also the speaker and buzzer will be ringed. If there is no tablet means the IR sensor not sensed. So the message is sent to the doctor automatically there is no tablet in IMEDBOX at that time the doctor prescribed the new medicine. When the time comes for taking the medicines, the IMedBox will activate an audio or video reminder (considering the difficulty of reading prescription labels for patients with a visual impairment or hearing loss) automatically.

a) Sensing the tablets



b) Displayed in patient smartphone

6. PATIENT LOCATION TRACKING:

This IMEDBOX is portable one wherever we can go taken it easily. In that IMEDBOX GSM modem is placed it is used to track the patient location. In case it is very emergency press the buzzer in IMEDBOX and it is automatically called area ambulance and also message is send to the doctor's smart phone . Immediately the doctor's prescribed the medicine.Every 30 minutes the patient location is directly send to the doctor and his/her assistant

6.1 GSM MODEM:

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this Display Message on Notice Board using GSM 900 modem will be that you can use its RS232 port

to communicate and develop embedded applications. Applications like SMS Control, datatransfer, remote control and logging can be developed easily. The modemcan either beconnectedto PC serial port directly or to any microcontroller. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. This GSMmodem is a highly flexible plug and play quad band GSM modem for direct and easy integration to RS232 applications

7. CONCLUSION:

Doctor can Monitor Patient Health Condition fromanywhere at any time. We can send patient healthparameters like heart beat and temperature to doctor'smobile directly. Doctor can suggest the medicinedepending on patient health condition which candisplayed on the LCD placed at the patient side. Thisinformation also be upload into the server so thatdoctor can monitor for any particular period of timeand can identify the changes in patient health conditionfrom time to time. We can create differ rent login ID'sfor different patients so doctor can access number ofpatients details and can decide to whom he should treat first.

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