

An Efficient Approach for Monitoring the Patient's Condition Using Augmented Reality Technology

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Abstract - Doctors are regularly on the lookout for technologies that will enhance their operating environment. The digital world, the continuing enhancement of the environment has led to number of innovative ideas being highlighted as potential disruptive technologies. Augmented reality (AR) application into healthcare helps to enhance the medical use of data. AR is the addition of artificial information that allows the user to perform the tasks more efficiently. Our system gives doctor a goggle which helps to identify patient's details using augmented reality technology. In a hospital, the details such as patient's temperature, pressure, heartbeat rate, activities of the body and respiration rate are measured for critical patients and alert if any abnormal condition occurs during surgery. Then the doctor can take appropriate action based on the patient's current health condition.

Key Words: Augmented Reality, Sensors, PIC Microcontroller, MP LAB IDE, Wireless Transceiver

1. INTRODUCTION

Augmented Reality interface so far has been used for a great number of task. Augmented reality is the technology that expands our physical world, adding layers to the digital information. Augmented reality can be displayed on various devices such as screens, glasses, handheld devices, mobile head Mounted display, etc. AR plays a vital role in future of medicine. Augmented Reality can help doctors access the latest and most relevant information about their patients. Augmented reality can be used for healthcare professionals in two ways – in the aspect of education, in the aspect of training, and in the aspect of diagnostics and treatment providing access to real-time patient data. We use augmented reality to visualize the basic medical report of the patients.

2. LITERATURE SURVEY

2.1 EXISTING SYSTEM

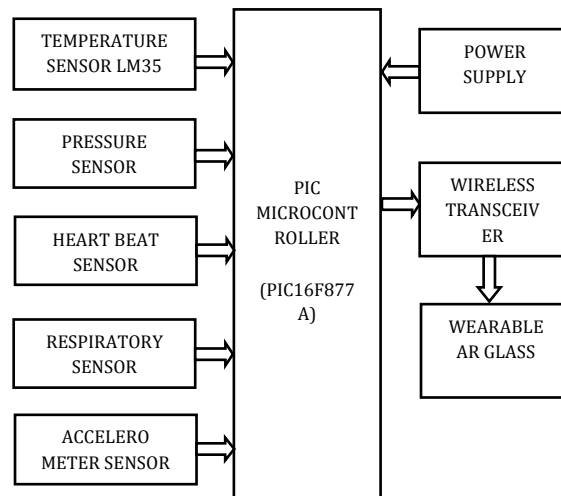
The PIC16F84A Microcontroller is connected to temperature, heartbeat and respiratory sensor. These are placed near the patient's bed. As soon as the patient gets admitted the details are inputted to the microcontroller through the sensors. The information is recorded in the microcontroller and sent to the doctor's goggles through ZigBee transceiver. It measures only limited three body parameters like temperature, heartbeat rate and respiratory rate and its output values are not accurate.

2.2 PROPOSED SYSTEM

Body parameters like heartbeat, temperature, accelerometer, respiratory and pressure are measured using the sensors. The analog outputs from the sensors are given as inputs to the PIC microcontroller and processed. The processed digital outputs are transmitted to the wireless transceiver through ZigBee protocol using HI-TECH software. The output is displayed on the wearable glass using augmented technology.

The patient's basic details such as temperature, heartbeat, accelerometer, respiratory and pressure details are displayed through a LCD monitor connected to the digital pins of the microcontroller. The ZIGBEE transmitter helps to transmit the data to goggle.

3. SYSTEM ARCHITECTURE



4. HARDWARE COMPONENTS

4.1 PIC Microcontroller

Microcontroller are used to monitor and control the system and make it user friendly. Microcontrollers are semi programmable devices so enable the required peripherals and make application hardware. PIC16F877A is one of the most popular microcontrollers which are commonly used to automate the hardware and also make the system user friendly.



Fig-1: PIC16F877A

4.2 Temperature Sensor

A temperature sensor is a device, typically a thermocouple or RTD that is used for temperature measurement through an electrical signal. Thermocouple (T/C) is a temperature sensor device made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature.

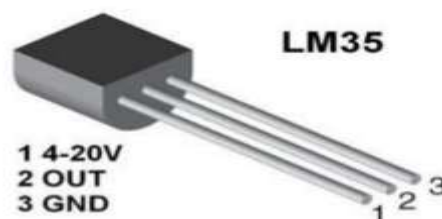


Fig-2: Temperature Sensor

4.3 Heartbeat Sensor

Heart beat sensor gives digital output of heart beat when a finger is placed on it. Output which is in the form of digital can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It is based on the principle of light modulation by blood flow through finger at each pulse.

4.4 Pressure Sensor

The Blood pressure Sensor is a device designed to measure human blood pressure. It measure systolic and diastolic and mean arterial pressure utilizing the oscillometric technique and pulse rate is also reported.



Fig-3: Pressure Sensor

4.5 Respiratory Sensor

A respiratory sensor is a sensitive girth sensor. It is worn using an easy fitting high durability woven elastic band fixed with a length adjustable webbing belt. It detects the chest or abdominal expansion or contraction and gives the output in respiration waveform.

4.6 Accelerometer Sensor

This sensor monitors five different patient positions like standing, sitting, and supine, prone, left and right. It can be helpful for monitoring the body positions and movements made because of their relationships to particular diseases.

4.7 ZigBee IEEE 802.15.4

ZigBee is wireless technology developed in an open global standard for addressing unique needs such as low-cost, low-power and wireless networks. The ZigBee standard operates at IEEE 802.15.4 radio specification and it operates in unlicensed bands of including 2.4 GHz, 900 MHz and 868 MHz, the transmitting range of coverage distances is from 10–100 meters line-of-sight and it depends on power output and environmental characteristics. ZigBee can transmit data over long distances.



Fig- 4: Zigbee Transceiver

5. CONCLUSION

The real-time data of patients in hospital are collected by the sensors attached to patient. The measured sensor values are given as input to the “PIC microcontroller “and the values are processed. The wireless ZIGBEE transceiver receives and displays the real time patient’s body details in augmented reality glass and alert if abnormal condition occurs. The doctor can take respective actions based on the patient’s current health condition. When the doctor enters the patient ward with the goggles as soon as he goes near the patient the information gets transmitted using these information the doctor can analyze the critical patients and treat them first.

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