

### AUTOMATIC PATIENT HEALTH MONITORING BY USING IOT APPLICATIONS

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#### ABSTRACT

The main aim Of This article Is Modify the manual patient health monitoring system to automatic patient health monitoring system by using IoT applications. In present situation we are generally now hospital inside working people like wise doctor, nurse, lab technicians have lot of stress that means they have different kind services to patient consequently above peoples are give irresponsible results to patient parents or relationships. There for patient health parameters are not properly followed. In final stage patient health will be goes to critical

condition. Some situation patient death occur. We get got awareness from above statement so for we designed one module to patient health monitoring in automatically how means this project contain internet of things applications and microelectronics parameters likewise sensors. Now days sensors technology developed in many places, home applications, industrial applications, medical applications. And also different kinds of sensors available in medical fields but we are using only for few sensors. Blood pressure, heart beat, temperature and oxygen related problems has become more critical for patients. So we are implementing an automated blood pressure, heart beat, temperature and oxygen sensing system. The blood

pressure sensing system will give the diastolic and systolic pressure reading on the display. The heart beat sensing system will detect the pulse of heart. The temperature sensing system will sense the changing room temperature. The oxygen sensing system will sense the breath in and breathe out air of the patient in non-invasive manner in which luminescence is generated by oxygen sensitive luminophore. It directly depends on the concentration of surrounding oxygen. The output of the four systems is received on the smart phone via Wi-Fi. The system can prove to be quite handy for the doctor as it will help in minimizing their work. This is a wearable and an easy device. It is combination of hardware and software. It is useful in the diseases like Asthma, Hypoxia, Heart Attacks and Fever.

**KEYWORDS:** GSM, PIC MC, Oxygen, WiFi, Heart.

## **1. INTRODUCTION**

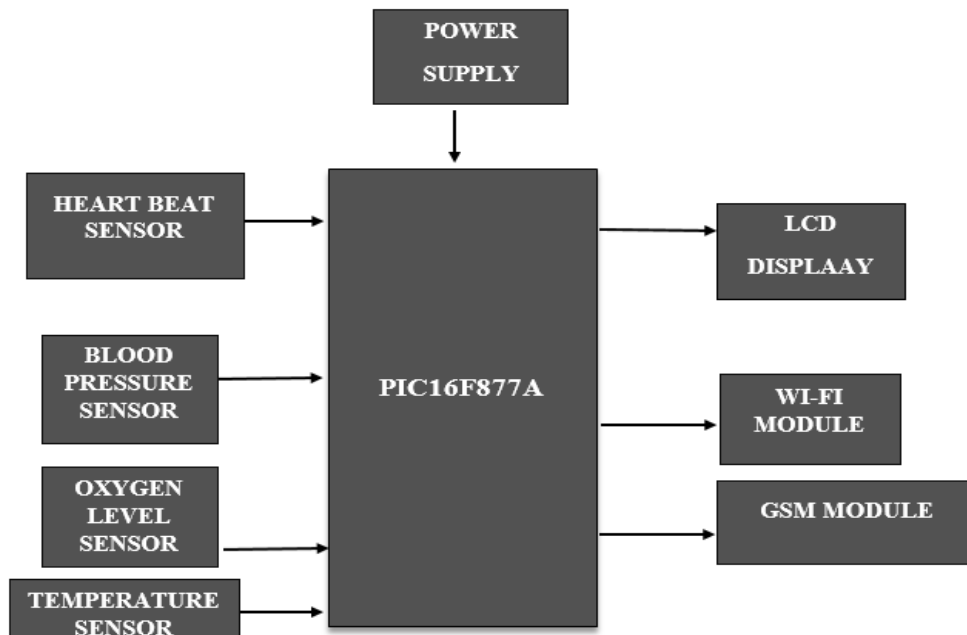
Human being is so much busy in work due to this busy life human suffers from so many disease but the percentages of blood pressure and oxygen related problem is more.<sup>[12]</sup> When our heart Brats pumps, blood flow from your body for that oxygen and energy is needed the force and strength of pushing, is called blood pressure. .Blood pressure is measure in mmHg (millimeters of mercury). Blood pressure can be high, normal, low. Previously many devices were designed which measured blood pressure and oxygen separately like the traditional mercury sphygmomanometer for measuring the blood pressure and spirometer for measuring oxygen. Internet of Things allows the physical objects to sense and collect the data and transfer it by using feature of an IP address for internet connectivity. IOT provides smart, connected healthcare with better security system. This system is useful for clinical applications in health monitoring, management and controlling for long term recording using database system. In this project, the term “Health monitoring” is used to describe “level of oxygen and blood pressure, heart beat,” This health monitoring uses a compact circuitry built around microcontroller PIC16F877A programs are developed in Embedded C. The results are confirmed by experimentally obtained. Different biomedical sensors like temperature sensor, heart rate sensor, blood pressure sensor are used for monitoring the health condition which is integrated on single system on-chip. If any varied change takes place it is notified. This notification would help to take an appropriate action at an instance of a time. This would save patients from the future health problem which would arise.<sup>[9]</sup> This would also help patient's concern doctor to take an appropriate action at proper time. Researchers design a system as portable device. Researchers are designed to different health monitoring system based on

requirement. Different platform like Microcontrollers are used to design the system based on this performance. The system is real time monitoring continuously reads patient's pulse rate or heart beat rate and body temperature through Fingertip Measuring Heart rate sensor and Thermistor Temperature Sensor. These values will be send to mobile and webpage using wireless communication for further analysis. By using data mining approaches, the system is trained for vital sign data. Patients give their measures to the system and know their health status without any nurse help.<sup>[6]</sup> This system enables high risk patients to be timely checked and enhance the quality of a life of patients. IoT means hire the devices to connect to the internet to ability our life greatly easier. The 'things' here refer to internet of things devices like chips, cameras, sensors or such other physical devices. IoT is going to be an essential part of our life in near future. Through IoT, distant or remote objects can be controlled on this network. You might have heard about industries. Industrial Internet is a hot discussion in the industrial world. It aims to empower industries with sensors, softwares and analytics to manufacture more advanced and brilliant machines. The major advantages of this will be quality control, sustainability, goods tracking and real time information exchange. Internet of things devices can be used in various fields and they may vary from home automation and the functionality of your house. Devices such as smoke detectors, thermostats, smart music systems, smart light bulbs come under this category. IoT devices can be used to monitor and control the mechanical,electrical and electronic system used in various types of building in building automation systems in this context . IoT end devices and sensors currently use a large number of communication methods, such as Bluetooth, NFC, RFID, ZibBee, WiFi, Ethernet, and cellular protocols.<sup>[3]</sup> The growth of the internet of things (IoT) is drastically making impact on home and industry. While the IoT affects among others transportation, healthcare, or smart homes, the Industrial Internet of Things (IIoT) refers in particular to industrial environments. IIoT is a new industrial ecosystem that combines intelligent and autonomous machines, advanced predictive analytics, and machine-human collaboration to improve productivity, efficiency and reliability. It is bringing about a world where smart, connected embedded systems and products operate as part of larger systems. The industrial Internet of things (IIoT) refers to the application of the Internet of things (IoT) across several industries such as manufacturing, logistics, oil and gas, transportation, energy/utilities, chemical, aviation and other industrial sectors.<sup>[1-5]</sup> A typical industrial Internet of things. IIoT is often used in the context of Industry 4.0, the Industrial Internet and related initiatives across the globe. Industry 4.0 describes a new industrial revolution with a focus on automation, innovation, data, cyber-physical systems, processes, and people. With Industry

4.0, the fourth industrial revolution is set on merging automation and information domains into the industrial Internet of things, services, and people. The communication infrastructure of Industry 4.0 allows devices to be accessible in barrier-free manner in the industrial Internet of things, without sacrificing the integrity of safety and security. The term “industrial Internet” was coined by Industrial giant GE to describe industrial transformation in the connected context of machines, cyber-physical systems, advanced analytics, AI, people, cloud, and so on. GE and the Industrial Internet Consortium (IIC) decided that IIoT was a synonym for the Industrial Internet.<sup>[7,4]</sup> IIoT is poised to bring unprecedented opportunities to business and society. Organizations like IIC and IEEE are working hard to define and develop the IIoT.

## **2. METHODOLOGY AND MATERIAL**

The Novel automatic patient Health monitoring System Includes Two Or Three Stages Viz. Detail Acquisition, Pre-Processing, Signal Operational And Also Using Different Types Of Components. These Are Listed Based On Some Functions Such As Power Supply Unit Also Contain Many Converter Parts There Are Step Down Transformer By Using Step Down The Incoming Voltage Based On PICMC Configuration And Also Using Bridge Rectifier Because PICMC Only Receive Direct Current Only Consequently Bridge Rectifier Output Of Direct Current Flow To Filter Circuit Because Bridge Rectifier Generate Direct Current With Ripple Content Therefor Filter Circuit Eliminated Ripple Content From Direct Current Output Finally The Dc Power Flow To Voltage Regulator And PICMC Vss Pin Shown In Figure 1. Reaming Parts Is Art Of This Project heart beat sensor By Purpose Of Sensing heartbeat or count the heartbeat, second one is blood pressure sensor, oxygen level sensor, temperature level sensor, above sensor was interfaced with peripheral interface chip. and also PICMC is embedded with condition or loop wise program. why means oxygen , temperature level etc. was normal time the PIC MC is not worked but abnormal condition PICMC program was matched abnormal parameter level also normal signal parameters was displayed. Alert critical condition time to doctors or patient visitors. How means we are using GSM module by purpose of communication.



**Figure 1 Typical Block Diagram For Automatic Patient Health Monitoring, signal Processing And Analysis.**

### 3. PIC MC Pin Configuration with Interfacing Line

PIC Microcontroller Is The Smallest Microcontrollers And Also Have Some Advanced Features That Can Be Programmed To Carry Out A Enormous Range Of Tasks Shown Figure 2. These Microcontrollers Are Found In Many Electronic Devices Such As Phones, Computer Control Systems, Alarm Systems, And Also Various Types Of PIC Microcontroller Have Various Types Like Wise PIC16, PIC17 But In Our Convenient We Are Using PIC16F877A. Everypic16f77a Microcontroller Architecture Consists Of Some Registers And Stack Where Registers Function As Random Access Memory (RAM) And Stack Saves The Return Addresses. The Main Parts Of PIC Microcontrollers Are RAM, Flash Memory, Timers/Counters, EEPROM, I/O Ports, USART, CCP (Capture/ Compare/ PWM Module), SSP, Comparator, ADC (Analog To Digital Converter), PSP (Parallel Slave Port), LCD And ICSP. The 8-Bit PIC Microcontroller Is Divided Into Four Types On The Basis Of Internal Architecture Such As Base Line PIC, Mid-Range PIC, Enhanced Midrange PIC And PIC18. In Our Project We Are Using Various Pins To Connected With External Components Likewise heart beat sensor Output Pin Was Connected PICMC RA2, Temperature Sensor PIN During PIC RA0, blood pressure sensor was connected RA1, oxygen level sensor interfaced RA3. Consequently GSM Module Connected With PIC RC5, wifi module Is Also Connected PIC RC6, GSM With, Liquid Crystal Display Connected To PIC RB0-RB7(Data Pins) Shown In Figure3.

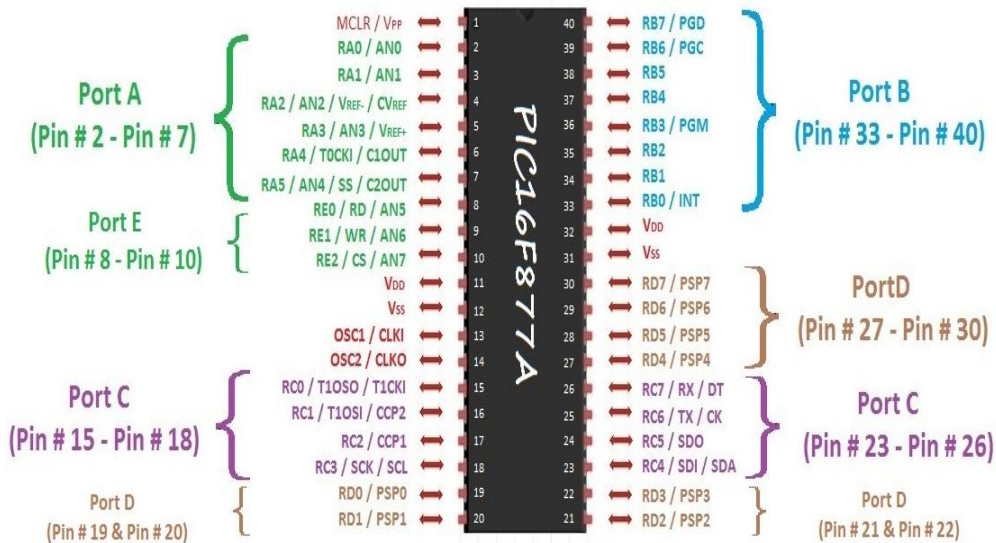


Figure 2: PICMC Pin Configuration.

#### 4. Novel Automatic Patient Health Monitoring

Replacement The Already Fundamental manual System To make automatic patient health monitoring scheme This Novel Scheme Consists Of Digital Display , blood pressure sensor, oxygen level sensor, temperature level sensor, heart beat sensor, WI-FI Module And GSM Module Interfacing With PIC MC . Basic blood pressure monitor using free scale products. The blood pressure monitor can be implemented using any of the Free scale medical oriented MCU Kinetics MK53N512 and Flexes MM members MC9S08MM128 and MCF51MM256 embedding a 16-bit ADC, 12-bit DAC, 2 Programmable-Gain Op-Amps, 2 TRIAMPS, Analog Comparators, and Vref generator. The K50 family can also perform DSP instructions for signal treatment and MCF51MM can perform multiply and accumulate (MAC) instructions. Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse. A sensor is mounted on the interior of the mask directly adjacent to or in contact with the skin of the wearer. The sensor preferably is positioned just below the jaw in the throat area, where blood vessels are relatively close to the skin and are of sufficient number and size so that a condition such as blood oxygen level can be sensed by non-invasive sensors. The sensor in turn is connected to a suitable controller that will receive the signal from the sensor and control the flow of oxygen to the mask, both as to pressure, and to control oxygen level. Additionally, the controller can regulate outside conditions such as a

pressure suit that may be worn by a fighter pilot, or can activate alarms as desired. Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. An LCD consists of two glass panels, with liquid crystal material sandwiched in between them. One each polarizer's are pasted outside the two glass panels. The polarizer's would rotate the light rays passing through them to a definite angle, in a particular direction. Temperature functional module we developed, we use the LM35 series of temperature sensors. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Fahrenheit temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in degrees Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling. The LM34 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1.2^{\circ}\text{F}$  at room temperature and  $\pm 11.2^{\circ}\text{F}$  over a full  $-50$  to  $+300^{\circ}\text{F}$  temperature range. The LM35 is rated to operate over a  $-50^{\circ}$  to  $+300^{\circ}\text{F}$  temperature range. The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The ESP8266 Wi-Fi Module is a self-contained Wi-Fi module capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Pre-programmed with an AT command set firmware, meaning, you can simply hook this up to PIC device and get about as much Wi-Fi-ability as a Wi-Fi Shield offer. A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system. The modem (modulator-demodulator) is a critical part here. These modules consists of a GSM module or GPRS modem powered by a power supply circuit and communication interfaces (like RS-232, USB 2.0, and others) for computer. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

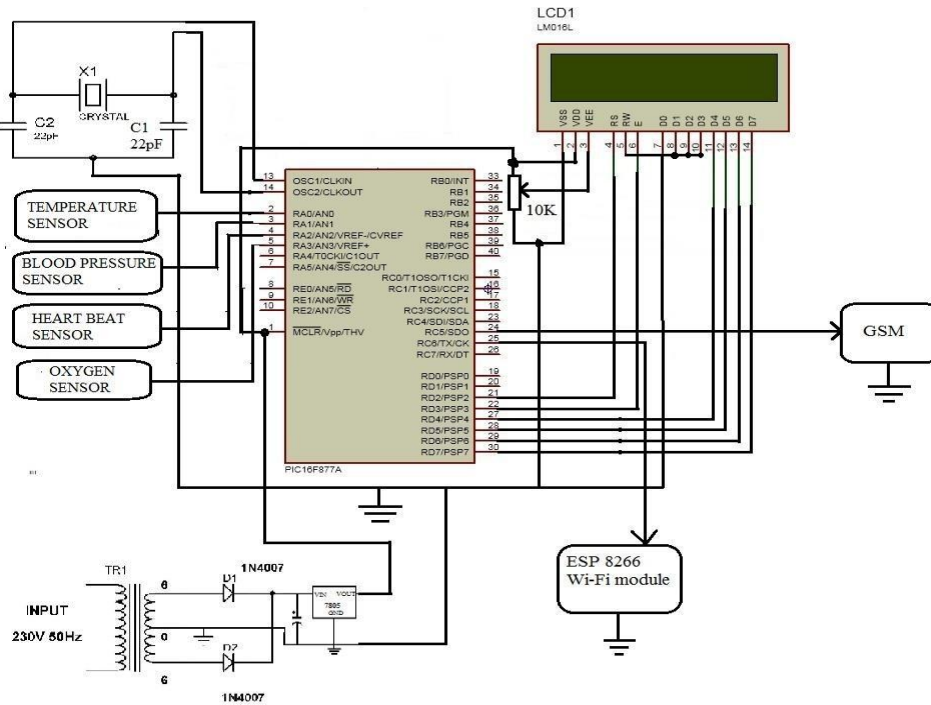


Figure 3: PICMC With Interfacing External Peripherals.

## 5 RESULTS AND DISCUSSION

The Results Which Are Obtained From Software And The Hardware Work Done Are Discussed Below- The Program Which Is Obtained From MPLAB Is Divided Into Various Parts But We Only Representing Coding Screen Shown In Figure 4.

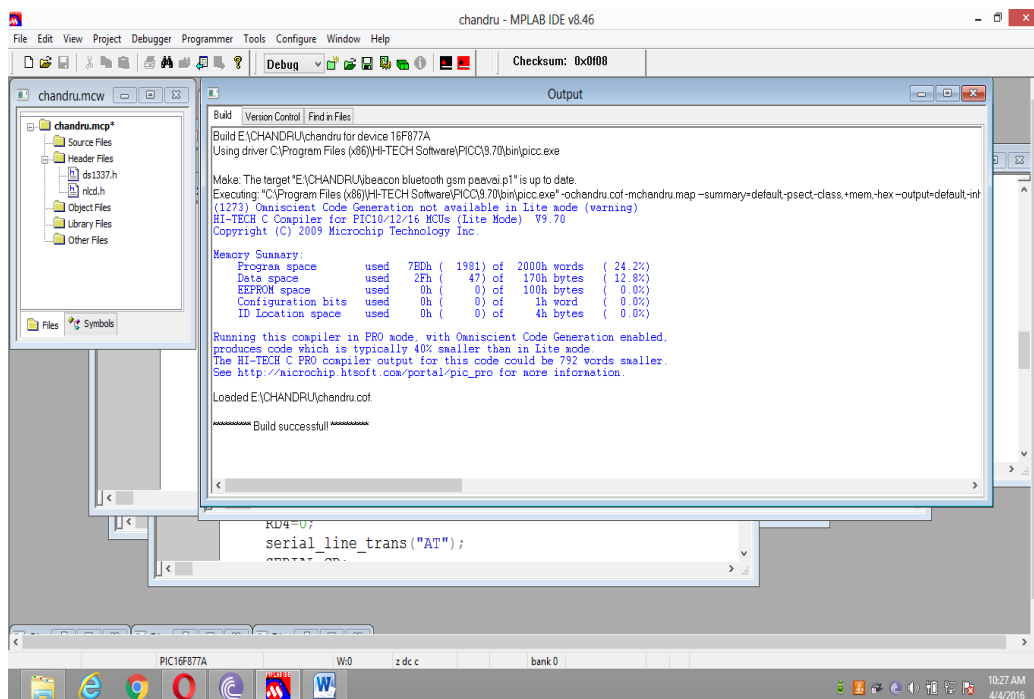
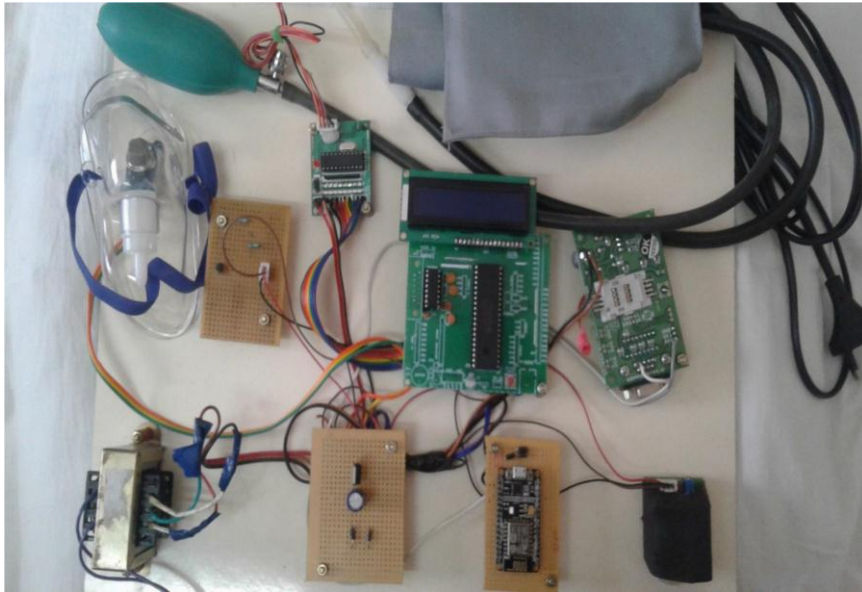


Figure 4: MPLAB Programming File.





**Figure 5: Novel Prototype Automatic Patient Health Monitoring.**

The Novel Prototype Model automatic patient health monitoring System Is Shown In Figure 5, Which Shows The Interfacing With PIC MC And Some External Peripherals Likewise blood pressure, oxygen level sensors GSM, MAX 232, WI-FI Module Etc. One Of The Primary Aim Is To Reduce The Wastage Memory From PIC MC And Free check or monitoring patient health Will Be Walk alert critical condition. For This Various Signal Functioning Methodology Are Being Adopted.

## 6. CONCLUSION

This system very handy and can be carried from place to place easily. This system is very convenient for the people from asthma, Hypertension. It is highly advisable for people suffering from blood pressure so as to keep a constant check on the BP level. The oxygen sensor is quite convenient and easy to use. Obtaining the message about patient health as well as time of medicine taking. The key objective of developing patient monitoring systems is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedures. The model returns the status of patients for the given vital signs, thereby the patient concluded either healthy or not. Wireless sensor technology is emerging as a significant element of healthcare services. In this proposed system a mobile physiological monitoring system is presented, which is able to continuously monitor the patients heartbeat, blood pressure and other critical parameters in the hospital. Data processing through cloud computing and remote access to store the data will improves the computing performance. Records will be stored compact fully for long term and easy to lateral recalls. Detecting the

more parameters for most secure purpose. Increase the parameters by addition of multiple sensors. In future we use following concepts in this project, Bluetooth, Zigbee, Wimax Radio frequency identification (RFID).

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