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Accupunture Based Blood Pressure Management Device using IoT

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***Abstract*--The most important goal of the challenge is to construct fitness tracking device the usage of Wi-Fi module. The challenge makes a use of virtual Blood Pressure sensor which video display units systole and diastole strain in conjunction with warmness price, LCD display, Buzzer and Wi-Fi ESP8266 module. The most important controlling tool of the challenge is AVR microcontroller module that's interfaced with enter and out placed modules. When the Digital blood strain sensor detects the atypical situation of the affected person then it signals the usage of buzzer alarm and additionally sends the monitored information to cloud the usage of Wi-Fi ESP8266 module primarily based totally on thingspeak.The controlling tool of the entire challenge is Arduino Atmega328 Microcontroller. Digital Blood strain sensor, LCD, buzzer and Esp8266 Wi-Fi module are interfaced to the Arduino microcontroller. Then microcontroller Continuously reads the information from sensor and screen this information on thingspeak cloud via Wi-Fi. To carry out those smart tasks, Arduino microcontrollers are loaded with an smart application written in embedded language.**

***Keywords*—LCD, Buzzer, Wi-Fi module, AVR controller, Digital blood strain sensor.**

I. INTRODUCTION

Internet of Things (IoT)- primarily based totally far flung blood strain tracking structures have an extensive ability of turning into an critical a part of the destiny scientific device[1]. In particular, those structures can play existence-saving roles for treating or tracking sufferers with important fitness issues[3]. The most important goal of the challenge is to construct an AVR atmega328 microcontroller primarily based totally protection tool for covid-19 protection regulations to lessen the ailment spread[8]. We attention on maximum not unusual place indoor dimension device to permit the humans at some point of quarantine[2]. The most important goal of the challenge is to construct fitness tracking device the usage of Wi-Fi module[4].

The challenge makes a use of virtual Blood Pressure sensor which video display units systole and diastole strain in conjunction with warmness price, LCD display, Buzzer and Wi-Fi ESP8266 module[12]. The most important controlling tool of the challenge is AVR microcontroller module that's interfaced with enter and out placed modules[5].When the Digital blood strain sensor detects the atypical situation of the affected person then it signals the usage of buzzer alarm and additionally sends the monitored information to cloud the usage of Wi-Fi ESP8266 module primarily based totally on thingspeak[7]. The controlling tool of the entire challenge is Arduino Atmega328 Microcontroller. Digital Blood strain sensor, LCD, buzzer and Esp8266 Wi-Fi module are interfaced to the Arduino microcontroller[15].Then microcontroller Continuously reads the information from sensor and screen this information on thingspeak cloud via Wi-Fi[6]. To carry out those smart tasks, Arduino microcontrollers are loaded with an smart application written in embedded language. Wi-Fi (Short for Wireless Fidelity) is a wi-fi generation that makes use of radio frequency to transmit information via the air[16]. Wi-Fi has preliminary speeds of 1mbps to 2mbps[2]. Wi-Fi transmits information withinside the frequency band of 2.four GHz[12]. It implements the idea of frequency department multiplexing generation. Range of Wi-Fi generation is forty-three hundred feet. ThingSpeak is an open-supply Internet of Things (IoT) utility and API to save and retrieve information from matters the usage of the HTTP protocol over the Internet or thru a Local Area Network[11]. This IoT tool should study the heart beat price and degree the encompassing temperature[17]. It constantly video display units the heart beat price and surrounding temperature and updates them to an IoT platform[6].We can't simplest growth the consolation of existence however additionally growth the fitness tracking strategies through utilizing superior generation[15]. In this challenge we're utilizing generation to experience severe fitness issues in order that green scientific offerings may be furnished to the affected person in suitable time[12].

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II. Literature Review

Zigbee based centralised patient monitoring system

Centralised patient monitoring systems are in high demand since they cut not just labour costs and time in clinical facilities. Previously, wired communication was employed, but today Zigbee, a wireless mesh network, is favoured since it saves money. Because it is energy efficient, low cost, and has a great range, Zigbee is chosen over Bluetooth and infrared wireless communication (several miles). We proposed using the Zigbee module to transmit data wirelessly between a patient and a centralised unit in this research. The paper is split into two parts. The first is a multi-patient monitoring system, and the second is a central monitoring system. These two systems communicate via Zigbee, a wireless transmission technique. We have patient monitoring for numerous patients in the first section. At their respective unit, several physiological data such as ECG, temperature, and heartbeat are measured for each patient. Each patient unit's emergency alert and LED blinks if any physiological parameter value exceeds the threshold value. This permits a clinician to monitor a patient's physiological data in real time. At each patient unit, the values are presented on the LCD. Similarly, numerous patients' physiological parameters are measured using specific sensors, and a patient monitoring system for multiple patients is created.In the second phase, a centralised patient monitoring system is created using MATLAB, in which all multiple patients' various parameters are presented on a central monitor. MATLAB software is also used to display an ECG graph on the centre monitor. Heartbeat and temperature are also displayed on the centre LCD.The module is less costly, has a low power consumption, and a long range. ECG signals, temperature sensor, Arduino-uno board, heartbeat sensor.

We employed Zigbee wireless transmission to communicate different physiological parameters from multiple patients to a central monitor in real time in this work. The nurse is stationed in a central room, where she monitors all of the patients' data. Temperature, electrocardiogram (ECG), and heartbeat are the physiological parameters that are measured. These parameters are determined using specific sensors on a single patient module. The node is made up of all of the patient units, and data from these nodes is sent to the central node, which is being set up at the hospitals. The clinical team will next identify the problems and take the necessary steps to correct them.

III. Proposed Methodology

A) Working

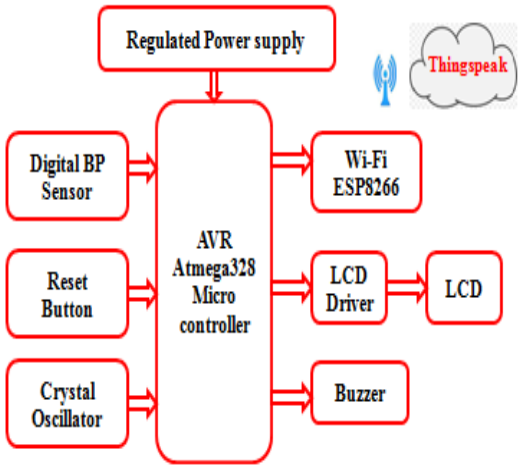

Figure1: Block diagram of BLOOD PRESSURE MANAGEMENT DEVICE USING IOT

This paper is on IOT primarily based totally blood strain tracking device the usage of micro-controller in conjunction with thick information storage[2]. Here the enter modules are BP module and output modules are Buzzer,LCD,Thingspeak. Here parameters are like coronary heart beat and systolic.diastolic blood strain[6].These 3 parameters are monitored constantly whilst the transfer is ON and this is decoded through the micro-controller from right here the information is despatched to the thingspeak IOT platform and the equal information is constantly displayed at the LCD display If there's any abnormality,like if the systolic is above a hundred forty five and diastolic is above ninety three and heartbeat is above 99,so,on this three conditions,the coronary heart price is under 60[17].There are the edge valves for the so known as parameters.so whilst ever those took place robotically the buzzer could be alerting and alert message could be displayed withinside the LCD display[16].

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B) Accupuncture:

1) Typically, an preliminary acupuncture consultation will contain an evaluation of wellknown fitness, a scientific records and a bodily examination, accompanied through insertion of the acupuncture needles.
2) Most acupuncture periods ultimate among 20 and forty minutes. three) Courses of remedy regularly contain up to ten separate periods, however this could vary.
3) The needles used are exceptional and are commonly some centimeters long. They need to be single-use, pre-sterilized needles which are disposed of straight away after use[13].
4) Acupuncture practitioners pick out particular factors to location the needles primarily based totally to your situation. From 1 to twelve factors will usually be used at some point of a consultation, and from time to time extra relying at the range of signs and symptoms you have. three)The needles can be inserted simply beneathneath the skin, or deeper in order that they attain muscle tissue[3]. Once the needles are in location, they will be left in function for a period of time lasting from a couple of minutes as much as round 30 minutes[4].

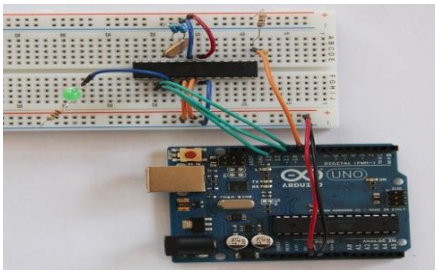
C) Thingspeak:

The Internet of Things(IoT) is a device of related matters[8]. The matters typically include of an embedded working device and an cappotential to talk with the net or with the neighboring matters[4]. One of the important thing factors of a common IoT device that bridges the numerous matters is an IoT carrier[15]. An exciting implication from the matters comprising the IoT structures is that the matters through themselves can't do anything[17]. At a naked minimum, they need to have an cappotential to hook up with different matters. But the actual electricity of IoT is harnessed whilst the matters connect with a carrier both at once or through different matters[16]. In such structures, the carrier performs the function of an invisible supervisor through supplying talents starting from easy information series and tracking to complicated information analytics[13].ThingSpeak is a platform supplying numerous offerings solely focused for constructing IoT applications[10]. It gives the talents of actual-time information series, visualizing the gathered information withinside the shape of charts, cappotential to create plugins and apps for participating with net offerings, social community and different APIs[8].

IV. Hardware And Software Description

Power supply: The time period is maximum usually carried out to electric strength supplies, much less regularly to mechanical ones, and seldom to others. A electricity deliver may also encompass a electricity distribution device in addition to number one or secondary reassets of strength such as. Conversion of 1 shape of electrical electricity to any other preferred shape and voltage, usually regarding converting AC line voltage to a well-regulated lower-voltage DC for digital gadgets.

*Atmega328p:*The ATmega48PA/88PA/168PA/328P presents the subsequent capabilities: 4K/8K bytes of In-System Programmable Flash with Read-While-Write talents, 256/512/512/1K bytes EEPROM, 512/1K/1K/2K bytes SRAM, 23 wellknown motive I/O strains, 32 wellknown motive operating registers, 3 bendy Timer/Counters with evaluate modes, inner and outside interrupts, a serial programmable USART, a byte-orientated 2-twine Serial Interface, an SPI serial port, a 6-channel 10-bit ADC (eight channels in TQFP and QFN/MLF packages), a programmable Watchdog Timer with inner Oscillator, and 5 software program selectable electricity saving modes.



Esp8266 Wi-Fi module: The ESP8266 Wi-Fi Module is a self contained SOC with included TCP/IP protocol stack which can provide any AVR microcontroller get admission to for your Wi-Fi community. The ESP8266 is able to both web website hosting an utility or offloading all Wi-Fi networking features from any other utility processor. Each ESP8266 module comes pre-programmed with an AT command set firmware.The ESP8266 module is an exceptionally price powerful board with a huge, and ever developing, community.

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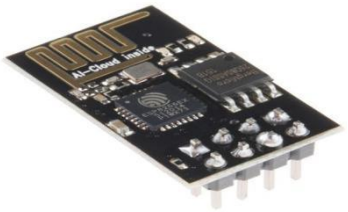
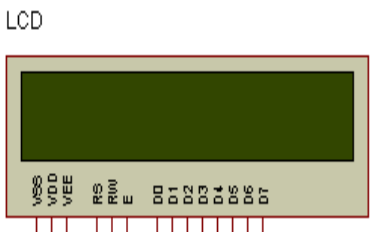


Digital blood pressure sensor:

Blood pressure (BP) is the pressure exerted by circulating blood upon the walls of blood vessels. When used without further specification, "blood pressure" usually refers to the arterial pressure in the systemic circulation. It is usually measured at a person's upper arm. Blood pressure is usually expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimeters of mercury (mm Hg). It is one of the vital signs along with respiratory rate, heart rate, oxygen saturation, and body temperature. Normal resting blood pressure in an adult is approximately 120/80 mm Hg.

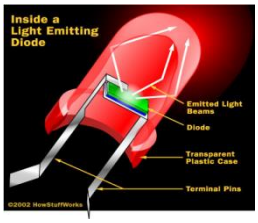
LCD module:

One of the maximum not unusualplace gadgets connected to a micro controller is an LCD display. Some of the maximum not unusualplace LCD related to the various microcontrollers are 16x2 and 20x2 displays. This method sixteen characters in keeping with line through 2 strains and 20 characters in keeping with line through 2 strains, respectively.



Buzzer: Basically, the sound supply of a piezoelectric sound issue is a piezoelectric diaphragm. A piezoelectric diaphragm includes a piezoelectric ceramic plate which has electrodes on each facets and a steel plate. A piezoelectric ceramic plate is hooked up to a steel plate with adhesives.

LED indicator: A mild-emitting diode (LED) is a semiconductor mild supply. LED's are used as indicator lamps in lots of gadgets, and are more and more more used for lighting. Introduced as a realistic digital issue in 1962, early LEDâ€™s emitted low-depth pink mild, however cutting-edge variations are to be had throughout the visible, ultraviolet and infrared wavelengths, with very excessive brightness.



V. Experimental Result

Case study-1 Initially the user need wear the BP sensing device and press the on button.After giving power suply the device will sense BP and display in LCD screen, if the threshold increases then the alert will generated.

Fig-1 :Systolic and Diastolic values in BP machine

Fig-1.1: Systolic and Diastolic values in LCD

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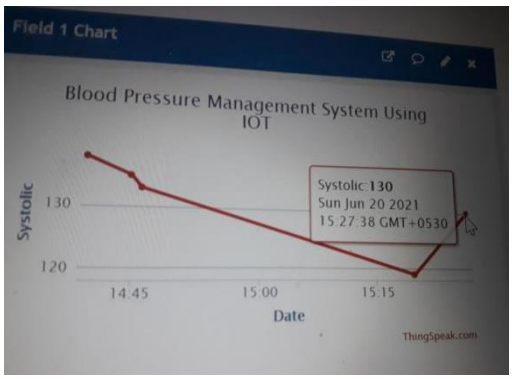

Fig-1.2: Systolic graph

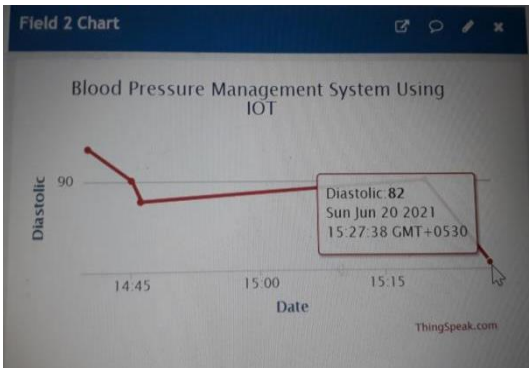

Fig-1.3:Diastolic graph

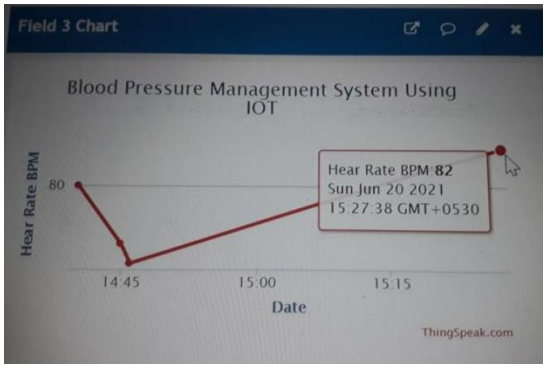

Fig-1.4: Heart rate BPM

The project "**BLOOD PRESSURE MANAGEMENT DEVICE USING IOT**" was designed to build health monitoring system using Wi-Fi module. The project makes a use of digital Blood Pressure sensor which monitors systole and diastole pressure along with heat rate, LCD display, Buzzer and Wi-Fi ESP8266 module. The main controlling device of the project is AVR microcontroller module which is interfaced with input and out put modules.

When the Digital blood pressure sensor detects the abnormal condition of the patient then it alerts using buzzer alarm and also sends the monitored data to cloud using Wi-Fi ESP8266 module based on thingspeak.

VI. Conclusion

Conclusion

Integrating capabilities of all of the hardware additives used had been advanced in it. Presence of each module has been reasoned out and located carefully, as a consequence contributing to the great operating of the unit. Secondly, the usage of distinctly superior with the assist of developing generation, the challenge has been effectively implemented. Thus the challenge has been effectively designed and tested.

Future Enhancement:

This project can be extended by adding more sensors like spo2, blood pressure, ECG;for storing the sensor data of the ICU patient for future reference purpose in case of emergencies.This project can be extended by adding raspberrypi3 processor instead of arduino it has an inbuilt wi-fi, so no need to connect xtra Wi-Fi module.This project can be extended by introducing a GPRS module through which the monitoring of patient can be done from anywhere in the world. We can extend the project by adding MMC/SD card for storing the sensor data of the ICU patient for future reference purpose in case of emergencies. Also, we can use a camera for live video image transmission. The project can also extended using GPRS technology which can send the alerting message to the predefined web link.

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