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Iot Based Live Health Consulation System

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ABSTRACT- *Health care is a major concern nowadays.developed science and knowledge based on Wireless-Sensing node technology oriented. Patients are facing a problematic situation of unforeseen demise due to the specific reason of heart problems and attack which is because of nonexistence of good medical maintenance to patients at the needed time. This is for specially monitoring the patients and informing doctors and loved ones. So we are proposing an innovative project to dodge such sudden death rates by using Patient Health Monitoring that uses sensor technology and uses internet to communicate to the loved ones in case of problems. This system uses Temperature and sensors for tracking patients health. This system also shows patients temperature and heartbeat tracked live data with timestamps over the Internetwork. Thus Patient health monitoring system based on IoT uses internet to effectively monitor patient health and helps the user monitoring their loved ones drom work and saves lives.*
KEYWORDS- *Internet of Things, Atmega16, Heartbeat Sensor, Transformer*

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I. INTRODUCTION

The objective of the project is to design and develop a system that measures heartbeat, body temperature and live consulting with doctor using IOT. The prime goal was to develop a live patient monitoring system so that the healthcare professionals can monitor their patients, who are either hospitalized or executing their normal daily life activities and patients can also consult without visiting to the doctor.

In the last decade, the healthcare monitoring systems have drawn considerable attentions of the researchers. The prime goal was to develop a reliable patient monitoring system so that the healthcare professionals can monitor their patients, who are either hospitalized or executing their normal daily life activities. In this work, we present a mobile device based wireless healthcare monitoring system that can provide real time online information about physiological conditions of a patient. The system mainly consists of sensors, the data acquisition unit, microcontroller, and software. The patient's temperature, heart beat rate, blood pressure, data are monitored, displayed, and stored by our system. To ensure reliability and accuracy the proposed system has been field tested. The test results show that our system is able to measure the patient's physiological data with a very high accuracy.

II. LITERATURE SURVEY

Health is one of the global challenges for humanity. According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. Healthy individuals lead to secure their lifetime income and hence to increase in gross domestic product and in tax revenues. Healthy individuals also reduce pressure on the already overwhelmed hospitals, clinics, and medical professionals and reduce workload on the public safety networks, charities, and governmental (or non-governmental) organizations. To keep individuals healthy, an effective and readily accessible modern healthcare system is a prerequisite.

Health is the level of functional and metabolic efficiency of a living organism. In humans it is the ability of individuals or communities to adapt and self-manage when facing physical, mental, psychological and social changes. The World Health Organization (WHO) defined health in its broader sense in its 1948 constitution as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

E-Health is the provision of healthcare with the inclusion of telecommunication techniques. This project looks at the construction of a simple device that will be capable of transferring the data of a patient's vital signs to a remote device wirelessly. The necessity of this project is to alleviate the difficulty that is encountered by medical experts in monitoring multiple patients simultaneously. This project will enable them to observe patients without having to be physically present at their bedside, be it in the hospital or in their home. A patient's body temperature, heart rate and electrocardiography (ECG) are transferred wirelessly through an agent such as Bluetooth technology.

III. REQUIREMENTS

The requirements (hardware & software) are mentioned below:

HARDWARE USED:

- Wi-Fi receiver ESP-8266
- Microcontroller ATmega16
- Temperature Sensor
- Heartbeat sensor
- LCD Display
- Power supply

SOFTWARE USED:

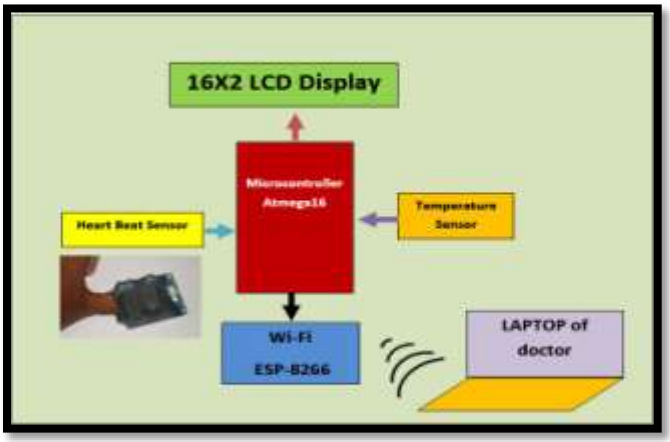
- JAVA for making desktop application
- AVR studio for coding of microcontroller
- DIP trace for PCB designing

MINIMUM SYSTEM REQUIREMENT:

- OS windows XP or above
- RAM 512MB
- Hard disk space 10GB
- Processor Core 2 duo

IV. METHODOLOGY

A. DATA FLOW DIAGRAM



B. WORKING

- Heartbeat sensor will monitor the heartbeat of Patient.
- Temperature sensor is used to measure body temperature of the patient.
- All these readings will be display on a LCD display.
- These readings will be transmitting over Wi-Fi to the Doctors laptop.
- Laptop will have software which will display these readings.
- .Net programming language will be used to make the desktop application.
- Doctor will examine all the readings and recommend medicine will display on the patient LCD screen.

V. FUNCTIONALITIES

A. Microcontroller Atmega16

The ATmega16M1/32M1/64M1 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16M1/32M1/64M1 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

Features:

• High Performance, Low Power Atmel®AVR® 8-bit Microcontroller

• Advanced RISC Architecture
– 131 Powerful Instructions - Most Single Clock Cycle Execution
– 32 × 8 General Purpose Working Registers
– Fully Static Operation
– Up to 1 MIPS throughput per MHz
– On-chip 2-cycle Multiplier
• Data and Non-Volatile Program Memory
– 16/32/64K Bytes Flash of In-System Programmable **Program Memory**
– 512B/1K/2K Bytes of In-System Programmable EEPROM
– 1/2/4K Bytes Internal SRAM
– Write/Erase Cycles: 10,000 Flash/ 100,000 EEPROM
– Data Retention: 20 years at 85°C/ 100 years at 25°C (1)
– Optional Boot Code Section with Independent Lock Bits

In-System Programming by On-chip Boot Program
True Read-While-Write Operation
– Programming Lock for Flash Program and EEPROM Data Security
• On Chip Debug Interface (debugWIRE)
• CAN 2.0A/B with 6 Message Objects - ISO 16845 Certified
• LIN 2.1 and 1.3 Controller or 8-Bit UART
• One 12-bit High Speed PSC (Power Stage Controller)

Non Overlapping Inverted PWM Output Pins with Flexible Dead-Time
– Variable PWM duty Cycle and Frequency
– Synchronous Update of all PWM Registers
– Auto Stop Function for Emergency Event

• **Peripheral Features**
– One 8-bit General purpose Timer/Counter with Separate Prescaler, Compare Mode

And Capture Mode
– One 16-bit General purpose Timer/Counter with Separate Prescaler, Compare
Mode and Capture Mode
– One Master/Slave SPI Serial Interface
– 10-bit ADC
Up To 11 Single Ended Channels and 3 Fully Differential ADC Channel Pairs
Programmable Gain (5×, 10×, 20×, 40×) on Differential Channels
Internal Reference Voltage
Direct Power Supply Voltage Measurement
– 10-bit DAC for Variable Voltage Reference (Comparators, ADC)
– Four Analog Comparators with Variable Threshold Detection
– 100µA ±2% Current Source (LIN Node Identification)
– Interrupt and Wake-up on Pin Change
– Programmable Watchdog Timer with Separate On-Chip Oscillator
– On-chipTemperature Sensor
• Special Microcontroller Features
– Low Power Idle, Noise Reduction, and Power down Modes
– Power on Reset and Programmable Brown out Detection
– In-System Programmable via SPI Port
– High Precision Crystal Oscillator for CAN Operations (16MHz)
– Internal Calibrated RC Oscillator (8MHz)
– On-chip PLL for fast PWM (32MHz, 64MHz) and CPU (16MHz)
• Operating Voltage: 2.7V - 5.5V
• Extended Operating Temperature:
– -40°C to +85°C
• Core Speed Grade:
– 0 - 8MHz @ 2.7 - 4.5V

B. 16X2 LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

Specifications

1) Hardware Features

- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation ,1.8 to 3.6V I/O
- PIO control
- UART interface with programmable baud rate
- With integrated antenna
- With edge connector

2) Software Features

- Default Baud rate: 38400, Data bits: 8, Stop bit: 1, Parity: No parity, Data control: has.

Supported baud rate: 9600, 19200, 38400, 57600, 115200, 230400 and 460800.

- Given a rising pulse in PIO0, device will be disconnected.
- Status instruction port PIO1: low-disconnected, high-connected;
- PIO10 and PIO11 can be connected to red and blue led separately. When master and slave are paired, red and blue led blinks 1time/2s in interval, while disconnected only blue led blinks 2times/s.
- Auto-connect to the last device on power as default.
- Permit pairing device to connect as default.
- Auto-pairing PINCODE:”0000” as default
- Auto-reconnect in 30 min when disconnected as a result of beyond the range of connection.

C. Wi-Fi Module - ESP8266

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that’s just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

There is an almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support. In the Documents section below you will find many resources to aid you in using the ESP8266, even instructions on how to transforming this module into an IoT (Internet of Things) solution!

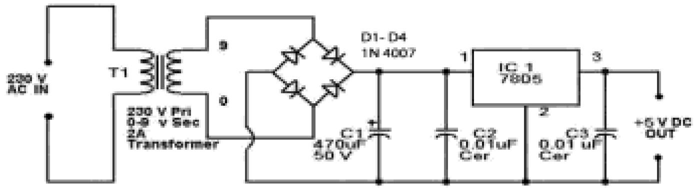
Note: The ESP8266 Module is not capable of 5-3V logic shifting and will require an external Logic Level Converter. Please do not power it directly from your 5V dev board.

Features:

- 802.11 b/g/n
- Wi-Fi Direct (P2P), soft-AP
- Integrated TCP/IP protocol stack
- Integrated TR switch, LNA, power amplifier and matching network

- Integrated PLLs, regulators, DCXO and power management units
- +19.5dBm output power in 802.11b mode
- Power down leakage current of <10uA
- 1MB Flash Memory
- Integrated low power 32-bit CPU could be used as application processor
- SDIO 1.1 / 2.0, SPI, UART
- STBC, 1×1 MIMO, 2×1 MIMO
- A-MPDU & A-MSDU aggregation & 0.4ms guard interval
- Wake up and transmit packets in < 2ms

D. Power supply



Working
This design is based around 4 main parts. A transformer, bridge rectifier, a smoothing capacitor and the LM7805 chip which contains a 'linear voltage regulator'. Transformer is used to convert 220 VAC to 18 VAC. Bridge rectifier is used to convert AC to ripple DC. Capacitor is used to filter ripples from dc. 7805 voltage regulator is used to regulate voltage to 5 VDC. LED is used for indication power supply is working or not.
Transformer
The electrical transformer receives on the primary winding an AC voltage and delivers on the secondary winding a different AC voltage (a lower one). This AC output voltage must be according to the DC voltage we want to obtain at the end. For example: If we want to obtain a final DC voltage of 12 volts, the secondary windings of the transformer must have an AC voltage no less of 9 volts.
The peak value on the secondary winding of the transformer will be Vp = 1.41 x 9 = 12.69 volts. Even though this value is very close to the one we wanted to get, it is not recommended because we need to take into account that the voltage drops at different stages (blocks) of the power supply. In this case, we can choose a transformer with a 12 volts AC secondary winding. With this AC voltage, we can get a peak voltage of: Vp = 12 x 1.41 = 16.92 volts.

Rectifier:
The output of transformer is given as an input to the rectifier block. The rectifier transforms the secondary winding AC voltage into a pulsating DC voltage. . In our case, we use a ½ wave rectifier, which eliminates the negative part of the wave a half wave rectifier conducts only during the positive half cycle of the AC input.

Filter:
The filter, formed by one or more capacitors, flattens or smoothen the previous wave eliminating the alternating current (AC) component delivered by the rectifier. These capacitors are charged to the maximum voltage value that the rectifier can deliver, and they are discharged when the pulsating signal disappears.

Voltage regulator:
The voltage regulator receives the signal from the filter and delivers a constant voltage (let's say 12 DC volts) regardless of the variations on the load or the voltage supply. The dc signals are further given to the regulator that maintains the output of the power supply at a constant level.
Linear power supply:
A linear regulated power supply regulates the output voltage by dropping excess voltage in a series dissipative component. They use a moderately complex regulator circuit to achieve very low load and line regulation. Linear regulated power supplies also have very little ripple and very little output noise. The above power supply is linear power supply.

E. Electrical Transformer

Transformers are capable of receiving AC power at one voltage and delivering it at another voltage. In this article, we will go through the working and construction of a 3 phase transformer by starting from its simplest form. We will also understand what power transformer is and how it is constructed.

Why Transformers are used?

Transformers are ubiquitous devices. They are used to either step-up the A.C voltage or to step-down it. But, why should we do this voltage transformation? It is a science fact that a stepped-up voltage is associated with a reduced current. A reduced current leads to low eddy current energy loss. In this way, transformers help achieve better transmission efficiency while transferring the power over longer distances. After the electrical power has transmitted to the desired spot, the voltage can be reduced to the desired level, using a step-down transformer.

F. Resistor

A resistor is a passivetwo-terminalelectrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity. Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within integrated circuits. The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

1) Ohm's law

The behavior of an ideal resistor is dictated by the relationship specified by Ohm's law:

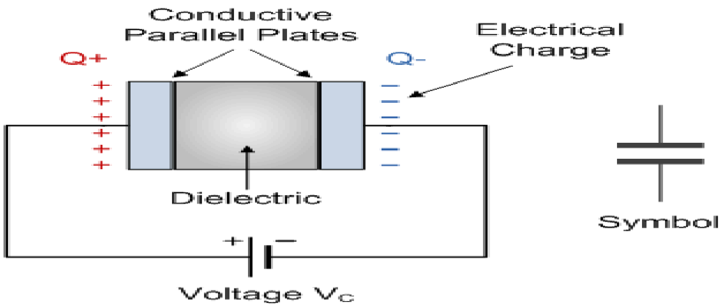
Ohm's law states that the voltage (V) across a resistor is proportional to the current (I), where the constant of proportionality is the resistance (R). For example, if a 300 ohm resistor is attached across the terminals of a 12 volt battery, then a current of 12 / 300 = 0.04 amperes flows through that resistor. Practical resistors also have some inductance and capacitance which affect the relation between voltage and current in alternating current circuits.

The ohm (symbol: Ω) is the SI unit of electrical resistance, named after Georg Simon Ohm. An ohm is equivalent to a volt per ampere. Since resistors are specified and manufactured over a very large range of values, the derived units of milliohm ($1\ m\Omega = 10^{-3}\ \Omega$), kilo ohm ($1\ k\Omega = 10^{3}\ \Omega$), and mega ohm ($1\ M\Omega = 10^{6}\ \Omega$) are also in common usage.

G. Capacitor

A capacitor is a passivetwo-terminalelectrical component that stores electrical energy in an electric field. The effect of a capacitor is known as self-capacitance. While capacitance exists between any two electrical conductors of a circuit in sufficiently close proximity, a capacitor is specifically designed to provide and enhance this effect for a variety of practical applications by consideration of size, shape, and positioning of closely spaced conductors, and the intervening dielectric material. A capacitor was there for historically first known as an electric condenser. The physical form and construction of practical capacitors vary widely and many capacitor types are in common use. Most capacitors contain at least two electrical conductors often in the form of metallic plates or surfaces separated by a dielectric medium. The conductors may be foils, thin films, or sintered beads of metal or conductive electrolyte. The no conducting dielectric acts to increase the capacitor's charge capacity. Materials commonly used as dielectrics include glass, ceramic, plastic film, paper, mica, and oxide layers. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy. When two conductors experience a potential difference, for example, when a capacitor is attached across a battery, an electric field develops across the dielectric, causing a net positive charge to collect on one plate and net negative charge to collect on the other plate. No current actually flows through the dielectric; instead, the effect is a displacement of charges through the source circuit. If the condition is maintained sufficiently long, this displacement current through the battery seizes. However, if a time-varying voltage is applied across the leads of the capacitor, the source experiences an ongoing current due to the charging and discharging cycles of the capacitor. Capacitance is defined as the ratio of the electric charge Q on each conductor to the potential difference V between them. The unit of capacitance in the International System of Units (SI) is the farad (F), which is equal to one coulomb per volt (1 C/V).

Capacitance values of typical capacitors for use in general electronics range from about 1 pF (10^{-12} F) to about 1 mF (10^{-3} F).



The parallel plate capacitor is the simplest form of capacitor. It can be constructed using two metal or metallized foil plates at a distance parallel to each other, with its capacitance value in Farads, being fixed by the surface area of the conductive plates and the distance of separation between them. Altering any two of these values alters the value of its capacitance and this forms the basis of operation of the variable capacitors.

Also, because capacitors store the energy of the electrons in the form of an electrical charge on the plates the larger the plates and/or smaller their separation the greater will be the charge that the capacitor holds for any given voltage across its plates. In other words, larger plates, smaller distance, more capacitance.By applying a voltage to a capacitor and measuring the charge on the plates, the ratio of the charge Q to the voltage V will give the capacitance value of the capacitor and is therefore given as: C = Q/V.

VI. CONCLUSION

From this paperwork, Patient Health Monitoring is beyond the apple accept started to analyze assorted abstruse explanations in order to improve healthcare accouterment in a address that accompaniments absolute casework by assembling the abeyant of loT. Similarly as for every thought of traditional system, this framework even now being used from their manufacturing Be that as it is thick, as cumbersome with handle separately Also extent Furthermore expense need aid also additional contrasted with those propel framework What's more also it detract more than 1minute for getting the correct come about.The Health-monitoring system takes less than a minute to compute the result of ECG, Blood Pressure and Temperature Monitoring. Scope also decreases likened to the conservative scheme because combination of no. of medicinal data sensors on a sole piece. So, Time-cost Complication is reduced.ATmega, PIC controller working here is needed to connect external outlying for gesture acclimatizing. Therefore,time-cost, memory storage and increases. Hence, as exterior outlying upsurges price and mem-size similarly rises. This Research Paper planned this Patient well-being nursing scheme by the requirements suggested by the Patient. Because of wireless Sensor network and data transferring over the internet. From this all the health related data and information of the Patients will be easily accessed on doctor's smartphone.

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