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WI-FI BASED HEALTH MONITORING AND CONTROL SYSTEM

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Abstract:

In this project we illustrate a WI-FI based smart communication system to achieve remote health monitoring applications. To achieve real time execution, a smart sensor unit and ATmega328 micro controller is proposed. The main aim of this system is to observe and control abnormalities of the patient. The sensor unit obtain several parameters such as body temperature, heart beat rate, blood pressure, glucose from patient. In this paper data acquisition and data transmission process is also considered. Transmission of data subsidize to a substantial amount of power disbursed by the transmitter and increase in the network traffic. The power disbursed can be reduced by continuous transmission of data.

Keywords: Atmega328 Micro Controller, Sensor Unit, Data Acquisition & Data Transmission.

1. Introduction:

At first, Wi-Fi was employed in place of only the 2.4GHz IEEE 802.11b communication standard, however the Wi-Fi Alliance has developed the broad use of the Wi-Fi term to include any type of network or WLAN invention based on any of the 802.11 communication standards, including 802.11a, 802.11b, twin-band, and so on, in an attempt to stop confusion about wireless LAN interoperability.

Wi-Fi works with no physical wired link between sender and receiver by using radio frequency technology (RFT), a frequency within the electromagnetic spectrum related with radio wave broadcast. When an radio wave current is delivered to an antenna, an Electro Magnetic (EM) field is formed that then is able to propagate through space. In continuous health monitoring the proactive analysis is mainly constrained due to the unavailability of the patient under omnipresent observing.

The major reasons for this scenario are the user is non-static (thereby user crosses the range of connectivity) and life time of the node. To deal with this problem we propose a system design for multi parametric remote health observing, which can be joined ubiquitously and consumes less energy. We have observed over the last ten years a proliferation of wireless technology that has now develop into omnipresent. Given the scarce availability of Radio Frequency spectrum, many of these technologies are obliged to use the same unlicensed frequency groups. For example, IEEE 802.11 (Wi-Fi), IEEE 802.15.1(Bluetooth) and IEEE 802.15.4. (ZigBee) 1 all split the sam2.4 GHz ISM band. Cross Technology Interference (CTI) is a result of this coexistence that can lead to loss of dependability and inefficient use of the radio continuum.

The majority of MAC protocols are designed to share the communication medium among nodes that understand the same PHY layer. In this model CTI is considered the same as random background noise, despite the fact that it can cause significant performance degradation. Even worse, system designers have little means to coordinate across network that use different wireless standards since they us ually belong to different administrative domains. CTI is especially unfavorable for 802.15.4-

based wireless sensor networks that have to counter the effects of severe interference from ubiquitous 802.11 deployments

As more humans engage in space expeditions, there is an increasing need to monitor their health during missions. A space suit outfitted with sensors is the noticeable conduit for measuring and transferring information about astronaut health. In order to avoid this scenario, one result is to reduce the amount of data that is to be transmitted. In continuous ECG monitoring relevance's the data require not be transferred continuously which will increase load on the network. In the obtainable architectures for data logger and transmission architectures, the traditional continuous transmission of data was used, which leads to most power utilization and increase in the communication network traffic.

In this proposed system, we propose design architecture for multi parametric continuous health monitoring which can deal with the matters discussed above. We strongly believe that the proposed design can discover potential applications in continuous health observing where the patient wants to be under stable monitoring. This can also be used in applications which necessitate uninterrupted connectivity such as habitat observing and civil structures scrutinizing.

2. System Architecture:

The proposed system architecture consists of three main units namely monitor unit, sensor unit, and control unit.

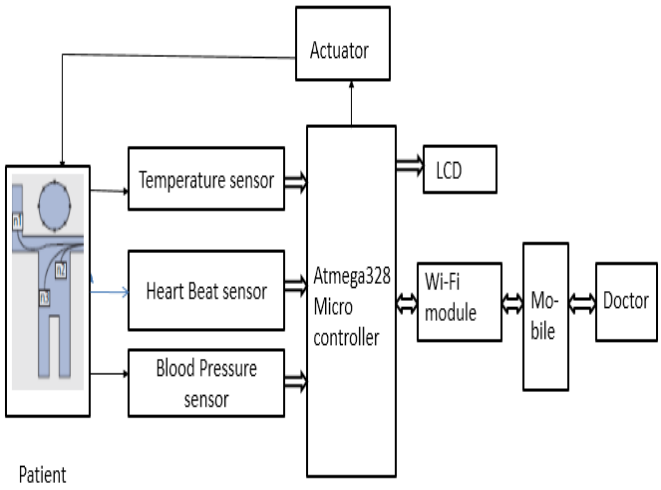


Figure 1: Architecture of Proposed System

A. Sensor unit

The sensor unit consist of three sensors namely Temperature sensor, Heart Beat sensor and glucose sensor. It acquires body temperature, heart beat rate and glucose level from patient. The most commonly used type of the entire sensor are those which detect heat or temperature. These types of temperature sensor differ from simple ON/OFF thermostatic appliances which control a domestic warm water heating system to highly vulnerable semiconductor types that can control complex process manage boiler plants.

Memorize from our school science classes that the progress of atoms and molecules produces heat (kinetic energy) and the superior the movement, the more heat that is produced. Temperature Sensors quantify the amount of heat energy or even coldness that is produced by an object or module or system, allowing us to "sense" or

detect any physical transform to that temperature producing either digital or an analogue result.

There are various different types of hotness Sensor presented and all have different characteristics depending upon their genuine application. A Temperature Sensor consists of two fundamental physical categories:

• Contact Temperature Sensor categories – These types of temperature sensor are required to be in physical contact with the object being sensed and employ conduction to watch revolutionizes in temperature. They can be employed to notice solids, gases or liquids over a large range of temperatures.

• Non-contact Temperature Sensor categories – These types of temperature sensor use convection and radiation to monitor changes in temperature. They can be employed to sense gases and liquids that emit radiant power as heat rises and cold resolves to the bottom in convection currents or detect the radiant power being transmitted from an object in the form of IR radiation (the sun).

B. Atmega328 micro controller

The ATmega328 is a single chip small size controller produced by Atmel and belongs to the mega AVR series. The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB In system Programming flash memory with read-while-write facilitiies,1 KB EEPROM, 2 KB SRAM, 32 general purpose working registers, internal and external interrupts, 23 general purpose I/O lines, serial programmable Universal synchronous asynchronous receiver transmitter (USART), three flexible timer/counters with compare modes, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit analog to digital converter (Eight-channels in TQFP and MLF/ QFN packages), programmable watchdog timer with inside oscillator, and 5 software selectable power saving modes. The controller operating voltage range 1.8-5.5 V.

The controller achieves throughputs approaching 1 MIPS per MHz; A common option to the ATmega328 is the "Pico Power" ATmega328P. A wide-ranging list of all other member of the mega AVR series can be established on the Atmel website. Today the ATmega328 is ordinarily employed in many projects and autonomous systems where a simple, low-powered, low-cost small size-controller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Nano and Arduino Uno models.

C. Liquid Crystal Display

A liquid-crystal display is an electronic visual display, even panel display, or video display that utilizes the light adapting properties of liquid crystals. Liquid crystals don't turn out light directly. Liquid crystal displays are available to display random images (as in a general-use computer display) or fixed images which can be showed or hidden, such as fixed words, digits, and seven-segment displays as in a digital clock. They use the similar essential technology, apart from that arbitrary images are fabricated of a large number of tiny pixels, while other displays have larger elements.

LCD displays are used for many more applications including computer monitors, instrument panels, aircraft cockpit displays, televisions, and signage. They are familiar in end user devices such as DVD players, clocks, watches, calculators, gaming devices, and telephones, and have substituted cathode ray tube displays in the majority uses. They are available in a broad range of display sizes than CRT and plasma displays, and since they do not use phosphors, they do not suffer image burn-in. LCDs are, however, vulnerable to image determination.

The LCD display screen is more energy efficient and can be organized of more safely than a CRT. Its low power consumption facilitates it to be used in battery

powered electronic apparatus. It is an electronically modulated optical gadget made up of any number of fragments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in. color or monochrome.

Figure 2: Blood Pressure Measurement

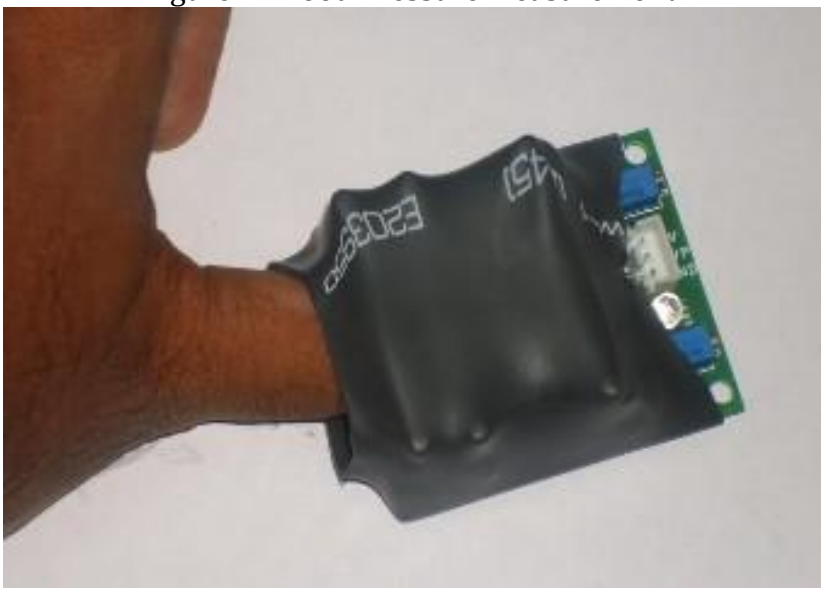
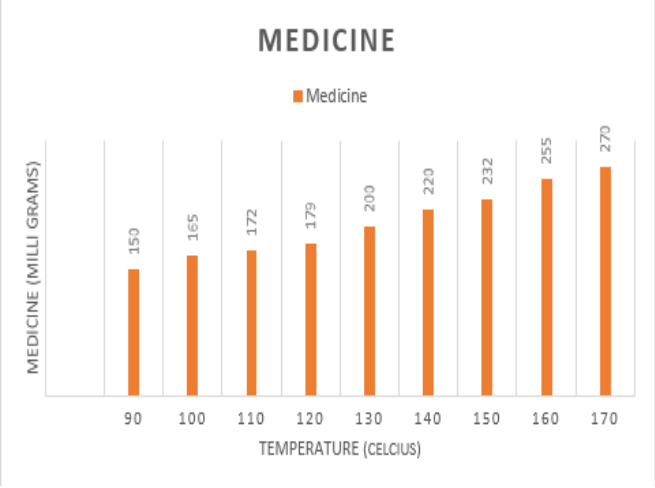


Figure 3: Heart Beat Sensor

3. Graphical Representation of Medicine Vs Temperature:



4. Software Requirement:

Arduino is a computer software and hardware company that provides open-source environment for users, project and user community that proposes and fabricates microcontroller based inventions for construction digital devices and interactive objects that can sense and manage the physical world.

This project is based on a family of microcontroller board drawings invented early by Smart Projects in Italy, and also by lots of other sellers, using different 8-bit Atmel AVR microcontrollers or 32-bit Atmel ARM microcontrollers. These systems provide sets of analog and digital I/O pins that can be interfaced to various development boards ("shields") and other circuits.

The board's characteristic serial communications interfaces, including USB on some models, for program downloading process from personal computers. For programming the microcontrollers, the Arduino proposal provides a software application or IDE based on the Processing project, which includes support for C, C++ and Java programming softwares, arduino software application based on the Processing project, which includes support for embedded C, C++ and Java programming softwares.

Figure 4: Proteus isis.

Proteus is simulation design application developed by Lab center Electronics for electronic circuit simulation, diagrams incarcerate and Printed Circuit Board design. Its simplicity and user friendly design made it popular among electronics hobbyists. Proteus is ordinarily applied for digital simulations such as microprocessors and microcontrollers. It can simulate LDR, LED, and USB Communication etc...

5. Simulation Results:

For simulation purpose, Proteus isis simulator is used. For program computing purpose, Arduino IDE tool is used.

The simulation results are given below:

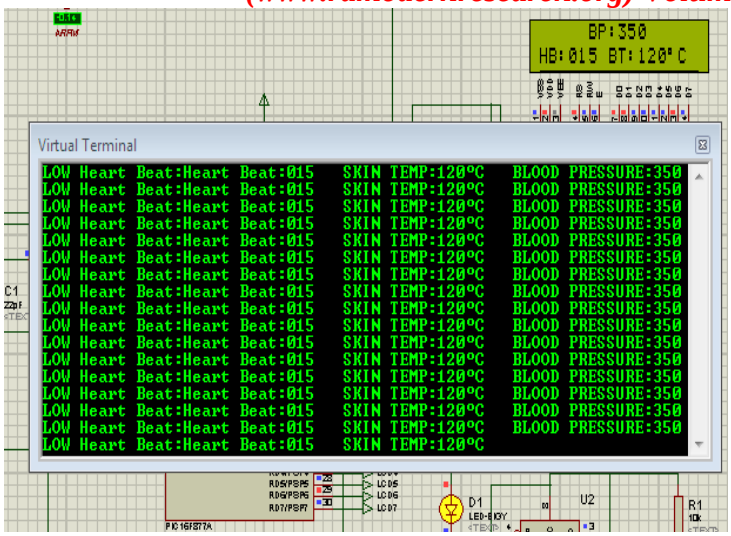


Figure 5: Monitoring value in LCD Display

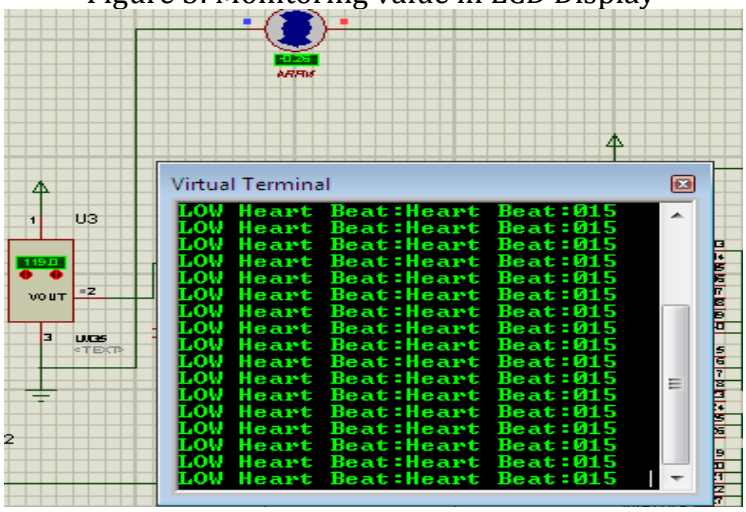


Figure 6: Low Heart Beat Value

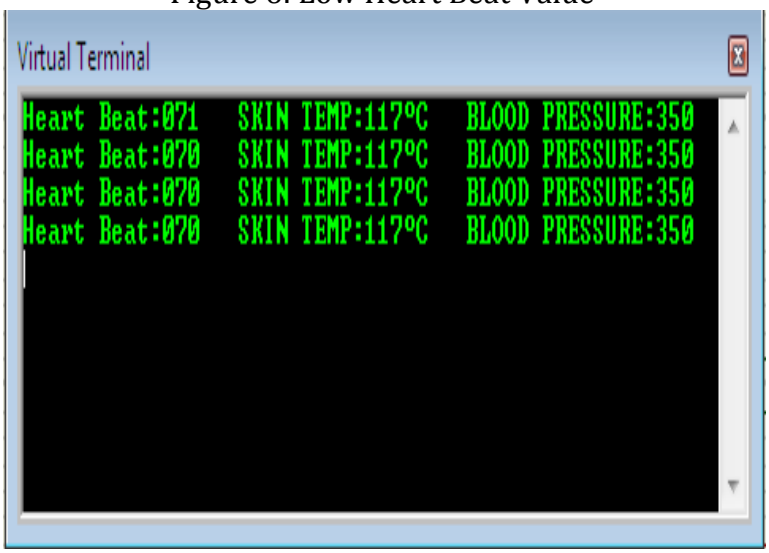


Figure 7: Virtual Terminal

6. Conclusion:

In this paper, we proposed a system Wi-Fi based remote health monitoring and control system using atmega328 microcontroller. We proposed a continuous monitoring and control mechanism to monitor the patient condition and store the

patient data's in server using Zigbee based wireless communication, we also proposed remote health care data acquisition and smart storage system. In recent years, it is one of the significant technology. For continuous health monitoring we also proposed a Wi-Fi based remote health monitoring system, which is able to continuously monitor the patient's heart beat, blood pressure and other critical parameters in the hospital. For the performance evaluation, simulation results are taken using PROTEUS 7 simulation tool with different patient parameters.

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