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Arduino Based Health Monitoring System

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ABSTRACT:

ICU stands for Intensive Care Unit, a place in the hospital where very ill patients are monitored very closely. Typically, the patient-staff ratio is very low and the LIFE-SAVING EQUIPMENT used is very advanced.

Generally ICU is a hospital facility for provision of intensive nursing and medical care of critically ill patients, characterized by high quality and quantity of continuous nursing and medical supervision and by use of sophisticated monitoring and resuscitative equipment

The patients in the ICU need a constant monitoring of their Temperature and heart beat. This project is a working model, which incorporates sensors to measure important parameters namely the Temperature, Respiratory temperature and Heart Beat. The sensors are interfaced to computer, so that the condition of a patient can be analyzed by doctors in any part of the hospital wherever they are. Generally ICU is a hospital facility for provision of intensive nursing and medical care of critically ill patients, characterized by high quality and quantity of continuous nursing and medical supervision and by use of sophisticated monitoring and resuscitative equipment

Keywords: Surveillance, Collisions, First-Person View, health monitoring, Quadcopter, autonomous navigation , extensive testing

Introduction:

An embedded system is a collection of computer hardware, software, and sometimes extra mechanical or other components that are intended to carry out a particular task. The microwave oven is a prime illustration. Though tens of millions of them are used every day in almost every household, very few people are aware that the creation of their lunch or dinner involves a processor and software.

The family room's personal computer stands in stark contrast to this. It is also made up of mechanical parts (disc drives, for example) and computer hardware and software. However, a personal computer may execute a wide range of tasks; it is not made to carry out a single task. To make this contrast obvious, the term "general-purpose computer" is frequently used. A general-purpose computer is a blank slate when it is supplied; the manufacturer has no idea what the buyer will wish for it. A customer might utilise it for a network file server, another just for gaming, and even another for crafting the next great American novel.

An embedded system is often a subsystem of a larger system. For instance, many embedded systems are found in contemporary cars and trucks. The anti-lock brakes are managed by one embedded system, the vehicle's emissions are tracked and managed by another, and information is shown on the dashboard by a third. These embedded systems may occasionally be linked together via a communication network, but it is by no means necessary.

What is aim of health monitoring system?

The goal of an Arduino-based photoplethysmography (PPG)-based health monitoring system is to track vital signs in real time. PPG uses light to measure blood volume changes, which makes it possible to track blood oxygen levels and heart rate. PPG sensors and Arduino are integrated to provide a portable and adaptable solution. This system can be used for early medical condition detection, remote patient monitoring, and fitness tracking. It is appropriate for a wide range of applications due to its versatility and affordability. It gives a non-intrusive way to track health data with its continuous monitoring features. All things considered, the Arduino-based PPG system offers a viable option for easily accessible and effective health monitoring.

Why is health monitoring system neccesary?

Since embedded systems were defined earlier in this chapter, it is impossible that the first of these systems could have been created before 1971. In that year, Intel unveiled the first microprocessor ever made. The 4004 chip was created specifically to be utilised in a series of business calculators manufactured by Busicom, a Japanese company. A series of specialised integrated circuits was requested by Busicom in 1969, one for each of their new calculator models. In response, Intel presented a general-purpose circuit that could be utilised by the entire range of calculators, as opposed to designing specific hardware for every calculator. This was the 4004 model. According to Intel, each calculator would have its own distinct set of functions thanks to the software.

The microcontroller became popular immediately, and during the ensuing ten years, its usage grew gradually. Unmanned space probes, computerised traffic signals, and aircraft flight control systems were among the first embedded applications. Embedded systems stealthily navigated the microcomputer era of the 1980s, introducing microprocessors into our living rooms (TVs, stereos, and remote controls), offices (fax machines, pagers, laser printers, cash registers, and credit card readers), and kitchens (bread makers, food processors, and microwave ovens). The number of embedded systems will inevitably continue to rise quickly. There are already a number of intriguing new embedded devices with enormous market potential, such as digital cameras, dashboard navigation systems, intelligent airbag systems that don't inflate when children or small adults are present, light switches and thermostats that can double as central computers, and pal-sized electronic organisers and personal digital assistants (PDAs). It is obvious that there will be a long-term demand for people with the knowledge and motivation to design the next generation of embedded systems.

METHODOLOGY

The methodology of an Arduino-based health monitoring system involves selecting suitable sensors for vital sign measurement, such as heart rate and blood oxygen levels, and integrating them into the Arduino circuitry. Programming the Arduino involves writing code to read data from these sensors, process it, and present the results. Signal processing algorithms are implemented to accurately interpret the sensor data. Once the data is processed, a user-friendly interface is developed to display the monitored health parameters. Additionally, power management techniques are employed to optimize energy usage, crucial for portable applications. Extensive testing is conducted to validate the system's accuracy and reliability under various conditions, ensuring it meets the desired standards for health monitoring. Through this methodology, an Arduino-based health monitoring system can be efficiently developed, offering an accessible and cost-effective solution for continuous health tracking..

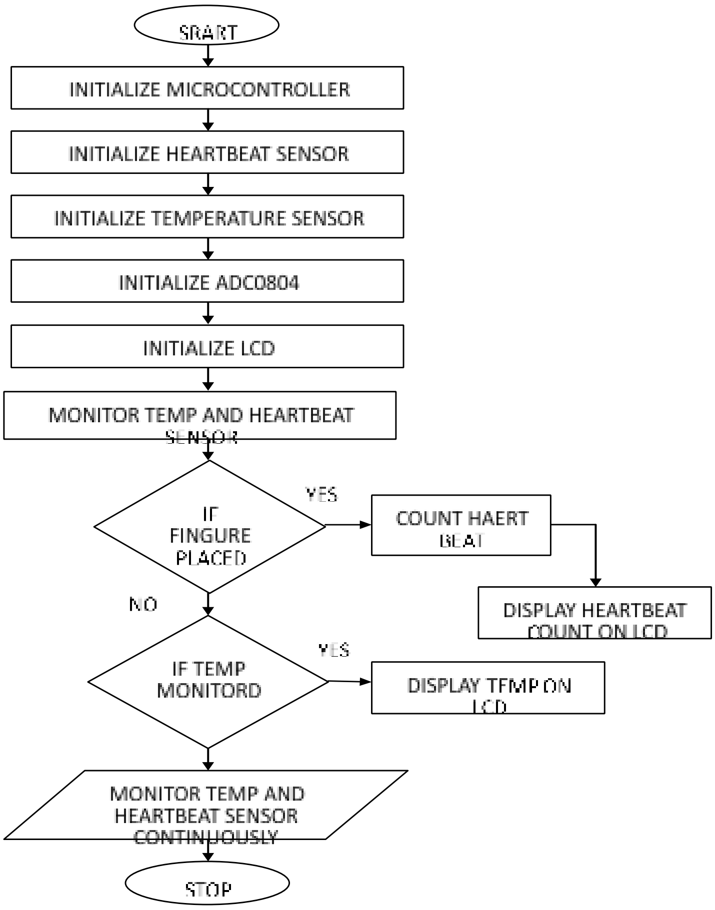

FIG NO 1: BLOCK DIAGRAM OF QUADCOPTER

The block diagram serves as a crucial visual representation of Arduino based health monitoring system, illustrating the integration of various components and their interrelationships. This chapter endeavours to delve deeply into both the existing and proposed system block diagrams, elucidating the evolution and enhancements in design and functionality. The existing system block diagram portrays the traditional configuration of a quadcopter, devoid of FPV capabilities. It delineates the fundamental components requisite for flight control and navigation, including motors, electronic speed controllers (ESCs), flight controller, battery, and transmitter. Each component's function and connectivity within the system framework are meticulously outlined, offering a comprehensive overview of the basic quadcopter architecture. The block diagram of the quadcopter system provides a clear visualization of the interactions between its core components. Understanding these connections is essential for designing, building, and troubleshooting quadcopter systems. By illustrating the flow of signals and power within the system, the block diagram serves as a valuable tool for comprehending the operational principles of the quadcopter. The block diagram of the quadcopter system illustrates the interconnectedness of essential components responsible for its operation. At the core of the system lies the flight controller, serving as the brain of the quadcopter. It receives input commands from the transmitter and processes sensor data to regulate the speed of each motor through electronic speed controllers (ESCs).

How does health monitoring system works?

An Arduino health monitoring system operates by interfacing sensors, like PPG for heart rate and blood oxygen levels, with Arduino boards. These sensors detect physiological signals, which are then processed by the Arduino using programmed algorithms. The Arduino interprets the sensor data to derive vital health parameters. The system displays these parameters on a user interface, such as an LCD screen or a smartphone app, for easy access and monitoring. It continuously gathers data, enabling real-time tracking of health metrics. With its portable design and customizable features, the Arduino health monitoring system offers a versatile solution for personal and medical applications alike.. The system displays these parameters on a user interface, such as an LCD screen or a smartphone app, for easy access and monitoring. It continuously gathers data, enabling real-time tracking of health metrics. With its portable design and customizable features, the Arduino health monitoring system offers a versatile solution for personal and medical applications alike..

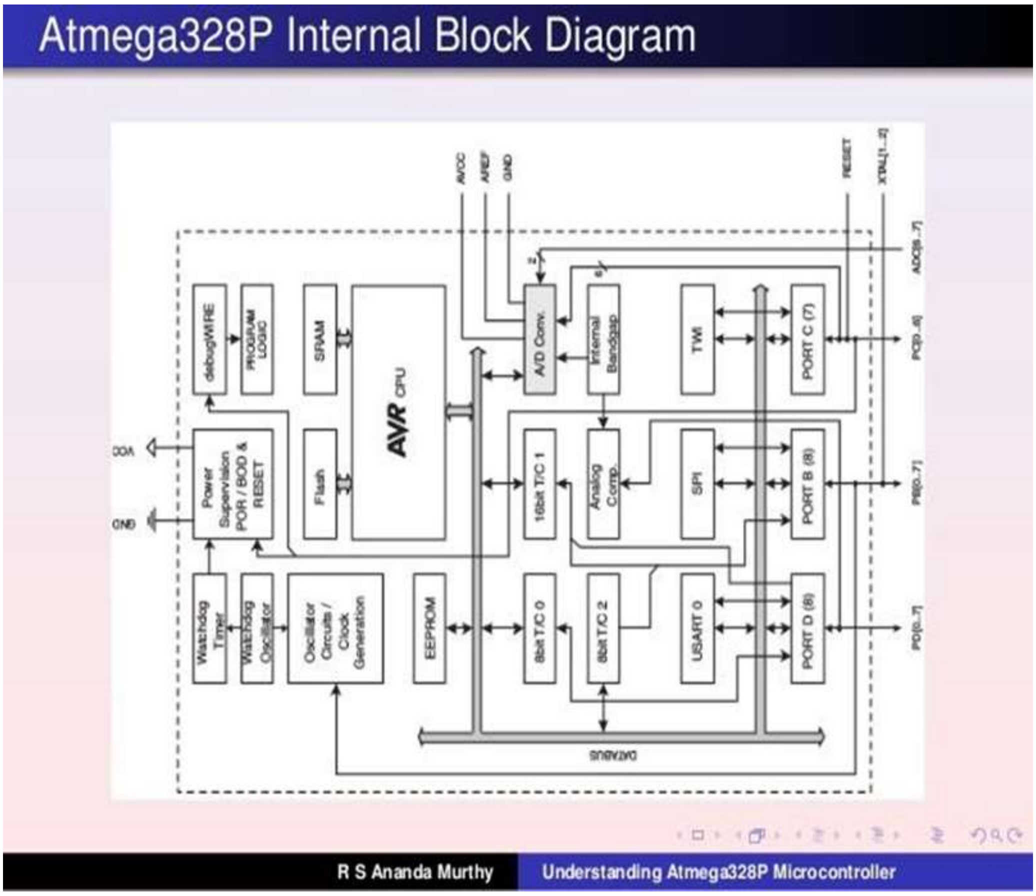

FIG NO 2: CIRCUIT DIAGRAM

Hardware Requirements:

1. *Arduino Board*: Choose a suitable Arduino board based on the project's requirements, such as Arduino Uno, Nano, or Mega, to serve as the main controller.

2. *Sensors*: Select sensors for measuring vital signs like heart rate, blood oxygen levels, and temperature. For example, photoplethysmography (PPG) sensors for heart rate and blood oxygen, and a temperature sensor like the LM35.

3. *Display*: An output interface to display the monitored health parameters, such as an LCD screen, OLED display, or LED indicators.

4. *Power Source*: Depending on the application, power can be supplied through USB, batteries, or external power sources.

5. *Wires and Connectors*: Various wires, jumper cables, and connectors for connecting the Arduino board to sensors and the display.

6. *Enclosure*: Depending on the application, an enclosure may be needed to protect the components and make the system portable.

7. *Optional Components*: Depending on the specific requirements, additional components like buttons for user input, Bluetooth or Wi-Fi modules for data transmission, and SD card modules for data logging may be incorporated.

By fulfilling these hardware requirements, you can build a functional Arduino-based health monitoring system capable of tracking vital signs accurately and reliably.

OBJECTIVES

Real-time Monitoring: Enable continuous tracking of vital signs such as heart rate and blood oxygen levels in real-time.

2. *Accessibility and Affordability*: Create a low-cost solution accessible to a broad user base, promoting widespread adoption for personal health management.

3. *Accuracy and Reliability*: Ensure precise measurement of health parameters through sensor integration and robust signal processing algorithms.

4. *Versatility and Adaptability*: Develop a flexible platform capable of accommodating various sensors and customizable features to meet diverse monitoring needs, from fitness tracking to medical research.

RESULT

The result of an Arduino-based health monitoring system is a cost-effective, portable, and customizable solution for tracking vital signs in real-time. This system enables continuous monitoring of parameters such as heart rate, blood oxygen levels, and temperature. It provides accurate and reliable data interpretation through programmed algorithms and sensor integration. The user-friendly interface allows for easy access to monitored health metrics, either through an LCD screen, LED indicators, or a smartphone app. With its versatility, the Arduino-based health monitoring system can be applied in various settings, including personal fitness tracking, remote patient monitoring, and medical research. Overall, it offers an accessible and efficient means of monitoring health status, contributing to improved healthcare management and wellness outcomes.. . With its versatility, the Arduino-based health monitoring system can be applied in various settings, including personal fitness tracking, remote patient monitoring, and medical research. Overall, it offers an accessible and efficient means of monitoring health status, contributing to improved healthcare management and wellness outcomes..

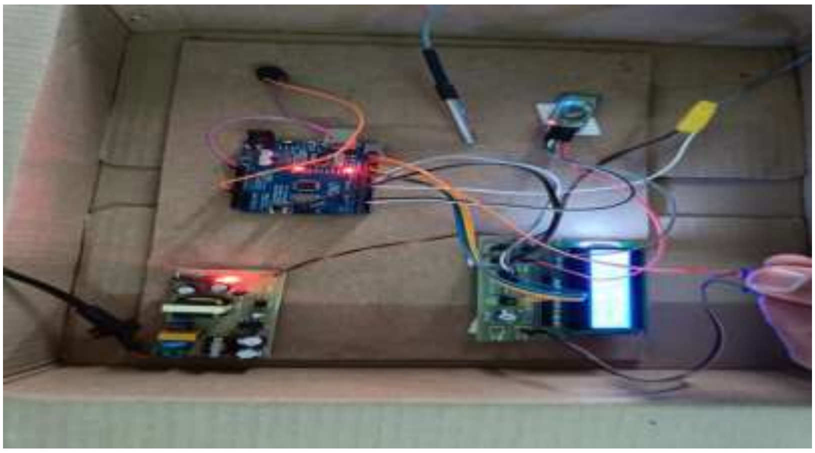

FIG NO:3 OUTPUT OF THE PROJECT

The project "Wireless patient monitoring system using BT MODULE " has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

FUTURE SCOPE:

A lot of the patient monitoring systems. The most foresighted example is where the book describes an example where a doctor receives an alert for a urine condition on one of his patients on his pager. This could be a taste for what possibilities there are for patient monitoring in the future. How the systems of tomorrow will look like will of course be just speculation. It is likely that the doctors and nurses would want to be mobile. When they visit a patient they could have a tablet PC with all the current charts and data for that particular patient ready. The architecture for supporting this could be designed in different ways, but the main parts that have to be realized would be .An infrastructure for the monitoring devices to push their data into, for example a server with a database. An infrastructure for the mobile devices to get the data .It could also be realized in such way that the monitoring device stores all the data and applications needing data connected directly to the monitoring device.

CONCLUSION:

The project “Wireless patient monitoring system using BT MODULE ” has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC’s and with the help of growing technology the project has been successfully implemented.

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