Coma Care: Body Movement and Health Monitoring Coma Patient Using IoT Sensors

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Abstract: IoT is essential for keeping track of the health of coma patients. Through timely detection, continuous fitness monitoring can save up to 60% of human lives. The equipment is specifically made for real-time monitoring of coma patients' health indicators. The usage of IoT has made it more appropriate to identify the patient's status or condition. For obtaining the patient's body temperature, coronary pulse rate, blood pressure and oxygen saturation %, this proposed technique includes a number of smart sensors, including temperature, pulse rate, blood pressure, (peripheral capillary oxygen saturation) sensors. This system makes use of the cloud computing concept and an Arduino-UNO board as a microcontroller. Here, an sensors is being utilised to show the coma patients' movement. Vital information about the patient is sent via a cloud server to the legal person's smartphones and PCs. These documents may be preserved and examined for additional assessment and decision-making.

Keywords: IoT Sensors, Body Movement Tracking, Health Monitoring, IoT in Critical Care.

1. Introduction

Health-related difficulties have recently become increasingly prevalent in daily life at an extremely rapid rate. Coma is one of the key problems with these health. Coma is a persistent condition of unconsciousness where a single patient is unable to be disturbed, unable to respond normally to harsh shocks, lights, or sound, wakes up slowly throughout a typical wake-rest cycle, and does not begin intended activities. Patients in comas are unable to intentionally feel, speak, or move. Issues can be caused by a variety of factors, such as the coma patient's severe head injury that gravely damages the cerebrum.

The solitary coma patient can now respond to the outside environment by being cognizant, for instance, by opening one eye when exposed to sunlight. In fact, a person in an extremely inactive state appears normal, but they are unable to perceive or respond to their environment. There is a requirement for routine concern and care because firm plant type people rarely move physically. New innovations will always make life simpler and more orderly, making it easier for people to tolerate.

Background

Coma is a state of profound unconsciousness where an individual is unresponsive and cannot be awakened Coma patients require constant monitoring to ensure their vital signs are stable and to detect any changes in their condition. Traditional methods of monitoring involve manual checks and observation, which may not be sufficient for providing accurate and real-time data.

This project aims to utilize IoT (Internet of Things) sensors to address these challenges and improve the care of coma patients. IoT refers to the network of physical devices embedded with sensors, software, and connectivity that enable them to collect and exchangeBy incorporating IoT sensors into the monitoring process, vital signs such as heart rate, blood pressure, temperature, and oxygen levels can be continuously tracked and transmitted wirelessly to a central monitoring system. This enables healthcare professionals to have real-time access to the patient's data, allowing them to detect any abnormalities or changes promptly.

Objectives

Continuous Health Monitoring: The project aims to implement IoT sensors to continuously monitor vital signs such as heart rate, blood pressure, temperature, and oxygen levels coma patients. This allows healthcare professionals to have real-time access to accurate and reliable data, enabling them to detect any changes or abnormalities promptly.

Body Movement Tracking: By incorporating motion sensors, the project aims to monitor and track the body movements of coma patients. This includes tracking eye movements, facial expressions, and subtle body twitches. The goal is to provide comprehensive data on the patient's movements, which can be useful in assessing their level of consciousness and responsiveness.

2. Literature Review

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As the population ages, it is becoming increasingly common for elders to have multiple chronic diseases and rely on medication to stabilize their health conditions. The Pharmacists Association has recommended greater family involvement in medication safety for these patients. However, ensuring that patients take the right medication atthe right time can be challenging. To address this issue, an IoT-based intelligent home-based health care platform has been proposed that connects smart sensors attached to the body for biological monitoring with an intelligent medical packaging system for daily medication management. The system can provide timely reminders to patients about their medication and closely monitor the type and amount of prescribed medicines to prevent misuse and abuse. When a patient visits a doctor, their information and prescription details can be uploaded to an online server, making it easy for remote physicians to update or create a prescription fora specific patient. This platform has the potential to improve medication adherence and health outcomes for patients with chronic diseases, while also providing peaceof mind for their families and caregivers.

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The field An Internet of Things Approach for ManagingSmart Services Provided by Wearable Devices" present an autonomous physical condition performance system based on a WSN that allows for the integration of several elements in an Internet of Things scenario, including a smartwatch, a physiological tracking unit, and a smartphone, in this paper. These wearable devices have been linked using Bluetooth, wireless sensor networks, and smart services. The unit collects physiological data from a commercial Bluetooth device. When an unsafe level of any vital parameter (e.g., heart rate) is reached, the user is warned to stop performing the workout. This alarm can be sent to a smartphone or a wearable smartwatch, as well as the emergency services via the ESB if activated.

3. Need for the Project

1.Safety: Alzheimer's patients often wander and may get lost, causing significant stress and anxiety for caregivers. The proposed system offers location tracking and SMS alerts to caregivers, which can improve patient safety and reduce stress levels.

2.Medication Management: Alzheimer's patients often have difficulty managing their medications, leading to missed doses and potential health risks. The proposed system offers SMS reminders to patients, helping them manage their medications more effectively and reducing the likelihood of adverse health outcomes.

3.Family Coordination: The proposed system offers a family member recognition feature, allowing the subject to recognize family members through machine learning based solution.

4. Proposed Methodology

1. **Design and simulation:** Firstly, the proposed system will be designed and simulated using the Arduino IDE board, Embedded C, LCD display, Buzzer, servo motor, and other necessary components. The simulation will be done on software like ensure that the system works flawlessly.

2. **Hardware assembly:** After the simulation and testing are done, the hardware components will be assembled according to the design. The Embedded C will be connected to the Arduino board to provide the time for medication schedules. The LCD will be connected to the Arduino board and mounted on the front of the pillbox foreasy usage. The LCD and Buzzer will be connected to the Arduino board to provide visual and audio alerts to the patient.

3. **Programming:** Once the hardware is assembled, the next step is to program the Arduino board. The code will be written in the Arduino IDE, which will communicate with the Embedded C, LCD display, Buzzer, and servo motor to operate the sensors. The program will be designed in such a way that it can store the medication schedule of each patient and also retrieve it when necessary.

4. **Testing:** After the programming is done, the system will be tested thoroughly to ensure that it works as intended. Testing will be done by running the sensors for multiple medication schedules and observing its performance. The system will also be tested for reliability and safety.

5. **SMS Integration:** The last step is to integrate SMS functionality to the system. This will be done by using GSM modules, which will allow the system to send SMS alerts to the patients and caregivers on LCD display In conclusion, the proposed methodology for the health monitoring project involves designing and simulating the system, assembling the hardware components, programming the Arduino board, testing the system thoroughly, and integrating SMS functionality to the system.

Software Requirements

Arduino IDE

The Arduino Integrated for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor Before uploading your sketch, you need to select the correct items from the **Tools > Board** and **Tools > Port** menus. The boards are described below. On the Mac, the serial port is probably something like **/dev/tty.usbmodem241** (for an Uno or Mega2560 or Leonardo) or **/dev/tty.usbserial-1B1** (for a Duemilanove or earlier USB board), or **/dev/**tty.USA19QW1b1P1**.1** (for a serial board connected with a Keyspan USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5, COM7, or higher (for a USB board) - to find out, you look for USB serial device in the ports section of the Windows Device Manager.

Benefits

- Improved Patient Care
- Remote Monitoring Reduced
- Response Time Enhanced
- Enhanced Patient Safety
- Cost Savings

Scope

The scope of the project "Coma Care: Body Movement and Health Monitoring for Coma Patients Using IoT Sensors" is determined by its objectives and the specific features and capabilities it aims to incorporate. Below are some key aspects that outline the scope of the project .

- Sensor Deployment
- Data Collection and Transmission
- Data Processing and Analysis

Hardware Diagram

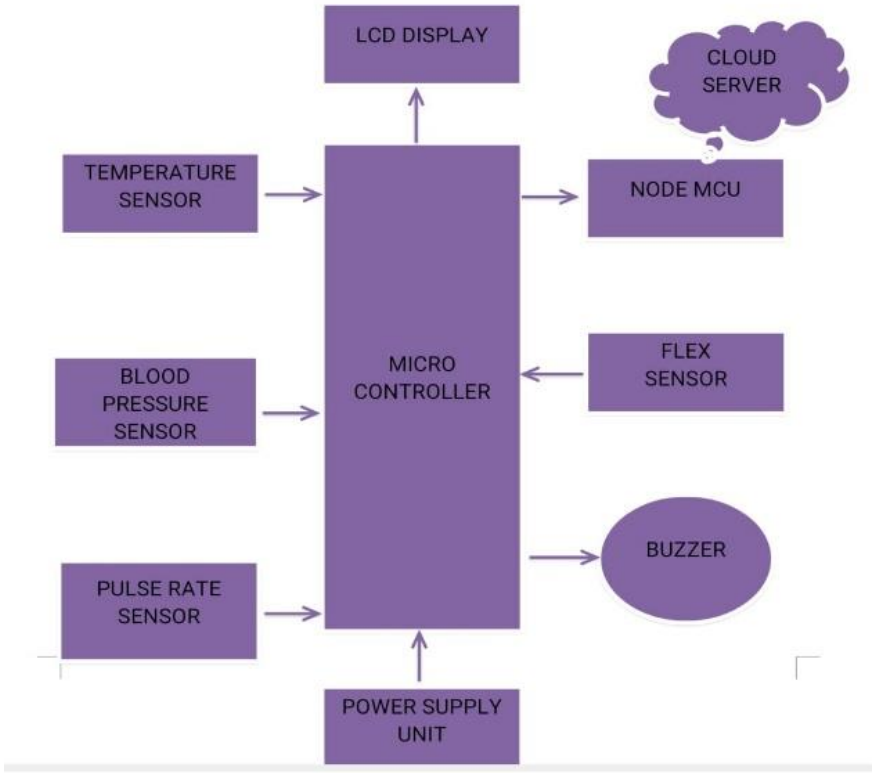
To monitor patients who are in a coma or unconscious, a patient monitoring system is crucial. The patient's motions are tracked using a pulse rate monitor, and an iot receives a signal when the throw occurs.. The suggested system keeps working even after it becomes aware of the analysis of each body part's degree of muscle activity and the establishment of a mobile network with a well-known platform for sensor integration.Through the use of a mobile application or iot, the system is helpful in lowering the load of a manual requirement to continually monitor the comatose and support to the coma health and consciousness state. It notifies the user of any irregularities in the comatose person's vital signs. The suggested solution is also concerned with data analysis for future use.

Both manual and automatic systems are kinds of the current systems.

Manual system: Nurses are designated to regularly collect patient readings and should alert the on-call physician in the event of an emergency. One time each day, the responsible doctor sees the patient, and the nurse reports the recorded readings.

Automated systems: When a doctor visits a patient, he only observes the parameters from the system, which monitors the patient's parameters. There are additional systems that transmit the observed parameters utilising GSM and IoT technologies.

Figure 1 Hardware Block Diagram



4.5 Hradware Requirements

S.No	Component name	Qty
1	Microcontroller	1
2	Temperature Sensor	1
3	Flex Sensor	1
4	Blood Pressure Sensor	1
5	Buzzer	1
6	Pulse Rate Sensor	1
7	LCD Display	1

5. Results and Discussion

The expected results of the project "COMA CARE: Body Movement and Health Monitoring for Coma Patients Using IoT Sensors" can vary depending on its specific goals and objectives, as well as the technologies and methodologies employed. However, here are some general expected results and outcomes that such a project aims to achieve:

Improved Patient Monitoring: One of the primary goals of this project is to enhance the monitoring of coma patients. The expected result is a system that provides continuous, real-time monitoring of vital signs, body movements, and other relevant health parameters.

Timely Intervention: The project aims to enable timely intervention in case of any changes or critical events in the patient's condition. This includes the ability to detect and respond to abnormal vital signs, seizures, or other health emergencies promptly.

Enhanced Data Accuracy: Through the use of IoT sensors and advanced data processing techniques, the project seeks to improve the accuracy and reliability of data collected from coma patients. This leads to more precise monitoring and better decision-making.

6. Conclusion

In conclusion, the COMA CARE project represents a significant advancement in the field of healthcare, specifically in the care and monitoring of coma patients. By harnessing the capabilities of IoT sensors, this project offers with real-time data analysis, enables early detection of changes in a patient's condition, thus improving the chances of a positive outcome.

However, it's crucial to recognize that the successful implementation of COMA CARE comes with its set of challenges. Data security and the potential to revolutionize the way we provide care for individuals in a coma. Continuous monitoring of vital signs and body movements, combined
privacy are paramount, necessitating robust safeguards to protect sensitive patient information. Sensor reliability and interoperability with existing healthcare infrastructure are additional considerations that demand careful attention.

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