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Comatose Monitoring: Body Movement Recognition via Smart Sensor

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ABSTRACT

This paper proposes a novel approach for coma patient monitoring utilizing smart sensors capable of recognizing body movements. The system is designed to detect the even subtle changes in the patient's condition. By strategically placing smart sensors on the patient's body, such as the hand, leg, finger, the system can capture a comprehensive range of movements. By continuously monitoring the patient's body movements, the system can provide valuable insights into the patient's neurological state and alert healthcare providers to any significant changes or abnormalities. Our system uses smart sensors like flex sensor, accelerometer (or) MEMS body sensor and eye blink sensor. When a person moves any finger, any eye lid or move the body to the right or left side, these three sensors detect the respective movements and an alert message send to the concerned person (doctor/guardian of the patient) through the GSM module. Our system also monitors the heart rate, body temperature of coma patients. If any of the above parameters exceed a certain threshold limit value, the smart device informs the doctors or guardians and ask for corrective actions to save the coma patient life.

KEYWORDS: Arduino UNO, Sensor, Comatose Monitoring, GSM, Embedded C

1. INTRODUCTION

Coma represents a profound state of unconsciousness wherein an individual remains unresponsive and cannot be roused. It is characterized by the inability to react to stimuli like pain, light, or sound, and lacks the typical sleep-wake cycle. Coma can arise from various factors such as intoxication, CNS diseases or infections, severe injuries, or oxygen deprivation. Medical professionals closely monitor coma patients, assessing their bodily movements, responses to stimuli, pupil size, and breathing patterns. These observations aid in diagnosing the underlying cause of the coma and tracking the patient's progress towards recovery.

Comatose monitoring involves utilizing smart sensors like flex sensors, eye blink sensors, and accelerometer sensors to track and analyze the body's movements and physiological signals in individuals who are comatose. Flex sensors detect changes in muscle movements, eye blink sensors monitor eye activity, and accelerometers measure body position and movement.

By integrating data from these sensors, healthcare professionals can assess the patient's level of consciousness, detect any signs of improvement or deterioration, and adjust treatment accordingly. It sounds like you're interested in a system for monitoring comatose patients using smart sensors and GSM technology. Such a system would likely involve sensors to detect body movements, which could then be transmitted via GSM (or similar) to healthcare providers for monitoring and intervention if necessary. This could be a valuable tool for ensuring timely care and response for patients in critical condition. These sensors provide valuable real-time data to aid in the management and care of comatose patients, enhancing both monitoring accuracy and patient outcomes. It using a smart sensor alert system involves employing sensors to detect body movements, enabling timely alerts for caregivers or medical professionals. This system can help monitor patients' vital signs and detect any potential emergencies, enhancing patient safety and care.

2. RECENT WORKS

Research in comatose monitoring and body movement recognition via smart sensors is ongoing, with recent works focusing on various aspects such as sensor development, data analysis techniques, and application in healthcare settings. Some recent approaches include using machine learning algorithms for real-time detection of movement patterns, developing wearable sensors for continuous monitoring, and integrating multiple sensor modalities for enhanced accuracy. Additionally, advancements in signal processing techniques and wireless communication have enabled remote monitoring and analysis, improving the efficiency and effectiveness of comatose patient care.

3. PROPOSED WORK EXPLANATION

The GSM-based Coma Patient Health Monitoring Project is designed to enable doctors or relatives to remotely monitor the health status of a patient. By integrating various sensors such as eye blink, accelerometer, flex sensor, heartbeat sensor, and temperature sensor, the system continuously tracks vital signs. Should any parameter exceed predefined thresholds, immediate alerts are dispatched to registered numbers. The system would involve integrating these smart sensors into a monitoring device, which would continuously analyze the data generated by the sensors.

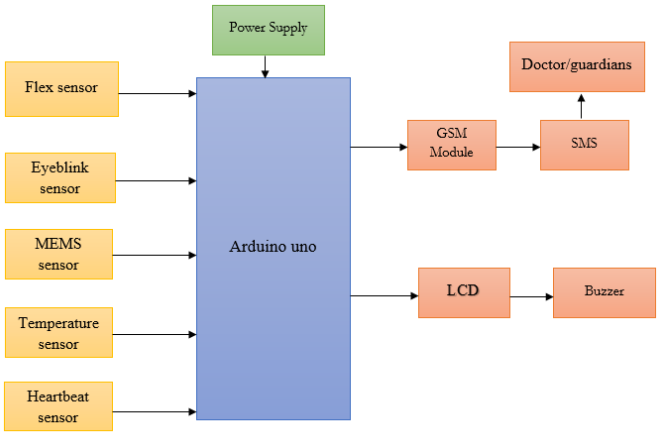

Figure 1: Proposed block diagram

At the core of the system is a microcontroller, which interfaces with an LCD display, heartbeat sensor, and temperature sensor. This setup facilitates real-time monitoring and data collection. Utilizing a GSM modem, the system transmits data to registered numbers, ensuring timely updates on the patient's condition. Powered by a 12V transformer, the system operates reliably and consistently. Alert system: Integration with an alert system to notify caregivers or medical personnel in case of significant changes or emergencies. Overall, the proposed system offers a promising approach to comatose monitoring, leveraging smart sensor technology patient care and facilitate timely interventions.

3.1 HARDWARE EXPLANATION

3.1.1 FLEX SENSOR:

It is mainly used to detect the finger movement of the patient. A flex sensor is a type of sensor that detects bending or flexing. It changes its resistance based on the degree of bending, providing a variable output signal. These sensors are commonly used in applications such as robotics, virtual reality gloves, and medical devices to measure the degree of bending or flexing in various objects or body parts.

3.1.2 EYEBLINK SENSOR:

The eye blink sensor can detect subtle eye movements providing valuable data for monitoring changes in consciousness levels or potential signs of improvement. These sensors work by capturing and analyzing the frequency and pattern of eye movement.

3.1.3 MEMS SENSOR:

MEMS sensor are made up of both electronic and mechanical components. (MEMS) technology to detect and analyze body movements in comatose patients.

3.1.4 TEMPERATURE SENSOR:

The temperature sensor is a device which is used to monitor the patient body temperature levels. Typically, normal body temperature ranges from 30 to 37 degrees Celsius for adults and children above 10 years old.

3.1.5 HEARTBEAT SENSOR:

A heart rate sensor, also known as a heart rate monitor or heart rate sensor, is a device that measures the heart rate in real-time. It typically detects the heart rate by monitoring the pulse either through contact with the skin or through other means such as optical sensors.

3.1.6 ARDUINO UNO:

Arduino Uno is a versatile and user-friendly platform for learning about electronics and programming, enabling users to bring their creative ideas to life through interactive projects and prototypes.

3.1.7 GSM MODULE:

The full form of GPS is Global System for Mobile Communication. A GSM module is a hardware device that enables communication over the cellular network. It allows devices to send and receive data, make calls, and send SMS messages via mobile networks.

3.1.8 LCD:

LCD is a display device which display the parameter value such as body temperature, heartbeat. etc, If the above parameter values become too high or abnormal, the device will send the alarm through the buzzer.

4. RESULTS AND DISCUSSION

Our proposed system aims to develop an accessible and user-friendly platform for storing and monitoring patient information efficiently. This model facilitates easy retrieval of stored data by doctors and staff, enhancing overall efficiency and throughput. By swiftly conveying critical patient information to healthcare providers, the system ensures prompt and effective healthcare services for comatose individuals. Furthermore, the collected data is globally networked via the internet and communication channels, enabling rapid responses and facilitating collaborative efforts in patient care.

5. CONCLUSION

Monitoring comatose patients is crucial for their care and prognosis. Utilizing smart sensors for body movement recognition can provide real-time data to healthcare professionals, enabling them to assess the patient's condition and make timely interventions when necessary. The results of such monitoring can include detecting changes in body position, movements indicative of discomfort or pain, or even signs of emerging consciousness, which can guide treatment decisions and improve patient outcomes.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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