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ARRHYTHMIA PATIENT MONITORING SYSTEM AND AUTOMATIC PARKING SYSTEM

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ABSTRACT

Cardiac patients are increasing in India, and cardiovascular illness is the major cause of death. Many people in India's rural areas would not receive sufficient cardiovascular disease therapy. They must travel to nearby hospitals in the city to receive proper treatment. An electrocardiogram (ECG) is a voltage-time graph of the heart's electrical activity, and any deviation in this pattern is referred to as arrhythmia. Sudden change in the health status of vehicle drivers causes too many accidents. So, we need an emergency system to control the car for preventing the driver from making an accident on the road Therefore, it's crucial that the monitoring system for driver doesn't limit or obstruct the driver's movement are currently being created. An autonomous parking system using sensors that dependent on the health status of the driver, which is determined through the heart rate sensor, Alcohol sensor and smoke sensor. The system is capable of self-parking the vehicle & the location of the person through GSM. Cardiac patients are increasing in India, and cardiovascular illness remains a major cause of death, particularly in rural areas where access to proper healthcare is limited. To address this issue, an advanced arrhythmia patient monitoring system has been developed. This system integrates machine learning algorithms to enhance the accuracy of detecting irregular heart rhythms using electrocardiogram (ECG) data. By continuously analyzing the patient's heart activity, the system can provide real-time alerts to healthcare providers, enabling timely intervention and potentially saving lives.

Keywords: Alcohol sensor, heartbeat sensor, motor driver, GPS, GSM, pulse sensor, Arduino Uno.

I. INTRODUCTION

Remote monitoring and control of heart function are of primary importance for patient evaluation and management, especially in the modern era of precision medicine and personalized approach. It is reported by The World Health Organization that cardiovascular diseases are the primary cause of the world's highest mortality, and arrhythmias are the most common. Arrhythmias are caused by abnormalities in the conduction system of the heart. They can be slowly, rapidly, or irregular heartbeats and can be life-threatening or nonlife-threatening. Nonlife-threatening arrhythmias need to be tested for a long period of time to ensure that the pathologic causes of the arrhythmia can be detected early. Based on the above, early detection of cardiac arrhythmias is of paramount importance, in order to improve patient management. Sometimes these people might be very normal and all of a sudden there might be irregular heart rate and attacks, in order to overcome all these issues, we provide a system that helps to be aware of their condition. In addition to the critical need for early detection of cardiac arrhythmias, there is also a growing concern regarding the safety of drivers on the road, especially considering the potential risks associated with sudden health changes while driving. The integration of an automatic parking system into vehicles not only addresses the need for continuous monitoring of heart function but also enhances road safety by aiding in emergency situations. By incorporating sensors that assess the driver's health status in real-time, such as heart rate, alcohol, and smoke sensors, the system can preemptively intervene to prevent accidents caused by parking feature adds an extra layer of convenience and safety by ensuring that the vehicle can park itself safely in case the driver becomes incapacitated. This innovative approach to integrating healthcare monitoring with vehicle safety systems exemplifies the potential of technology to improve overall well-being and enhance public safety on the roads. Moreover, the integration of GPS technology into the automatic parking system enables the tracking of the vehicle's location, allowing for swift emergency responses in case of accidents or health emergencies while

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driving. By transmitting real-time location data via GSM, emergency services can quickly locate and aid drivers in distress. This seamless integration of health monitoring and emergency response mechanisms not only enhances the safety of individual drivers but also contributes to the overall efficiency of emergency services and reduces response times, potentially saving lives in critical situations. Additionally, by raising awareness about the importance of cardiovascular health and providing proactive measures for mitigating risks, this integrated system fosters a culture of preventative healthcare and responsible driving practices, ultimately contributing to a safer and healthier society.

II. PROPOSED ARRHYTHMIA MONITORING SYSTEM

The system consists of Power supply unit which supplies power to the whole system. Embedded C codes are used to program and control the sensor and other devices. The heartbeat is detected by the heart pulse sensor. The analogue to digital converter (ADC), which converts the sensor's detected data into a digital signal, receives it. The microcontroller receives the digital signal after conversion. Alcohol sensor is implemented to detect if the person has consumed any drinks and driving. If the Pulse value varies, then the speed is controlled and stops, shares the location of the person with the help of GPS through GSM.LED strip is used to indicate the emergency stop to the vehicles back side. These parameter values are displayed over LCD.

2.1 Hardware

Heart beat sensor is designed to give digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

Figure 1. Heartbeat sensor

Medical heart sensors are capable of monitoring vascular tissue through the tip of the finger or the ear lobe. It is often used for health purposes, especially when monitoring the body after physical training. Heart beat is sensed by using a high intensity type LED and LDR. The finger is placed between the LED and LDR. As Sensor a photo diode or a photo transistor can be used. The skin may be illuminated with visible (red) using transmitted or reflected light for detection. The very small changes in reflectivity or in transmittance caused by the varying blood content of human tissue are almost invisible. Various noise sources may produce disturbance signals with amplitudes equal or even higher than the amplitude of the pulse signal. Valid pulse measurement therefore requires extensive preprocessing of the raw signal. The new signal processing approach presented here combines analog and digital signal processing in a way that both parts can be kept simple but in combination are very effective in suppressing disturbance signals.

2.2 GPS Receiver

GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on Earth, and the GPS receivers owned by users. GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power

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jack, an ICSP header, and a reset button. It contains anything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions.

Figure 2. GPS Receiver

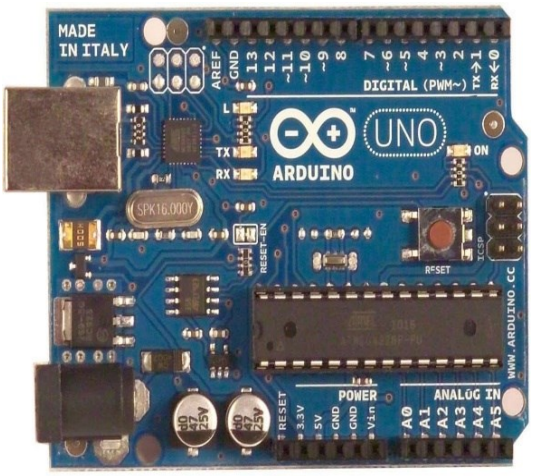

Figure 3. ARDUINO

GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The reason for this is to limit the designers as little as possible but still to make it possible for the operators to buy equipment from different suppliers. The GSM network is divided into three major systems: the switching system (SS), the base station system (BSS), and the operation and support system (OSS).

2.3 Software

Arduino Software (IDE) includes the built-in support for the boards in the following list, all based on the AVR Core. The Boards Manager included in the standard installation allows to add support for the growing number of new boards based on different cores like Arduino Due, Arduino Zero, Edison, Galileo and so on. Arduino Software (IDE) has been translated into 30+ different languages. By default, the IDE loads in the language selected by your operating system. (Note: on Windows and possibly Linux, this is determined by the locale setting which controls currency and date formats, not by the language the operating system is displayed in. Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

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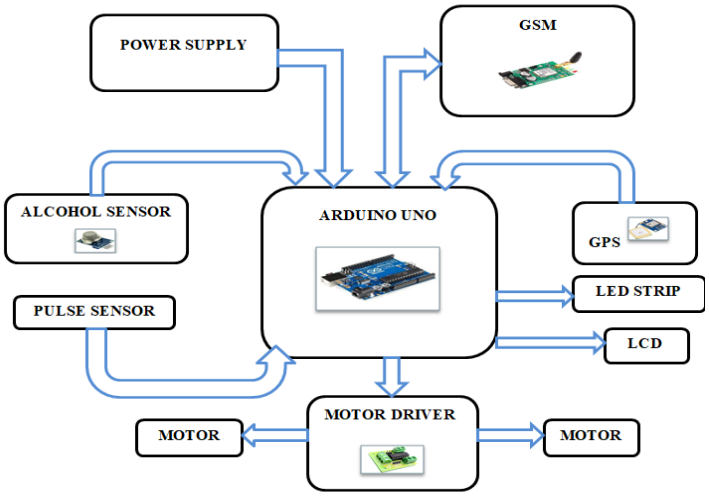

Figure 4. Working model

III. CONCLUSIONS

The purpose of this prototype is to continuously monitor people's health and automatically park the vehicle. The person's pulse levels are obtained, and they are continuously observed. In the event that a he/she experiences any discomfort, or any drop-in pulse values then it alerts the family members. The entire suggested system is modifiable. It can be more efficiently optimized for both power and size. As biosensor capabilities continue to evolve, so too does the scope to manage cardiovascular pathology remotely in a safe, high-quality and cost-effective manner, allowing earlier investigation in patients presenting with their own data and, ultimately, decreasing the time to diagnosis and use of healthcare. As the first clinical trials begin to report cardiovascular outcome data rigorously, we can cautiously expect that consumer-provided monitoring technology could become a valid tool in arrhythmia management. Moreover, as advancements in technology continue to revolutionize healthcare, the integration of artificial intelligence and machine learning algorithms holds promise in further enhancing the capabilities of such monitoring systems. By analyzing vast amounts of data collected from individuals, these algorithms can not only detect irregularities in real-time but also predict potential health issues before they manifest clinically. Additionally, the scalability of such systems opens avenues for population-wide health monitoring, providing valuable insights into epidemiological trends and facilitating proactive interventions at both individual and community levels. As we stride towards a future where preventive healthcare takes center stage, the synergy between innovative technologies and medical expertise holds immense potential in reshaping the landscape of cardiovascular care.

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