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Design and Development of Cyclist Jacket

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ABSTRACT

One of the thing that is of most concern to the cyclists is safety. Sometimes, it can be serious cycling during night. Studies have shown that cyclists are chronically bad at estimating how visible they are on the road, especially during night time. An Abetment Cyclist Jacket is introduced to solve this issue and to make sure that the cyclists are better visible especially by indicating the directions before making any turn. The jacket also measures the heart rate of the cyclist on a continuous basis. Once the heart rate falls below or rises above a particular value, the cyclist jacket is responsible for sending the location of the cyclist to the specified phone numbers thereby alerting the akin that the cyclist needs help.

Keywords . GSM technology, GPS technology, Arduino, Heart rate sensor.

I. INTRODUCTION

In recent years, cycle riding has become more popular to people. It can not only save energy resources, but also protect the environment from air pollution. For these advantages, more people prefer cycling on the road. However, there are also other vehicles, such as buses, cars and motorcycles, and passengers on the road. In this situation, if a cycle does not mount any indication sign to indicate their instantaneous moving actions to surrounding bikes, vehicles and passengers, the rider will be at a risk of traffic accident. As a result, it is necessary to mount an indication sign on a cycle to indicate its instantaneous moving actions for reducing the risk of traffic accident [1]. Unfortunately, a cycle is usually small and lightweight and hence it is not easy to mount an indication sign, such as a brake sign, a left-turn sign and a right-turn sign, to indicate its instantaneous moving action. Thus, an abetment cyclist jacket is designed as a solution to efficiently reduce the risk of accidents of cyclists on the road. This jacket is also meant to work as a heart rate monitoring system where the cyclist can view his/her heart rate [2]. The jacket also alerts the concerned person of the cyclist for medical help through a message that shows the current location of the cyclist [3]. An application that has access to GPS and messaging services such that whenever it receives emergency signal, it can send help request along with the location co-ordinates to the nearest police station, relatives and the people in near radius who have the application was developed [4]. This system enables instantaneous help from the police and public who can reach the victim with great accuracy. In addition, since everyone's pulse rate goes high at the time of any dangerous situation, a pulse rate sensor was incorporated to sense the pulse rate and send help request along with the location. An auto- defender mechanism constituting of a buzzer, a sprinkler and shock mechanism was also provided. Only a button had to be pressed, when in danger on the developed device [5]. In such case, GPS tracks the location of the needy and sends emergency message using GSM to saved contacts and police control room. Also, the audio and video recorder will start to capture the live incident. If the pressure sensor senses the physical pressure, the

message will be sent to the contacts with live recording through GSM. A buzzer is also provided in the device, wherein when the device is activated the buzzer produces high sound to alert the people nearby.

A system that notified the other vehicles and by passers about the intensions of the cyclist was developed by [6]. It enabled the wearer to observe a rear view to identify the approaching traffic, thus improving safety of the cyclist. The cyclist can avoid turning their head to see the approaching traffic from behind. Also, the cyclist can avoid signalling their intended direction of turn by lifting their arm. This device was helpful especially in case of child rider or old person by providing greater stability.The indication light can be triggered using a mechanical switch or an accelerometer or capacitance screen or pressure sensor on strap or audio sensor or from a remote device such as a smart phone or based on GPS.

Here, the sensor interfaced to the microcontroller allowed checking heart rate readings and transmitting them over internet [7]. The user can set the high and low limits of heart rate. The system monitors the heartbeat and once it goes beyond the limits, the system sends an alert to the controller which then transmits this over the internet to alert the doctors and concerned users. The user himself and the concerned users can also monitor the heart rate whenever they wish to.

The developed system was meant to remotely monitor the real-time heart rate of a patient. It uses simple infrared light and photo detectors mounted on the fingertips of the patient to detect and pick up the rate of heart beat signal and send the measured data wirelessly to the MQTT broker, which may be the doctor or relative. With the help of ESP8266 module, the Arduino is able to publish the heart rate measured every minute, so that the doctor or the user can monitor the heart rate provided they are connected on the same network [8].

The prototype of the wearable jacket that included two independent system controlled using two switches was developed by [9]. When first switch is pressed the device would get activated, immediately the location of the victim would be tracked with the help of GPS and emergency message along with latitude and longitude value was sent to stored contacts every one minute with updated location. When second switch is pressed the system would only send the location. The receiver then receives victim's updated location in form of coordinates that can be used to find exact location using Google Maps. A brake light control system was designed to be attached to a vehicle and to correspond with the vehicle's turn signal lights and brake lights. The middle sensor detected red light and send a signal to the processing unit; then it issues an activation command to the brake indicator. The left-hand and the right-hand sensor detect yellow orange light and when it detected yellow-orange light, it sends a signal to the said processing unit. When the intensity of signal obtained from the left-hand sensor is greater than that obtained from the right hand sensor, the processing unit issued an activation command for the left turn indicator, and same is the case with the right turn indicator [10].

The proposed system of [11] consisted of a simple wearable heart rate monitoring device that helped to continuously keep track of their heart rate and share the data with their physician through an SMS any time for medical attention using GSM technology and LPC2148 microcontroller. The circuit measured the pulse impulses of the person for 30 seconds using heart rate pulse sensor and was sent to the Microcontroller that counted the number of pulses received with the help of an inbuilt timer and then multiplies the counted value by 2 as per the program and displayed the value on the LCD in beats per minute. This value was then sent automatically to the GSM circuit containing a SIM card and sends the value received as an SMS to doctor's number as specified in the program.

A system consisting of front and rear turn signal lights and rear alert light for braking was proposed by [12]. The left and right turn signal button was conveniently mounted to the handlebar proximate to the handle grip so that the rider can actuate the front and rear left and right turn signals by thumb or finger without having to release the handgrip. Using a timer incorporated, the signals would remain illuminated and blink for a predetermined period and then shut off automatically. Rear alert light, which is red in color, located between the left and right rear turn signal indicators, which are orange in color. The rear alert light includes a running mode that remains illuminated continuously or in a predetermined blinking pattern as long as the system is turned on. When in a running mode, the rear alert light is less bright than the alert mode.

A humidity sensor SHT-75, temperature sensors LM35 and heart rate sensor was used along with microcontroller to measure humidity, temperature and heart rate [13-15]. The humidity sensor was placed on the neck of jacket, and temperature sensor was placed inner layer next to skin and the other temperature sensor was placed on the outer side of the jacket. The heart beat sensor was attached with cuff of the jacket close to hand and LCD was placed on right arm placed in the upper layer of the jacket. Digital results were displayed on the LCD installed on left arm.

II. METHODS AND MATERIAL

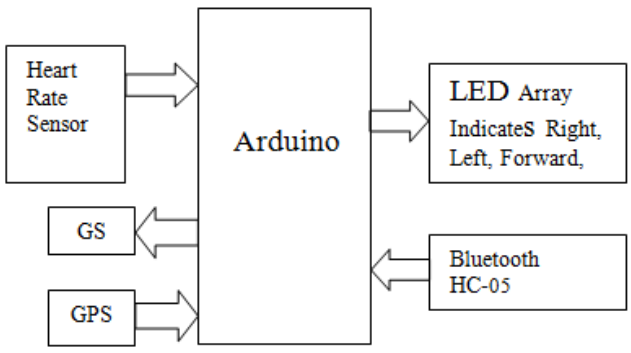

Figure 1. Block diagram of abetment cyclist jacket

Figure 1 shows the block diagram of the abetment cyclist jacket which consists of.

1. Arduino Mega
2. Bluetooth module
3. GPS module
4. GSM module
5. LED arrays

The basic theme of this paper is to enable the cyclist to indicate any instantaneous movement with the help of an application "Bluetooth Controller" on one's Android smart phone via Bluetooth communication. Selecting the soft keys of the application as shown in Figure 2 turns on the respective LED arrays attached to the jacket, thereby indicating the directions.

The jacket is also designed to monitor the heart rate of the cyclist on a continuous basis using a heart rate sensor and the cyclist can track or view his/her heart rate over the "Bluetooth Controller" application on the Android smart phone.

A predetermined value for the maximum and minimum heart rate is fixed as the threshold. As soon as the heart rate goes above or below the set threshold, the controller sends an alert message which includes the current location of the cyclist using GSM and GPS technology, to the concerned people that the cyclist needs help. Your paper must be in two column format with a space of 1.27 cm between columns.

III. RESULT AND DISCUSSION

Figure 2. Simulation Results of the Abetment Cyclist Jacket

The Abetment Cyclist Jacket is designed and built such that it enables the cyclist to indicate his instantaneous moving actions/directions in a more convenient manner, makes the cyclist more visible especially during night rides, monitors and displays the heart rate of the cyclist and also alerts the people concerned that the cyclist needs medical help.

IV. CONCLUSION

Travelling by cycles is the current trend. Cycling trips are fast gaining popularity. But bicycle safety is a serious issue especially during night rides. A user friendly cyclist jacket with direction indication and heart rate monitoring facility is developed for the comfort of the cyclists.

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