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IMPLEMENTATION OF SMART HELMET

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Abstract - *There was a survey till 31 Mar 2015, Which clear tells that there are total of 154.3 million two wheelers are there in India, considering only the registered and renewed vehicle in to consideration, as the density of the two wheelers increases, there the main risk factor is to provide the safety to the riders.70% of the accidents reported are subjected to two wheelers and out 3 accidents in India 2accidents involve two wheelers as a victims, accidents of two wheelers are because of high density roads, heavy traffic, rash or negligence driving, drunk & Drive and a Sleepy riding, many times even after the accidents, accidents will not be reported properly or even the medical aid or assistance will not be available to the riders because of poor or no communication of the accidents, which leads to many number of the death in the recent years.*

In this paper *we are developing an IoT product called Smart helmet, which comprises of to units, motor unit and helmet unit, Helmet unit consists of the alcohol and Eye blink sensor, Alcohol Sensor will not allow rider to take on bike after drinking alcohol and eye blink sensor raises the alarm in sleeping conditions. Motor unit is able to communicate with the care takers with messages and GPS helps the system to track the location of the bike in case of the accidents, also this system act as accident prevention and detection system.*

Keywords: Smart Helmet, IoT, GSM, GPS, Sensors, Accidents, Smart Helmet, Prevention

I. INTRODUCTION

The monitoring of physiological signals using wearable devices is increasingly becoming a prerequisite for the assessment of the state of body and mind in natural environments. This has been facilitated by small-scale analogue and digital integrated circuit technology, together with on-chip processing power for dealing with movement induced artifacts in bio potentials, which are present when performing daily activities. Physiological signals recorded in real life tend to be notoriously weak and with a low signal to-noise ratio (SNR). To this end, an amplifier with a high common mode rejection ratio is required; such high quality bio-appliers are typically integrated into the analogue front end of large stationary devices. Because of the many leads and electrodes required, such devices are well suited for clinical environments, where patients are normally stationary (except e.g. for cardiac stress tests), so that the noise level is relatively low.

Objectives

Objective of this Project is to design an intelligent or smart helmet, which act as a Security system and also a monitoring system for the two wheeler and its rider, This embedded system is consists of the Sensors network with Communication modules, which helps to stop the drive or not to allow the driving at the critical or abnormal situations, also we are intended to set the accident detection system.

II. LITERATURE SURVEY

Smart Helmet with Sensors for Accident [1] The impact when a motorcyclist involves in a high speed accident without wearing a helmet is very dangerous and can cause fatality. Wearing a helmet can reduce shock from the impact and may save a life. There are many countries enforcing a regulation that requires the motorcycle's rider to wear a helmet when riding on their motorcycle, Malaysia is an example. With this reason, this project is specially developed as to improve the safety of the motorcycle's rider. Motorcyclist will be alarmed when the speed limit is exceeded. A Force Sensing Resistor (FSR) and BLDC Fan are used for detection of the rider's head and detection of motorcycle's speed respectively. A 315 MHz Radio Frequency Module as wireless link which able to communicate between transmitter circuit and receiver circuit. PIC16F84a is a microcontroller to control the entire component in the system. Only when the rider buckled the helmet then only the motorcycle's engine will start. A LED will flash if the motor speed exceeds 100 km/hour.

Keywords-Microcontroller PIC16F844a, 315 MHz Radio Frequency Module, Force Sensing Resistance, BLDC Fan, 5VRelay, LM311 and IC 555.

Smart Helmets for Automatic Control of Headlamps [2] Intelligent Safety Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. There are many countries enforcing regulations to wear a helmet while riding. India is an example. The idea is obtained after knowing that the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. This project is designed to introduce automatic autonomous headlight technology for the safety of motorcyclist. Here, we focus on intelligent headlamps that react according to the rider's facial movement. It makes use of accelerometer and other

sensors to direct small electric motors built into the headlight casing to turn the headlights accordingly.

Keywords- Smart helmets, Headlamps, Accelerometer, RF transmitter, RF receiver, Servo motor

A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection[3] It is known that head gesture and brain activity can reflect some human behaviors related to a risk of accident when using machine-tools. The research presented in this paper aims at reducing the risk of injury and thus increase worker safety. Instead of using camera, this paper presents a Smart Safety Helmet (SSH) in order to track the head gestures and the brain activity of the worker to recognize anomalous behavior. Information extracted from SSH is used for computing risk of an accident (a safety level) for preventing and reducing injuries or accidents. The SSH system is an inexpensive, non-intrusive, noninvasive, and non-vision based system, which consists of an Inertial Measurement Unit (IMU) and dry EEG electrodes. Adaptec device, such as vibrotactile motor, is integrated to the helmet in order to alert the operator when computed risk level reaches a threshold. Once the risk level of accident breaks the threshold, a signal will be sent wirelessly to stop the relevant machine tool or process.

Key words — Safety; Head motion recognition; IMU; EEG; accident avoidance; human machine interaction

III. METHODOLOGY

This module contains different sensors and a transmitter Circuitry. Microcontroller contains three sensors which are alcohol sensor, vibrate sensor and IR sensor. Alcohol sensor has been utilized to recognize the alcohol focus. The alcohol sensor will be put close to the mouth of the rider, inside the helmet. Vibrate sensor is utilized for crash location. Another microcontroller contains two sensors which are pulse sensor and UV sensor. Pulse sensor has been utilized for measuring of pulse rate. When the pulse rate increases it stimulates LED1 which blinks white light. UV sensor will sense the front moving vehicle to avoid collision also controlling the accident. If any vehicle detected near to our vehicle LED2 is activated which blinks red light. A RF transmitter which can transmit information from any controller or standard Encode IC has been utilized. The RF transmitter transmits information from the microcontroller on the helmet side to the recipient on the vehicle side through transmit antenna.

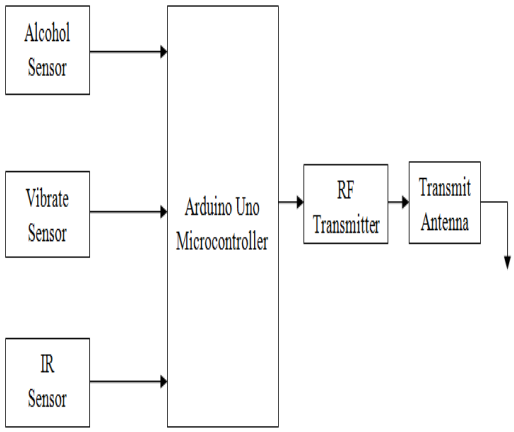

Fig.1 Transmitter side block diagram

This module comprises of a LCD, GSM module, RF recipient, Receive antenna, DC motor, drive L293D and GPS module. This works with wireless communication. Receive antenna receives information from the transmit antenna then sends to the RF receiver which gets the information and sends it to the microcontroller for further Handling. In the coming of an accident, the GPS module will gain the co-ordinates of the accident site. These co-ordinates are sent by means of GSM module to a pre defined number. The person who belongs to this number receives the detection of accident along with location with the help of GPS. The start status is controlled by the microcontroller relying upon different conditions. Any sensor senses their activity DC motor decreases speed by using drive called driver L293D. LCD is used to display the conditions of sensors activities.

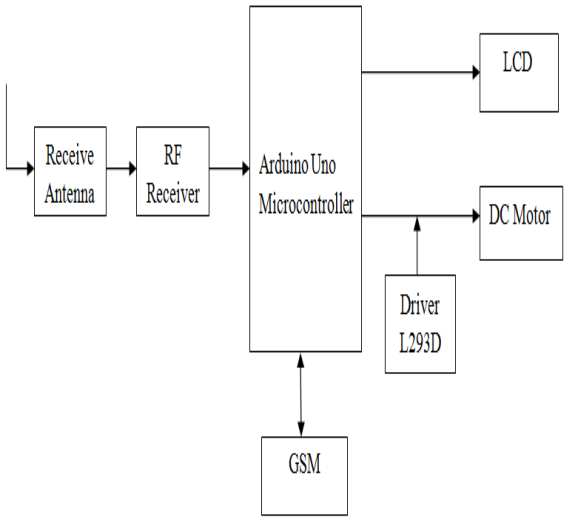

Fig.2 Receiver side block diagram

RESULTS

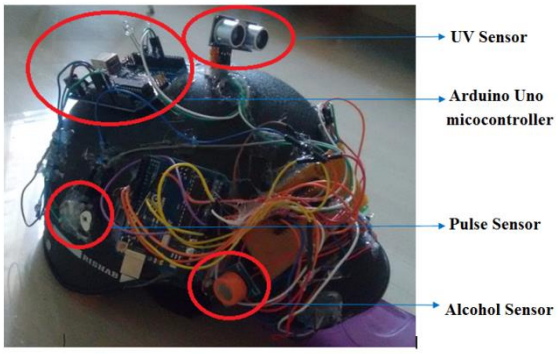

Fig.3 Transmitter side view

This transmitter side of helmet consists of arduino uno microcontroller, UV sensor, pulse sensor, alcohol sensor. Arduino uno microcontroller controls the transmitter part which connects to all sensors. First sensor UV sensor which measures the distance of the front moving vehicle. It locates the distance between vehicles, at the time of critical positions then speed of the vehicle decreases and then it stops with the help of RF transceiver. Second sensor pulse sensor which used to measures the pulse rate. Usually human normal pulse rate 80-120 this sensor measures continuously but it sends information after crosses normal pulse rate it seems like person is in trouble. Third sensor alcohol sensor which utilizes to detect alcohol content this mainly used for prevent accident. The person is in drunken condition sends information to receiver that time bike decreases the speed then come to off state with the help of RF transceiver.

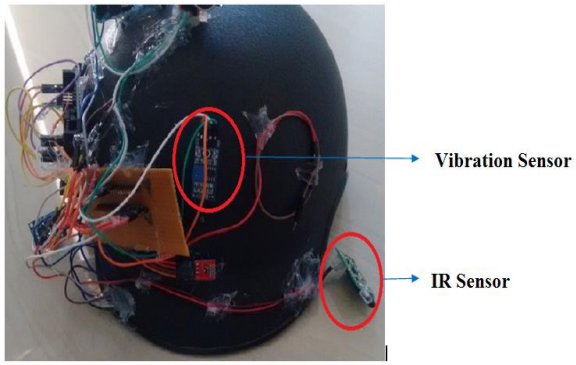

Fig.4 Transmitter front view

The same transmitter of helmet consists of vibrate sensor and IR sensor. Fourth sensor vibrate sensor used for detect the accident at the time of critical sutuation. This sends information to receiver also sends message to pre difined number like the person is in trounle.

The fifth sensor used called IR sensor which measures the drozymness of people. This also sends information to the receiver decreases the speed of vehicle then come to off state.

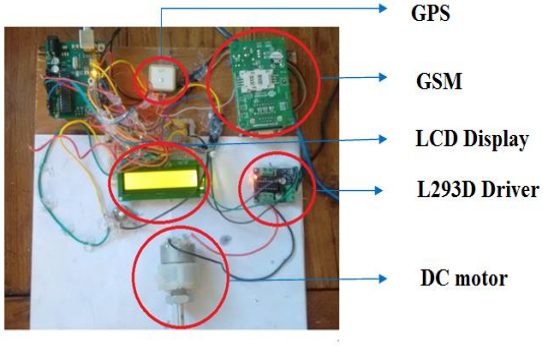

Fig.5 Receiver view

This receiver consists of GPS, GSM, LCD display, DC motor and L293D driver. The GPS is used for identify the location of accident. This receives in our cell phone. GSM is used for messaging and calling purpose when the accident detect. LCD display shows the output of the all sensors. If the vibration sensor activates it seems like the person is in trouble. If the IR sensor activates it seems like the person is in sleepy and as same if the alcohol sensor activates it seems like alcohol detected. DC motor is used in receiver part of vehicle. At the time of sensor activates it decreases the speed and then going to be stop state. This DC motor run by using the motor driver called L293D driver. This helps to drive DC motor.

CONCLUSION

We have conducted a proof-of-concept study to demonstrate that electrodes mounted to the inside of a motorcycle helmet can reliably record doziness, alcohol detection and pulse rate. Recording of pulse rate signals has been conducted. Helmet can also help to prevent the damage occurred to the vehicles by the accidents. So this helps in curbing the road accidents by implementing mandatory Helmet protection and detection of alcohol content during the starting on of the bike and most importantly saves the precious life of a person as one cannot run a motor vehicle once he is drunk and if the helmet is not present. Family members will be informed as well. We can detect the safer distance between the two vehicles by using UV sensor. The LED is used for sensors activities also buzzer is used for alarm. By inserting a buzzer in the helmet, the motorcyclist will be more alert and will slow down the motorcycle once they received the signal. This system also helps in efficient handling of the outcome of accidents by sending a SMS with the location of the biker to the family member. This ensures that the victims get proper and prompt medical attention, if met with an accident.

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[3]A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection
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