Saving Life using Eye Blink Sensor in Helmet

G. Sumathy[1] Dr. Arokia Renjith[2]
[1]Associate Professor [2]HOD
[1]Department of Information Technology [2]Department of Computer Science & Engineering
[1,2]Jeppiaar Engineering College, Chennai-119

Abstract— *This letter implements an effective way of method for wearing helmet and to ensure safe driving. With our two monitoring steps, we provide a more accurate detection. For the detecting stage, the eye blink sensor always monitors eye blink moment. If the eye blink moment is not detected then the microcontroller activates an alert and stops the vehicle engine. And the second application was to detect the alcohol and to inform the specified number using GSM.*

Keywords— advanced systems for driver assistance, Helmet- to- vehicle, Eye blink Sensor, Alcohol detector, GSM

I. INTRODUCTION

The object of this letter is to present an interaction system implementing a helmet-to-vehicle communication based on Eye blink sensor, alcohol detector and RF Transceiver. The system is targeted to increase the safety level of a motorcycle.

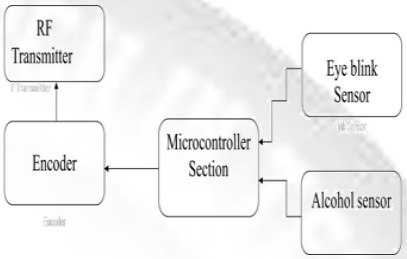
In the last decade, the research interest in two wheels vehicles has been driven by two main features. On one hand, motorcycles are means for personal mobility with a low environmental impact due to the relatively low weight, and they seem to be extremely promising for the development of electric vehicles. On the other hand, they are responsible for about 20% of road incidents due to a relatively low level of safety. To ensure an improved safety in a motorcycle, this letter proposes to increase the informative interaction between the vehicle and the helmet.

In the existing system the interaction took place between vehicle and driver .In this interaction occurs between helmet and vehicle. the driver has no control over the interaction. This makes the driver to follow rules strictly. The hands-free interaction seems to be the best compromise between safety and the level of information to deliver. The objective of this letter is to study a system capable of implementing a wireless interaction with the driver. To this aim; the system should include the following features: the acquisition, elaboration, and the wireless communication from the driver (via the RF Transmitter) and a human–sensor interface for the setup by the user.

The system is defined by two end points. One is the helmet section and the other is the vehicle section. The helmet section consists of the eye blink sensor; alcohol detector and RF Transmitter .The vehicle section consist of RF Receiver, motor and a GSM. The eye blink sensor used senses and detects the presence of helmet using the movement of eye and sends the signal continuously to the microcontroller. The alcohol detector detects the presence of alcohol and informs the microcontroller. RF Transmitter and Receiver are used to transmit the signals from helmet to the vehicle. GSM is used to inform details to the specified number.

The letter is outlined as follows. Section II is devoted to the hardware architecture. The software architecture is presented in Section III. Section IV presents System Testing.

A. Helmet Section



B. Vehicle Section

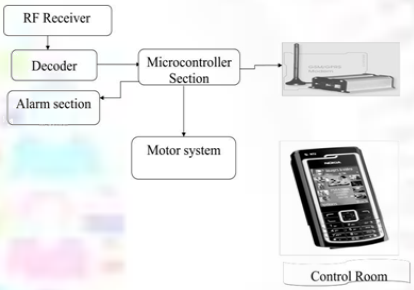


Fig. 1: Vehicle System

II. SYSTEM ARCHITECTURE AND HARDWARE

The system consists of the following elements (see Fig. 1).

- A helmet with eye blink sensor and alcohol detector. The signals are transmitted over a RF Transmitter by the embedded transceiver of the helmet.
- A motorcycle natively equipped with an 8051 microcontroller controls the engine, and transmits signal using GSM.

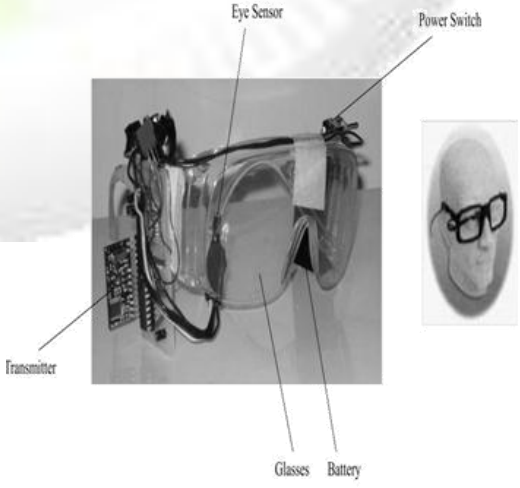


Fig. 2: Eye Blink Sensor

This switch is activated when the user blinks their eye. It allows individuals to operate electronic equipment like communication aids and environmental controls hands-free. Each blink of the eye is detected by an infrared sensor, which is mounted on dummy spectacle frames. The eye blink switch can be set up to operate on either eye and may be worn over normal glasses. The sensitivity of the switch can be adjusted to the user's needs and involuntary blinks are ignored.

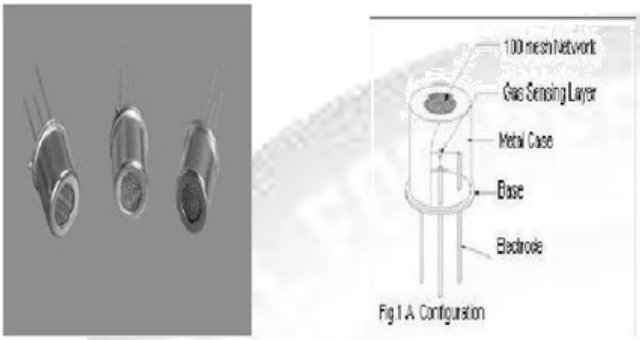


Fig. 3: Alcohol Detector

The alcohol detector utilizes the vapors in the breath to calculate an estimation of the level of alcohol in a person's system. This simple approach is due to the fact that alcohol is not digested by the body and is merely absorbed through different parts. These include the mouth, stomach and intestines. As a result, traces of the material can still be identified minutes after drinking, making it possible for the Breath analyzer to calculate an accurate number.

Currently, the legal limit for a person is around .08 BAC. This is derived from the ratio of breath alcohol to blood alcohol shown at the nearest percentage.

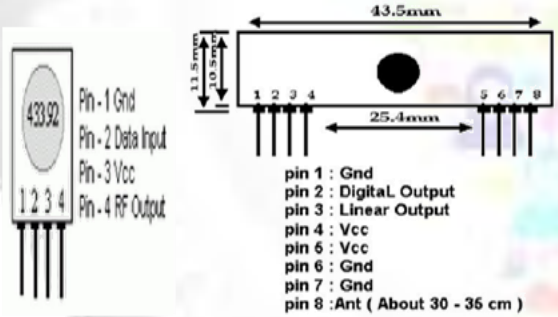


Fig. 4: RF Transmitter and Receiver

The transmitter output is up to 8mW at 433.92MHz with a range of approximately few meters . It accepts both linear and digital inputs. It can operate from 1.5 to 12 Volts-DC .It is approximately the size of a standard postage stamp. RF Receiver also operates at 433.92MHz, and has a sensitivity of 3uV.It operates from 4.5 to 5.5 volts-DC, It has both linear and digital outputs.

III. SOFTWARE ARCHITECTURE

In order to implement this system, each layer of hardware, as presented in the previous section, needs to be complemented by a corresponding layer of software. The software architecture is represented in Fig. 5, which depicts each of the hardware subsystems, and the software interface between them. For the sake of conciseness, Fig. 5 focuses on the helmet-to-motorcycle interaction.

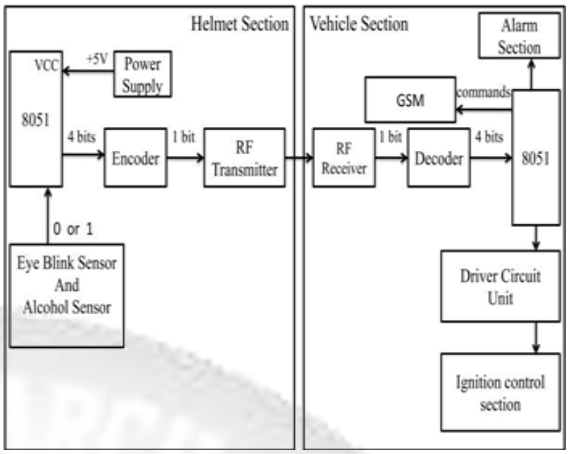


Fig. 5: Software architecture representing the Helmet-to-vehicle interaction

A. Helmet Layer

The helmet is equipped with eye blink sensor and alcohol detector which sends the value (0 or 1) to the microcontroller .The 8051 sends the four bits to the encoder. The 2^12 encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12N data bits. Each address/data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF transmission medium. Transmission is enabled by applying a low signal to the TE pin.

B. Vehicle Layer

The vehicle consists of RF Receiver which receives the signal from helmet and gives it to decoder.2*12 decoders are a series of CMOS LSIs for remote control system applications. The decoders receive serial addresses and data from a programmed 2^12 series of encoders that are transmitted by a carrier using an RF transmission medium. They compare the serial input data three times continuously with their local addresses.

IV. SYSTEM TESTING

For test purposes, the system has been implemented using motor, relay and the glass which contains eye blink sensor. The testing of individual module was carried out using keil c compiler

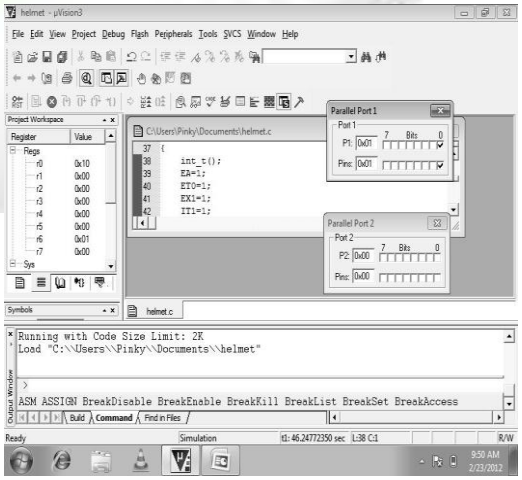


Fig. 6: Alcohol detector tested using keil c.

Port 1.0 is set to high which indicates the presence of alcohol. The port 2.1 is set to low which indicates that is

If Port 2.0 is set to zero (i.e., RF1) it indicates that the eye blink has not been sensed therefore the relay (i.e., Port 0.0) is set to zero which indicates that the motor is turned off.

- Eye blink sensor has monitored the presence of eye blink continuously using IR sensor and the motor is stopped once the blink is not detected.
- Alcohol detector has detected the presence of toxic gases in the breath and it has stopped vehicle and also enabled transmission of message using GSM to specified number.
- On the reception of signal the 8051 in the vehicle section has started an alarm and has stopped the vehicle by controlling the fuel tank.

V. CONCLUSION

This letter presented the definition and implementation of an interaction system for a helmet-to-vehicle communication, based on a RF Transceiver. The helmet has been equipped with an eye blink sensor and alcohol detector and vehicle section has been equipped with GSM. Since a relatively low development effort is required from the motorcycle manufacturer and from the helmet manufacturer. This makes the architecture interesting for practical applications and product development. It is worth noticing that the proposed architecture may be seen as a platform for the software implementation of several added value services.

REFERENCES

[1] M. Pieve, F. Tesauri, and A. Spadoni, "Mitigation accident risk in powered two wheelers domain: Improving effectiveness of human machine interface collision avoidance system in two wheelers," in Proc. 2nd. Conf. Human Syst. Interact., Catania, Italy, May 21–23, 2009, pp. 603–607.

[2] E. D. Bekiaris, A. Spadoni, and S. I. Nikolaou, "SAFERIDER project: New safety and comfort in powered two wheelers," in Proc. 2nd Conf. Human Syst. Interact., Catania, Italy, May 21–23, 2009, pp. 600–602.

[3] C. Little, "The intelligent vehicle initiative: Advancing "human centered" smart vehicles," Public Roads, vol. 61, p. 18, 1997.

[4] "Smartphone-Based Vehicle-to Driver/Environment Interaction System for Motorcycle" by Cristiano Spelta, Vincenzo Manzoni, Andrea Corti, Andrea Goggi, and Sergio Matteo Savaresi