Implementation of Embedded System based High Performance Protective System in Vehicles

S. Sundaramoorthi, V.Agnes Idhaya selvi, M.Karuppasamypandiyan

Abstract*: *In the modern developed and developing nations people who are using mobile phones have increased at a rapid pace, the people are addicted to them so much they are not even able to ride their vehicle without using their mobile phones. This act of negligence has risen to an extent to cost their lives. Many researches have been conducted to determine the concentration of a person when he is driving his vehicle with and without using their mobile phones. The results were as expected; people tend to lose their concentration when they are using their mobile while driving. In this paper we have come out with a method by which we can reduce the accidents occurring to the people using their mobile phone while driving. The high-performance safety driving system inhibits further acceleration and slows down the vehicle automatically eventually coming to rest. This system involves an addition of sensor to the mobile and a control to the vehicle.

Keywords*: *Mobile control, Motor Voice, RF communication, Safety driving,

I. INTRODUCTION

In the modern world, people who are using mobile phones have increased at a rapid pace; the people are addicted to them so much they are not able to ride their vehicle without using their mobile phones. This act of negligence has risen to a formidable extent of costing their lives. Many researches have been conducted to determine the concentration of a person when he is driving his vehicle with and without the mobile phonic conversation. The results were as expected; people tend to lose their concentration when they are using their mobile while driving. Hence, we intend to save their valuable life as effective as possible.

Revised Manuscript Received on December 05, 2019.

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II. HIGH PERFORMANCE SAFETY DRIVING SYSTEM

The circuit diagram of high-performance safety driving system is shown in Figure 1. The answer to call key placed in the mobile acts as a sensor to the system. The IC HT12E acts as an encoder. The ASK Transmitter IC is used to establish wireless communication between the mobile and the vehicle. The ASK Receiver IC receives the signal from the transmitter and the IC HT12D decodes the information and passes it on to the controller, as and when the input is sensed by the controller, the controller provides the output to the DC motor, voices playback IC APR9600 and parking lights (LED's), to stop the vehicle, to alarm the driver to stop his vehicle and to alarm the preceding vehicles respectively so that they don't land up in an accident. The relays are used to invert the rotation of the motor and to stop the rotation of the motor.

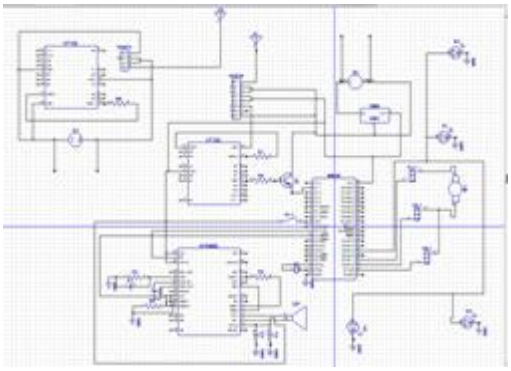


Figure 1. Circuit Diagram of High-Performance Safety Driving System.

III. DESIGN OF SYSTEM COMPONENTS:

The following parameters are considered to design the high-performance safety driving system.

TABLE-I

1	Supply Voltage (Vin) Mobile section	3.7 V

2	Supply Voltage (Vin)	12 V
3	IC HT 12 E	3.7 V
4	IC HT 12 D	5 V
5	ASK TRANSMITTER	3.7 V
6	ASK RECEIVER	5 V
7	IC APR 9600	5 V
8	RELAY	12 V
9	RESISTOR	1.1Mohm
10	MOTOR	12 V
11	SWITCH	-
12	TRANSISTOR	-
13	DIODE	-
14	MOBILE	-
15	VEHICLE	-

IV.WORKING OF HIGH-PERFORMANCE SAFETY DRIVING SYSTEM

a. Transmitter Section

The various components involved in the transmitter section and their contribution towards the achievement of the goal is explained.

(i) Description of the transmitter section

The components involved in the transmitter section are the mobile, switch sensor, the encoder IC HT 12 E, and the ASK transmitter. To sense, that the person is going to talk over his mobile a **SWITCH** under the answer to call key is placed. When the person presses the answer key the circuit is completed, the encoder connected to it receives the data and the transmitter receives the input from the encoder. Now the transmitter transmits the data using the RF wave. The entire transmitter section is powered by the battery of the mobile which gives 3.7V output.

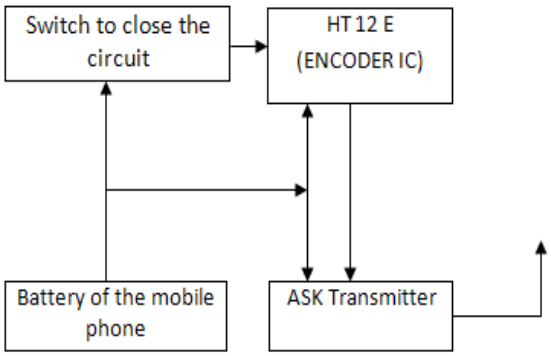


Figure 2. Block Diagram of the Transmitter Section

Figure 3. Actual Image of the Hardware

(ii) Operation

Two leads are taken from the battery of the mobile in such a manner that the leads do not disturb the normal working of the mobile. Now these leads are connected to the mini switch that is embed beneath the answer to call key of the mobile. This switch acts as the message for the entire operation. The encoder IC and the ASK transmitter are connected to the back of the mobile with its Vcc and ground pins connected to the chip where a common Vcc and ground are made. The resistor 1.1M ohm is connected to the encoder for generating internal frequency. Now the switch is placed across any of the data pins of the encoder. Thus, when the circuit is completed data is obtained. The output from the data output pin of the encoder is fed to the data input pin of the ASK transmitter. The RF type of communication is used by the ASK transmitter. The input Vcc of the encoder and the transmitter is from 3~5V, thus the output from the battery of the mobile which is 3.7V is sufficient to power then ON.

Now the transmitter section is complete and ready to work according to our requirement.

b. Receiver Section

The various components involved in the receiver section and their contribution towards the achievement of the goal is explained.

(i)Description of the receiver section

The components involved in the receiver section are the ASK receiver, the decoder IC HT 12 D, microcontroller, relay, motor, loud speaker, parking lights, voice recording cum playback IC APR9600 and the vehicle. The ASK receiver receives the signal from the transmitter and the data out pin of the receiver is connected to the data input pin of the decoder, now the decoder verifies the signal with that of the address already stored in the decoder. When both these addresses match the decoder provides the output to the microcontroller. The program that is already stored in the memory of the microcontroller is executed. The entire receiver section is powered by the battery of the vehicle which gives 12V output. Using a voltage regulator 5V is tapped from the source to power the various IC's used in the receiver section.

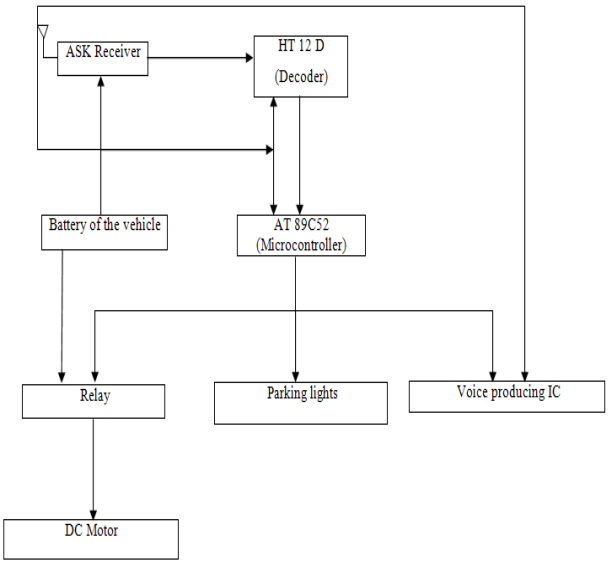


Figure 4. Block Diagram of the Receiver Section

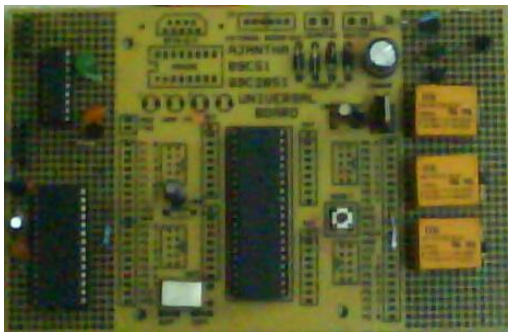


Figure 5 Image of the receiver section

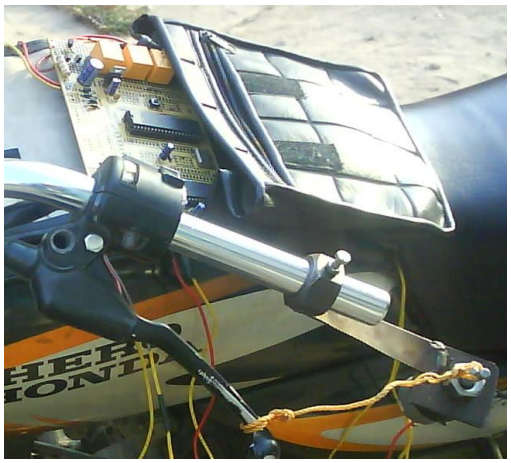


Figure 6. Implementation of the system in Vehicle

(ii) Operation

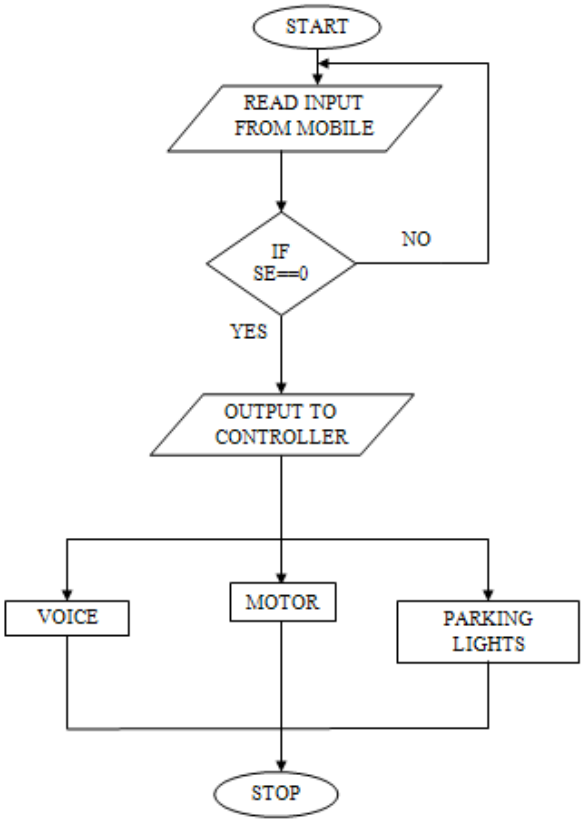
Two leads are taken from the battery of the vehicle in such a manner that the leads do not disturb the normal working of the vehicle. Now these leads are connected to the common Vcc of the chip. The ASK receiver has the data out pin through which the data from the receiver is passed on to the decoder. The resistor 51Kohm is connected to the encoder for generating internal frequency. The address of the encoder and the decoder is verified by the decoder and then the message is passed on to the microcontroller if the address matches, else the output is not passed on the microcontroller. The program of the microcontroller executes as and when the input is sensed. The relays, voice playback IC and the parking lights are activated to perform their actions. First the three relays are turned ON and then the relays are controlled in such a manner that the motor rotates in clockwise direction for 5 seconds and then the relays are reset to rotate the motor in the anticlockwise direction for another 5 seconds and then finally turned OFF. Simultaneously the parking lights are turned ON and OFF for every 50ms. The voice playback IC's message1 pin and control enable are activated to produce the voice "STOP YOUR VEHICLE." The RF type of communication is used by the ASK receiver. The input Vcc of the decoder, receiver, APR 9600, parking lights, is provided with 5V from the voltage regulator. The relays are directly powered from 12 V of the vehicle. Now the receiver section is complete and ready to work according to our requirement.

(c) No input conditions

When the user doesn't use his mobile while driving, there is no disturbance caused to the normal working of the vehicle.

(V) SOFTWARE MODULE

Flowchart



We have used the port 1.0 for sensing the output of the mobile and port 2.1, 2.2 and 2.3 for working of the relay port 2.5 for providing the output to the LED's to turn on the parking lights, port 3.1 for voice producing IC and port 3.2 for Control enable of the APR 9600. The timer of 8051 is used to provide the time delay for various operations. When the port 1.0 is made low the motor rotates in the clockwise direction. After a delay of 5 seconds the motor rotates in the anti-clock wise direction

VI.CONCLUSION

Our novel idea of "Implementation of Embedded system based High performance safety driving system in vehicles" is to save the life of a person who is riding the vehicle and talking over his mobile simultaneously. It has been realized practically by comparing it to an existing system "key2safedriving".

Comparison of Key2SafeDriving and Implementation of high-performance safety driving system

Key2SafeDriving	Implementation of high-performance safety driving system
1. Requires Bluetooth or RFID which can't be used in phones that do not support either of them.	1. Simple RF communication where the mobile's answer to call key acts as a sensor.
2. Incoming calls and texts are automatically answered with a message saying, "I am driving now. I will call you later when I arrive at the destination safely." In this case the driver is not able to receive emergency calls that have to be conveyed to him.	2. The driver free to see who the caller is and can take actions accordingly. if he finds that the call is very much essential, he can go on with the conversation but the control system employed stops the vehicle automatically.
3. User can call or text 911 or other numbers pre-approved by the administrator	3. No calls to any number. All the numbers are treated equally
4. High cost and less efficient.	4. Low cost and highly efficient.

Table- II: Name of the Table that justify the values

PROBLEMS TACKLED

The ASK transmitter sends the RF signal for 360degree range and thus there is a chance that the vehicle next to the actual vehicle that has to be stopped also receives the signal. To overcome this problem, we used the encoder and decoder IC's which are provided with specific address, thus only the address of the encoder and decoder IC's match each other the controller receives its input. Each vehicle has been provided with different address in the encoder, decoder IC's

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