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AR Based Assistive System for Detecting Driver Phone in a Moving Vehicle

¹Mrs. K. Saranya, ²S. Ashath Elliyash, ³S. Gokulakrishnan, ⁴G. Hari Haran, ⁵P. Kamaraj

Assistant Professor, Department of Computer Science Engineering, Jai Shriram Engineering College, Tirupur,

Tamilnadu, India¹

UG Students, Department of Computer Science Engineering, Jai Shriram Engineering College, Tirupur, Tamilnadu,

India^{2,3,4,5}

ABSTRACT: Mobile phone use while driving is common, but widely considered dangerous due to distracted driving and the driving persons may miss the important calls and messages to solve this problem this paper introduces a new concept based on visible light communication through this a driver gets an intimation about the called person and also can able to view the messages while in driving by wearing light weight augmented reality glass as well as send alert message to the called person. It helps to avoid the distractions among the drivers for avoiding the accidents due to the usage of mobile phones while in driving and to give the different enhanced features in the features to the users through the augmented reality device.

KEYWORDS: Augmented Reality, visible light communication.

I. INTRODUCTION

Mobile phone use while driving is common, but widely considered dangerous due to distracted driving. Due to the number of accidents that are related to cell phone use while driving, some jurisdictions have made the use of a cell phone while driving illegal. Many have enacted laws to ban hand held mobile phone use, but allow use of a hands free device. In some case restrictions are directed only to minors or those who are newly qualified license holders.

Smart phones have made it easy for us to stay connected at all times. But that can pose serious safety risks if someone decides to check his or her text messages, emails, phone calls, or any other mobile applications while driving. Interaction among vehicles frequently causes congestion as well as bottlenecks in road capacity. In dense traffic, waves of traffic density propagate backward as drivers try to keep safe distances through frequent acceleration and deceleration. This project presents a vehicle driving system in a model Predictive control framework that effectively improves traffic flow. The vehicle driving system regulates safe inter vehicle distance under the bounded driving torque condition by predicting the preceding traffic.

In this project, whenever a person gets a call in his/her mobile then the call is automatically disconnected using single relay and acknowledgement message is send to the caller about driving as well as the called person number is displayed to the driver in assistant glass and also if the driver gets any messages, it will be displayed in assistant glass by zigbee.

II. DETECTING THE DRIVER PHONE

This section provides the basic information about how the drivers phones get detected using GSM (GlobalSystem for communication). The program gets dumped to the PIC controller and the GSM detects the drivers call from then network and provides the information about the called person to the controller and the controller gets the mobile number of the called person by using the GSM services.

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A. GSM

This section provides the basic information about how the drivers phones get detected using GSM (Global System for communication). The program gets dumped to the PIC controller and the GSM detects the drivers call from the network and provides the information about the called person to the controller and the controller gets the number of the called person by using the GSM services.

This GSM Modem can accept any GSM network act as SIM card and just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. The SIM800C is a complete Dual-band GSM/GPRS solution in a SMT module featuring an industry-standard interface, the SIM800CS is a quad-band GSM/GPRS module that works on frequencies GSM850MHz, delivers performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.

B. Requirements

The most important requirement is the GSM. It provides the network signal to mobile phones. The requirements include the single relay which helps to switch the signal to the wireless transmitter through which the data get transmitted to the augmented reality device through which the driver gets the notification about the called person.

III. PIC CONTROLLER

The microcontroller is a device that can perform a specific function according to the coding/program burnt into its program memory. The microcontrollers are special purpose devices used in many applications like automobile, medical, instrumentation, battery management, smartphones accessories, motor and control drives, USB and wireless technology etc.

One of the most reputed manufacturers of micro-controller is MICROCHIP. PCB design. They have the vast series of micro-controllers from 8bit, 16, 32 bit controllers both in SMD and through whole package.

This board is built with PIC16F877A as a microcontroller unit. The input supply to the board can be fed from both ac and dc. It uses a crystal oscillator for generating frequency. A serial communication is achieved by an UART protocol. This board is specially designed for connecting digital and analog sensors which has input voltage range 5 or 12VDC as well as it can be interfaced with serial communication devices, relay boards etc. The output can be monitored in LCD as well as pc. Data EEPROM is used to store data defined by the user. PCB design. When a variable is defined it is stored in program memory and the value of the variable is stored in data EEPROM Synchronous serial ports are used to communicate with other peripheral devices like serial EEPROMS, A/D converters and shift registers. PCB design. They have two modes. 1- SPI Serial Peripheral Interface 2- I2C Inter Integrated Circuit.



Fig. 1. PIC Controller

The PIC controller helps to control all the other components like GSM board, Single Relay, ZigBee by

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which the information can be transmitted to the augmented reality device. PIC handles the call as interrupt and send the interrupt to the single relay which switch the data to the ZigBee through which the drivers get the notification not only the driver but also the called person.

IV. AUTOMATIC ACKNOWLEDGE

This section provides the basic information about how the message get transferred to the called persons. This can be done by using the single relay Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet.

The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. They were used to switch the signal coming from one source to another destination. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

A. Requirements

The most important requirement is the single relay board a relay is an electromechanical switch which is activated by an electric current. A single relay board arrangement contains driver circuit, power supply circuit and isolation circuit. A relay is assembled with that circuit. The driver circuit contains transistors for switching operations.

The transistor is use for switching the relay. An isolation circuit prevents reverse voltage from the relay which protects the controller and transistor from damage. The input pulse for switching the transistor is given from the microcontroller unit. It is used for switching of a single device.

The single relay helps to provide the switching function which helps to switch the call interrupt to the controller by which it provides the automatic acknowledgement to the called persons. It cut the call from the driver phone and switches the call and it provides the automatic message to the called person by using the ZigBee.



Fig. 2. Single Relay

V. WIRELESS TRANSMITTER

In this section for the transmission of the data we are using the ZigBee which helps to transmit the data wirelessly to the augmented reality device. It helps in the faster transmission of data wirelessly and also the less consumption of the power. The data get transmitted to the augmented reality device from the ZigBee. The ZigBee gets the interrupt from the single relay which get its interrupt from the PIC controller through the GSM by which the messages get transmitted to the augmented device and the called person.

ZigBee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used for

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wireless networking. It is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless M2M networks. ZigBee (CC2500) is a low cost true single chip 2.4 GHz transceiver designed for very low power wireless applications. The RF transceiver is integrated with a highly configurable baseband modem. ZigBee devices are required to conform to the IEEE 802.15.4-2003 Low-Rate Wireless Personal Area Network (LR-WPAN) standard. The standard specifies the lower protocol Control portion of the data link layer (DLL). The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi. Its low power



Fig. 3. ZigBee

layers are the physical layer (PHY), and the Media Access consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics.

VI. HUMAN INTERFACE

In this the human interface for the system is the augmented reality device and which provides the machine to human communication interface with the help of the concept of visual light communication. Which provides the information to the driver through the augmented reality device in which the visible light provides the information which will not interrupt the driver while in driving and helps to get the important notification to the driver and also the important messages to the driver and the driver can able to maintain his privacy about the important messages or the calls from the others who are in the vehicle.

A. Augmented Reality

Augmented Reality represents one of the most convenient way able to share data with the user - the smart device displays original image with additional data about taken video frames. The additional data is added to the video signal using another video layer. This method of AR implementation is called "video method" - the view presented to the user is composed of multiple layers digitally merged together.

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B. Smart Glasses

In the future we can implement the system through the smart glasses which makes the system to become intelligent and helps in avoiding the accident. Smart glasses are a special wearable device able to display only the additional layer containing the information pertaining the observed scene. On the other hand, a conventional smart phone can be used for AR implementation. In this case, the smart phone displays both the original frames overlaid by a generated video layer forming together the AR.

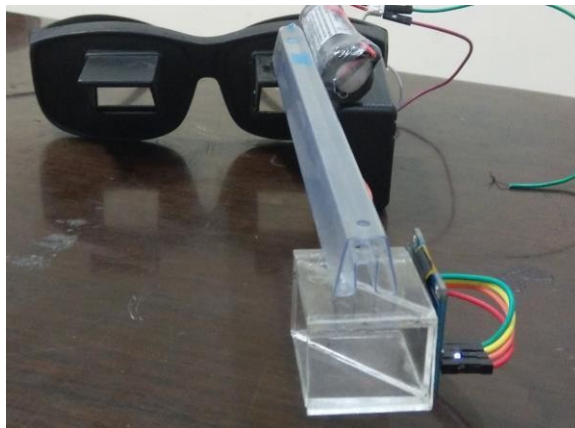


Fig. 4. Wireless augmented visualization device

VII. SYSTEM ARCHITECTURE

The system architecture describes about the whole working structure of the system. It had different devices like GSM, PIC controller, Single Relay and ZigBee. They are used for different works the below Fig.6 show the system architecture which provides major working condition of the system.

A. PIC

The PIC controller which helps to control all the other components of the device. The program is dumped in to the device and which helps to manage the other components in the system. When it receives the interrupt from the GSM. It gets the information about the called person and send it to the dingle relay.

B. GSM

Normally the GSM gets the signal when a person call it consider as an interrupt and send the interrupt to the PIC controller which had some codes on it by which the called person information can be gained through the PIC controller by the GSM.

C. Single Relay

Once the interrupt is founded by the PIC controller then send it to the single relay which switch between the GSM and the wireless transmitter. While switch to the GSM the GSM sends the message to the called person with the help of the PIC controller.

D. ZigBee

The ZigBee is the wireless device which can able to transmit the data wirelessly. ZigBee gets the interrupt from the single relay and the ZigBee gets the information about the called person from the PIC controller and it

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sends the data wirelessly to the Augmented device the range of the ZigBee is about (10-100m)

E. Augmented Reality Device

The augmented reality device which helps to receive the data wirelessly and the information about the called person is displayed on the augmented reality device as it had the concept of the visual light communication and provides the information to the driver.

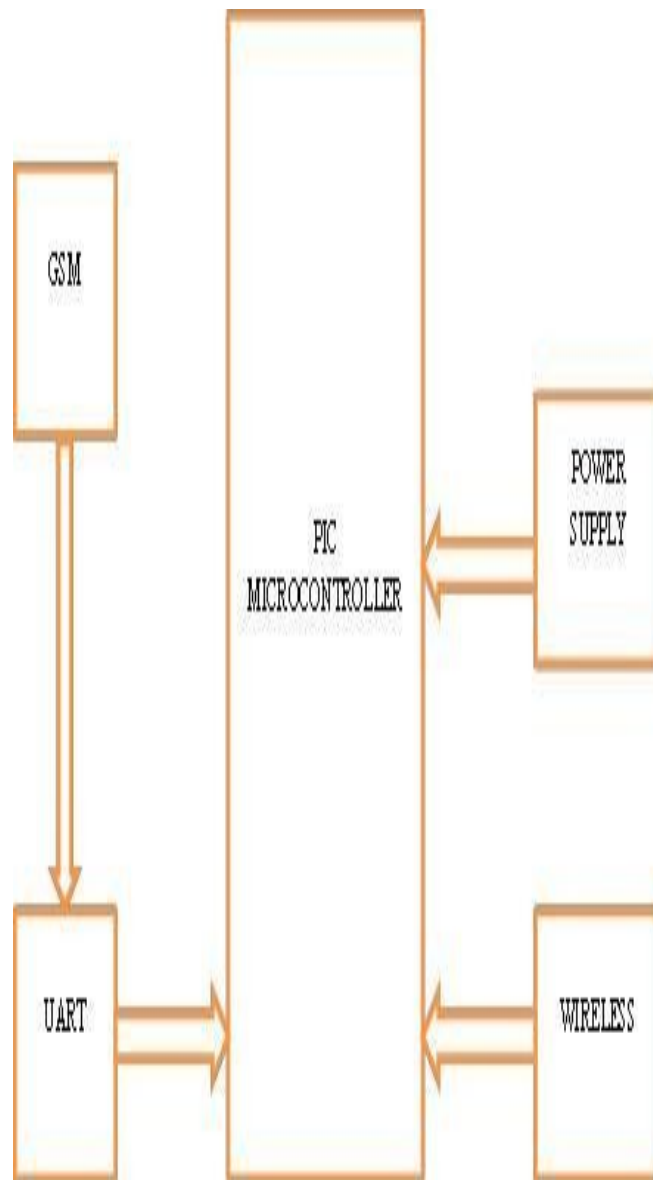


Fig. 5. System Architecture

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IX. OUTPUT AND RESULT



Fig. 6. AR Device Displaying Calling Person Details

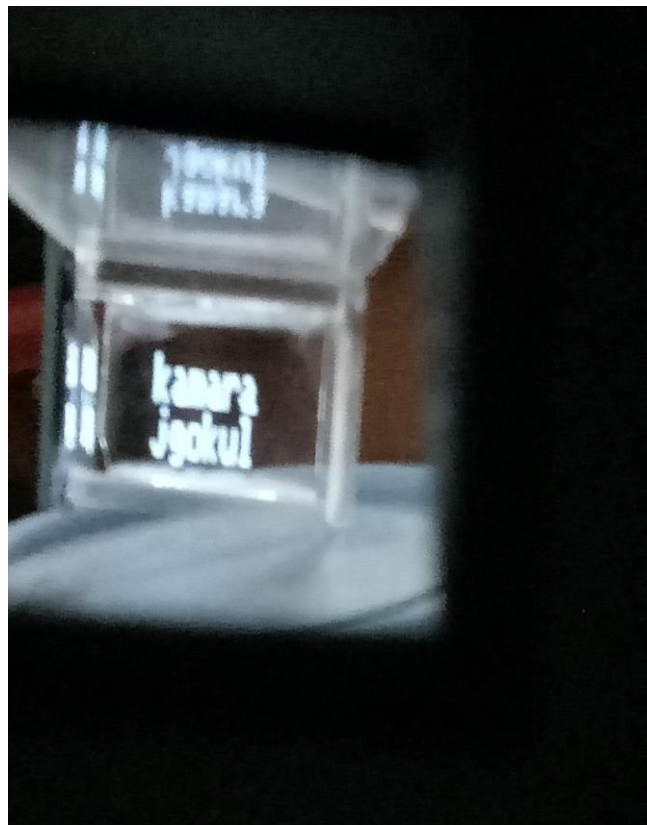


Fig. 7. AR Device Displaying Message Detail to Driver



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In the fig.6and fig.7 shows the output of the system. Where it displays the called persons number or the important messages to the driver.

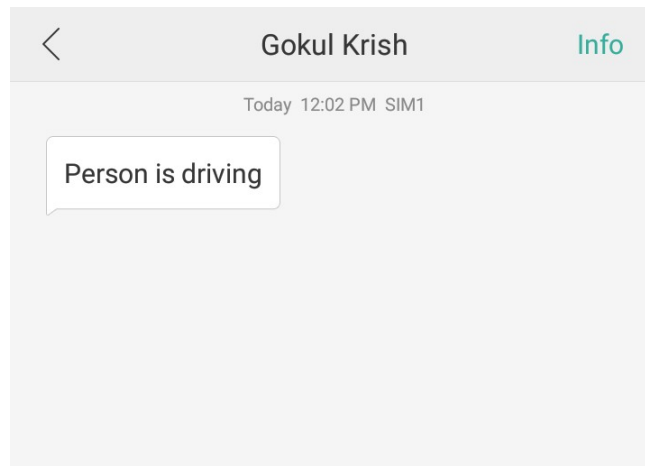


Fig. 8. Automatic acknowledgement to the called person.

The above fig.8. represents the automatic acknowledgement to the called person it shows the message as the person is driving.

VI. CONCLUSION AND FUTURE ENHANCEMENT

This paper provides the innovative idea to solve the distraction of drivers while in driving which helps to avoid the use of smart phones while in driving, and this system can be developed in the future it can be able to assist the driver and helps them to find the best route for the destination and also provide the various information to the driver.

In future we can implement this system to display caller details and full message content to the vehicle front glass.

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