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Wireless Safe Smart and Secure Driving System Version 3.0

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Abstract :*The evolution in the electronic systems is driving the automotive industry. The inefficient mechanical systems are replaced by efficient and accurate electronic devices with the help of sensors and actuators. The driver assistance systems are meant to support driver with driving process in order to avoid accidents which enable various users to be better informed and makes safer, more coordinated and smarter use of transport network. Our paper says about one such system which uses Alcohol Sensor, GPS module, Cameras for assistance of the driver for the safety and secured driving by various applications.*
Keywords:*MQ-3 Sensor, Raspberry Pi 3, LCD, GSM module, Camera, Arduino Uno.*

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I. Introduction

Road facilities are major concern in the developed areas. Recent study shows that about 60% of roadway accidents are due to unconsciousness of driver and blindness due to high beam of the head lights etc.

Drunk driving is a major reason of accidents in almost all countries and all over the world. Alcohol detector in vehicles is implemented for the safety of the people.

Only having a key, vehicle is not secured because of duplication of key so, to have a security, in this system password is provided along with key using keypad interface. During a night drive high beam of incoming traffic causes a temporary blindness which may lead to an accident. This problem is addressed by an automatic vehicle head light control system.

Violating the speed limit in the speed restricted areas causes accidents which leads to loss of life of innocent people. To address this issue a speed restriction warning system is designed that warns the driver to slow down in speed restricted areas.

when car is parked outside the parking roof there is no ventilation inside. This is the serious problem which causes suffocation when the driver enters the car. A ventilation system is to be designed that maintains the humidity inside the car even when the car is 'OFF'.

II. Methodology

The fig.1 shown below is the block diagram of wireless safe smart and secure driving system version 3. Which includes the main six applications using raspberry pi 3 and Arduino Uno as controller.

The first one includes the interfacing of keypad and display with Arduino Uno for safe ignition control [7]. The MQ 3 alcohol sensor is interfaced with Arduino Uno which detects the alcohol concentration in human breath. If the concentration of alcohol is more than the vehicle cannot be turned on [4].

vehicle overtake assistance system is used to help in safe overtaking of HMV's. The system has a camera and a display, the camera placed in front of HMV's is used to capture the front portion of HMV's and the display present in the car displays the frames captured by the camera present in HMV's. The frames are captured using the command cap=CV2.Videocapture(0) and the frames are displayed using the command CV2.imshow(). (Fig 2)

The automatic headlight control is done using image processing using open CV python. The control of the headlights is implemented on Raspberry Pi 3B model [2][6]. Here we interfaced USB camera and relay with Raspberry Pi as shown in the figure below.

The camera captures the image by the command cap = cv2.VideoCapture(0). The captured image frames are converted from BRG to HSV using command hsv = cv2.cvtColor(img,cv2.COLOR_BGR2HLS).

The converted images are masked using a kernel values and a bound rectangular frame is formed for detecting white light. If the white light received is greater than the frame size then headlights are turned to low beam else turned to high beam.

Real time co-ordinates of vehicle are tracked to get the exact location of the vehicle. These co-ordinates are further used to check if the vehicle lies in the speed restricted area. It the vehicle lies in speed restricted area then a warning is given to the driver to drive slowly [1].

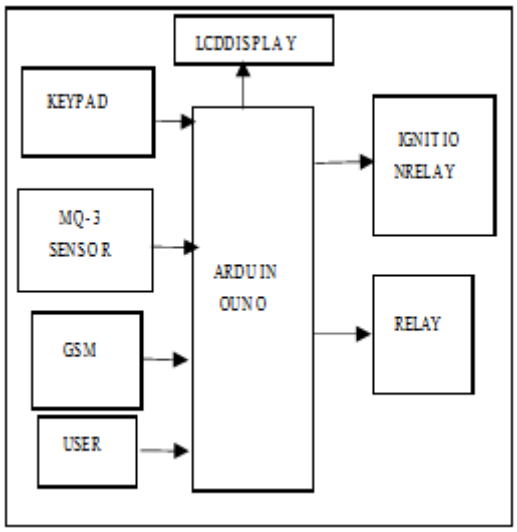

Fig 1 Block diagram for Arduino

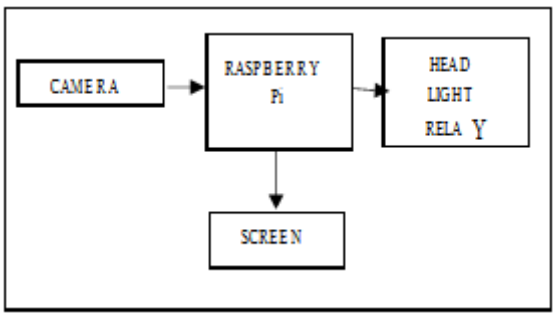

Fig 2. Block diagram for Raspberry pi

The ventilation system is implemented using a GSM module SIM 900A. The system will be continuously monitoring the GSM module waiting for user to send a message to switch "ON" the ventilation system. When the system gets the message to "Switch ON" the AC. The controller drives the AC Relay to start the AC.

III. Flowchart

The fig.3 shown represents the flow diagram of system. Initially to start the vehicle the user needs to enter the password the systems checks for a correct password. If the password is correct then system checks for alcohol sensor signal. If the signal is false then LCD displays the message as shown in figure. If both the password and alcohol sensor are true the ignition relay turns on.

When the vehicle turns on the process is split into two processes one process running in backend and other running in frontend. The backend running process initially turns on the display by capturing the frames from camera continuously. If the headlight button is pressed then the system starts the automatic headlight control. If headlight button is again pressed

then it stops automatic headlight control and the control is given back to the display.

Another process running in frontend starts the GPS monitoring by capturing the GPS coordinates and checks whether the vehicle lies in speed restricted area. If it is true then displays "speed restricted zone go slow" else displays "no speed restriction". At last if vehicle stop button is pressed then vehicle turns off and starts GSM, waits for user input. Else it continues GPS monitoring.

When the GSM starts and waits for user input it checks the message received by the user if it's true the AC relay is turned on else waits for user input. When vehicle starts it turn off the ac and control go to start.

IV. Applications

1. Safety applications – Safety application include automatic control of headlight during night, HMV overtaking assistant system for safe overtake.
2. Smart applications - It includes a ventilation system inside car when parked outside the parking roof.
3. Secured application – It includes a keypadbased car unlocking systems and alcohol detection system inside the car.

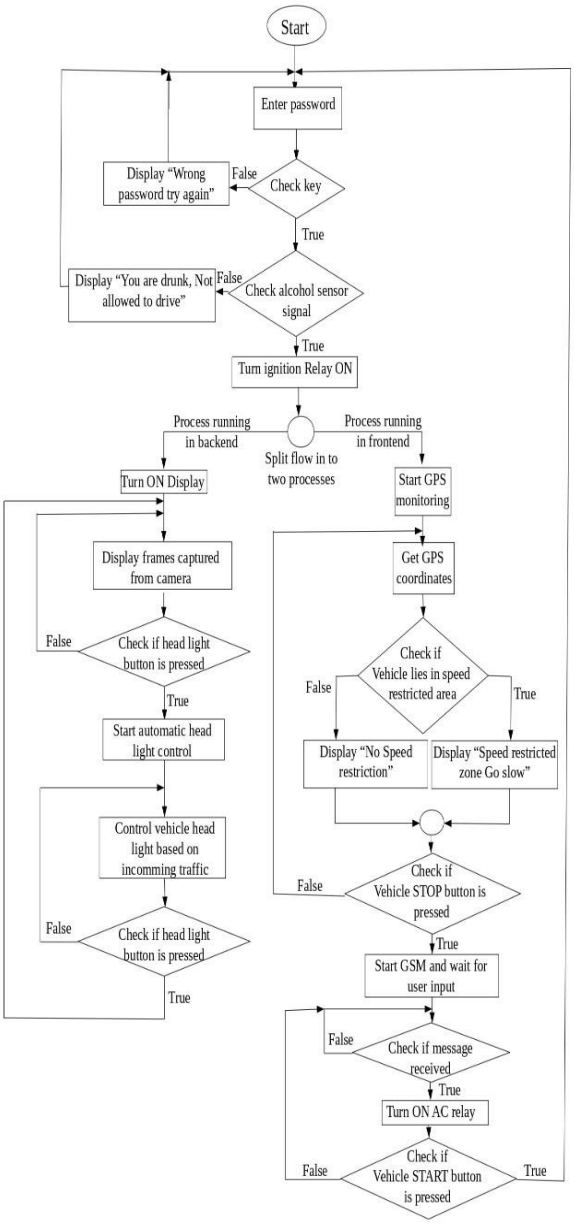

Fig 3. Flowchart

V. Results

1. The Realtime working of the system is presented in fig.4
2. Ignition of the vehicle is controlled by the keypad.
3. Activates/ deactivates central locking systems based on user command such as alcohol sensor as shown in fig.6
4. Display of speed restricted areas on LCD on dashboard.
5. Automatic Headlight control using camera is as shown in fig.5
6. Display of HMV overtaking.

Fig 4. Overall control unit.

Fig 5. Automatic Headlight control in real time.

Fig 6 Keypad based ignition control

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