Security System Based on Face Detection

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ABSTRACT: In this busy world, no one and nothing is safe. Every day, we wake up to the news of thefts. This is seen more in automobile sector. It is about time we develop a system to protect them. Here, we have taken a step towards this.This project, vehicle safety using face detection, introduces a solution for this problem. Here we proposes an inexpensive embedded and software based control system that can protect the car. It contains a face recognition based authorization that will help the user to protect the car from thefts. It also contains an alcohol detection system that helps to stop drunken driving. In addition this, the user can locate the car using GPS installed in the system via an android mobile app-MATLAB MOBILE. The speed of the car can also be known by this app. Here used micro-controller (Arduino Uno) based embedded system. GPS is added along with it using a mobile to find out the accurate location. Communication with the system for the user is made available via e-mail. The position determined by the GPS is delivered to the owner via e-mail. According to the commands from the proprietor, Arduino enables its ports. Thus owner can interact with his/her car conveniently.

KEYWORDS: MATLAB, MATLAB mobile Android application, Arduino, L293D, Motor

I.   INTRODUCTION

The main aim of this paper is to offer an advance security system in automotive, in which consists of a face detection system, which detects the face of the unauthorized person entered into the car, a web camera to capture the images and comparison is done using MATLAB. An alcohol sensor is connected to the Arduino board sense alcohol usage of driver.MATLAB mobile an android application gives the location details, speed of vehicle to MATLAB in PC. By using this information owner can track vehicle on theft and image thief. If someone going on over speed e-mail with picture can send owner or Police. If detected face and alcohol consumption on limited manner it allows start ignition .Else send Mail to the owner and blocks the ignition.

II. OVERVIEW

In this project the car security system is approached by using the face detection system, which is implemented by using a web camera inside the car. Captures the images of the person when the key is put turn to on position .If the person is authorized then then checks alcohol consumption if both the condition are satisfied then grant permission to turn on the ignition.Else either one of the condition is violated ignition does not turn on and also sends message to owner showing un authorized access , location to E-Mail which is already set. The location tracking is enabled by using MATLAB Mobile application in android phones. If the owner wants to track down the car location by providing a simple html input after entering a passwordand get information through E-mail. Another feature that if driverdoing rash driving it also send information to owner or Police.
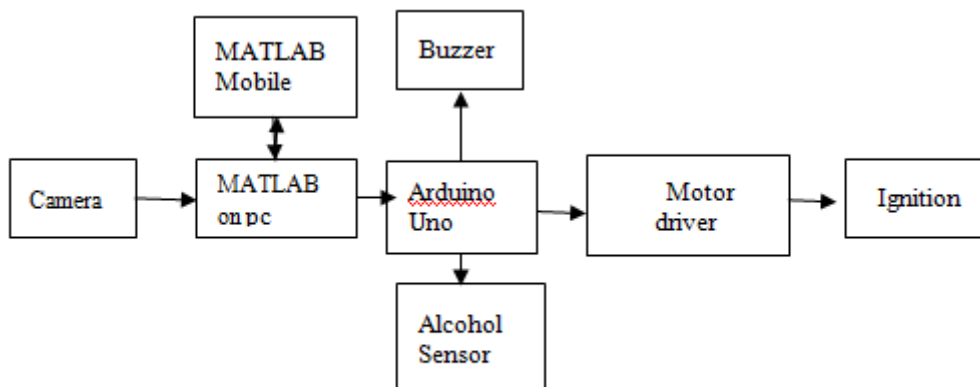
Fig.2.1 Block Diagram

III.MATLAB ON PC FOR FACE DETECTION

A **computer** is a machine that is able to take information (input), do some work on or make changes to the information (process), to make new information (output). It solves problems according to instructions given to it by the computer user called programs or software. In this project we are using the software MATLAB which is useful image processing, easily interfaced with Arduino , Internet, can connect MATLAB app .We are usingMATLAB version of R2015a.MATLAB is a metaparadigm numerical computing environment and fourth-generation programming language. A proprietary programming language developed by MathWorks, MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, interfacing with programs languages C, C++, C#, Java, Fortran etc.

The face detection is an important part of face recognition, but face detection is not straight forward because of variations of the image appearance like pose (front and non-front) and facial expressions. There are several methods proposed to resolve these variations in the last decade. We find that on detecting face comparing with database chance to have background noise factors are more from dress wore on that time. To avoid this we find matching cropped out eye area which get better quality of output while using **VIOLA-JONES** algorithm (Vision.Cascadeobjectdetector).On MATLAB compares with driver's images and predefined database .If the face matches it allows the ignition after comparing alcohol level. Else send a mail to the owner with its location face captured initially.

Sendmail is a system used to send mails from MATLAB. The syntax for it is as follows:

sendmail(recipients,subject);

sendmail(recipients,subject,message);

sendmail(recipients,subject,message,attachments);

IV. CAMERA

A **webcam** is a video camera that feeds or streams its image in real time to or through a computer to computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

Image of the person trying to start the vehicle is taken using a webcam. The image is then send to the computer in which MATLAB is already installed. The image is then cropped and resized to a given dimension. This image is then compared with the saved database. Camera here used is with a pixel of 1.3mp and resolution of 640 x 480.

V. ANDROID MATLAB MOBILE APP

MATLAB Mobile is a lightweight desktop for your iPhone, iPad, or Android device that connects to a MATLAB session running on Math Works Cloud or on your computer. From the convenience of your mobile device, you can evaluate MATLAB commands, create, edit, and run MATLAB files, visualize data, and view results. Custom keyboards enable easy entry of MATLAB syntax.Connecting to the cloud provides access to a MATLAB session, along with storage on MATLAB Drive. Once stored, your files are available wherever you go. MATLAB Drive synchronizes files between your computers and MATLAB Mobile, eliminating the need for manual upload and download. Connecting to your computer provides access to your MATLAB scripts and data on that computer. WithMATLAB Mobile, you can also acquire data from device sensors like the accelerometer, the gyroscope, the magnetometer and the GPS. Acquired data can be sent to a MATLAB session on the cloud or on your computer.

FUCTIONS	MATLABCOMMAND
To connect with MATLAB	Connector on password
To acquire sensor	m.mobiledev
To access data from the sensors	m.logging=1
To get latitude	m. latitude
To get longitude	m.logitude
To get speed	m.speed

VI. ARDUINO UNO

An Arduino board is one type of microcontroller based kit. The first Arduino technology was developed in the year 2005 by David Cuartielles and Massimo Banzi. The designers thought to provide easy and low cost board for students, hobbyists and professionals to build devices. Arduino is an open-source hardware. The Arduino Uno is a microcontroller board based on the ATmega328 . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter to get started. We choose Arduino Uno since it is simple in programing part it can do program in MATLAB itself by adding the support package to it.Fig 6.1 shows the image of an arduino uno board.
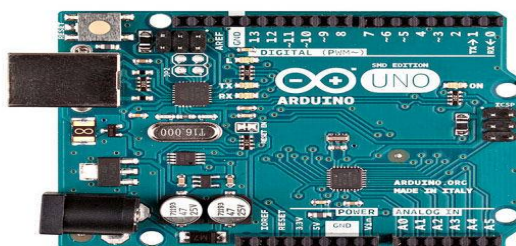

Fig.6.1. Arduino Uno board.

Connect the board	ard=arduino_server('COM1')
Specify pin as output	ard.pinMode (13,'output');
Write data on pin	ard.digitalWrite(13,1);
Specify pin as input	ard.pinMode(4,'input');
Read data from pin	x=ard.digitalRead(4);
Read analog data	y=ard.analogRead(5);
Write analog data	ard.analogWrite(5,round(av))
Disconnect Board	delete(ard)

VII. ALCOHOL SENSOR

Grove - Alcohol Sensor is a complete alcohol sensor module for Arduino. It is built with MQ3semiconductor alcohol sensor. It has good sensitivity and fast response to alcohol. It is suitable for making Breathalyzer. This Grove implements all the necessary circuitry for MQ303A like power conditioning and heater power supply. This sensor outputs a voltage inversely proportional to the alcohol concentration in air. The output obtained from alcohol sensor is in analog or digital format and this fed as input to microcontroller
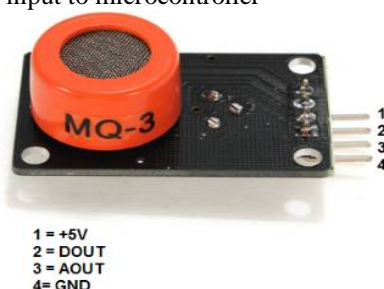

1 = +5V
2 = DOUT
3 = AOUT
4= GND

Fig.7.1. Alcohol sensor

VIII. MOTOR DRIVER

Since motors require more current then the microcontroller pin can typically generate, you need some type of a switch (Transistors, MOSFET, Relay etc.,) which can accept a small current, amplify it and generate a larger current, which further drives a motor. This entire process is done by what is known as a **motor driver**. Motor driver is basically a current amplifier which takes a low-current signal from the microcontroller and gives out a proportionally higher current signal which can control and drive a motor. In most cases, a transistor can act as a switch and perform this task which drives the motor in a single direction.

Turning a motor ON and OFF requires only one switch to control a single motor in a single direction. The simple answer is to reverse its polarity. This can be achieved by using four switches that are arranged in an intelligent manner such that the circuit not only drives the motor, but also controls its direction. Out of many, one of the most common and clever design is a H-bridge circuit where transistors are arranged in a shape that resembles the English alphabet "H".
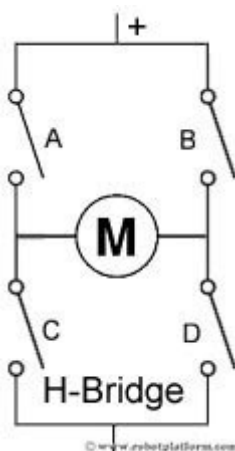

Fig.8.1 H Bridge Circuit Motor Driver

As you can see in the image, the circuit has four switches A, B, C and D. Turning these switches ON and OFF can drive a motor in different ways.

[1] On Switches **A** and **D** makes the motor rotate clockwise
[2] Turning on Switches **B** and **C** makes the motor rotate anti-clockwise
[3] Turning on Switches **A** and **B** will stop the motor (Brakes)
[4] Turning off all the switches gives the motor a free wheel drive
[5] Lastly turning on **A** & **C** at the same time or **B** & **D** at the same time shorts your entire circuit. So, do not attempt this.

H-bridges can be built from scratch using relays, Mosfets, field effect transistors (FET), bi-polar junction transistors (BJT), etc. But if your current requirement is not too high and all you need is a single package which does the job of driving a small DC motor in two directions, then all you need is a L293D IC. This single inexpensive package can interface not one, but two DC motors. L293, L293B and few other versions also does the same job, but pick the L293D version as this one has an inbuilt flyback diode which protects the driving transistors from voltage spikes that occur when the motor coil is turned off.

IX. IGNITION SYSTEM

Here a DC Motor is used to show the ignition system. A DC MOTOR in simple words is a device that converts direct current(electrical energy) into mechanical energy. It's of vital importance for the industry today, and is equally important for engineers to look into the working principle of DC motor in details that has been discussed in this article. In order to understand the operating principle of DC motor we need to first look into its constructional feature.

The very basic construction of DC motor contains a current carrying armature which is connected to the supply end through commutator segments and brushes it is placed within the north south poles of a permanent or an electro-magnet as
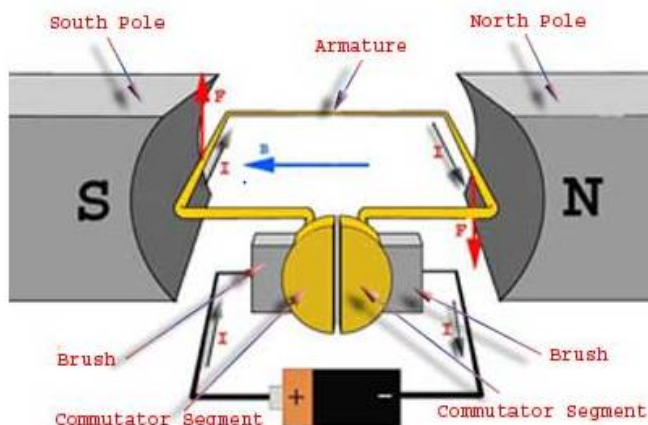

Fig .9.1 DC Motor Architecture

Shown in the diagram .

Now to go into the details of the operating principle of DC motor, its important that we have a clear understanding of Fleming's left hand rule to determine the direction of force acting on the armature conductors of DC motor.

Fleming's left hand rule says that if we extend the index finger, middle finger and thumb of our left hand in such a way that the current carrying conductor is placed in a magnetic field (represented by the index finger) is perpendicular to the direction of current (represented by the middle finger), then the conductor experiences a force in the direction (represented by the thumb) mutually perpendicular to both the direction of field and the current in the conductor.

X. RESULTS

The fig 10.1 shows an unauthorized access to the car and tracking request from distant location. Fig 10.2 shows the cropped eye image to compare with the data base .This cropped area is used to decide whether entry is authorized or not. Fig 10.3 shows face of undetected person which is to send as Email to the owner.
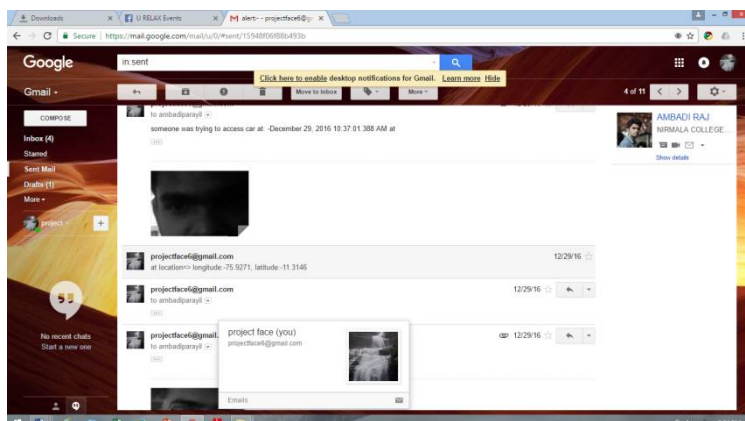

Fig 10.1   Alert Obtained Email On Theft And On Request Of Location.   Fig.10.2 Detected Eye
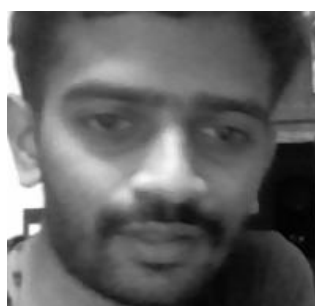

Fig.10.3 Image to Send

XI. CONCLUSION

The project implementation was carried out successfully and optimal results were obtained according to our expectations. We found the proposed embedded system works effectively. To detect the owner of the vehicle a detection system based on face detection was developed. To reduce the errors, features of eye were extracted and databases were created. To track the location of the vehicle, MATLAB mobile app was used. It can also be used by the user to get alert when speed of the car exceeds over a particular limit. In addition to all of this, an alcohol detector is also added. A major advantage of the system is its low cost and ease in installation. Even after all this, the system suffers from some disadvantages like problems in face detection majorly due to light effects. Apart from this, the system can be considered an efficient one and can be used as a security measure for car.

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