

Vehicle Checking System Using Open CV

¹Manasa M, ²Gandhigude Lankesh

M.Tech Student

Department of Electronics and Communication Engineering, Manipal University Jaipur, Rajasthan, India

manasam191@gmail.com , lankesh.lg@gmail.com

Abstract— Implement of latest technology in traffic system development is a hobby for a developers, this project includes all latest technology like 32-bit ARM microcontroller, TFT display, 4 wire resistive touch screen, GSM, GPS, buzzer, VGA camera and power supply and software such as Open CV, C sharp in order to help police department to control illegal activity in society.

Index Terms— Open CV, GSM, GPS, ARM

I. INTRODUCTION

Here, in our project we show how to build a high-tech traffic system. This system needs the RTO to collect each and every single detail about the vehicle and also about the owner of that vehicle. In our system we get to know the details such as who is the owner of the vehicle, his address, contact number and details about the vehicle such as whether the vehicle is blacklisted, whether it has undergone carbon emission test or not, whether it has insurance or not, number of accident cases etc.

II. SCOPE OF THE PROJECT

In our project we not only capture the number of the vehicle but, we are also able to know the details of the vehicles such as the whether the vehicle has undergone carbon emission test, insurance is there or not, and whether vehicle is blacklisted and also about the owner of the vehicle like who is owner of the vehicle, their contact number, address. Here we send the message to the owner of the vehicle like, they have not undergone the carbon emission test, not renewed their insurance and also like their vehicle has been blacklisted and also the message in which place their license plate has been captured.

III. METHODOLOGY

Project is carried out in two phases: Image processing using Open CV to extract license plate number; development of source code for ARM9 for controlling rest of the modules.

This system has the following features:

A. Video capture:

When the system works, the camera in the front of the car captures the image automatically and saves it in the video buffer.

B. Optical character reorganization:

The system recognizes the number plate of the vehicle using this optical character reorganization.

C. Image processing:

The recognized image is then converted in to some text format this processing is done by using OPEN CV programming.

D. Communication function:

The vehicle checking terminal communicates with the server center by the SMS message on the GSM network.

E. GPS positioning:

The system can correctly send the position and time of the checking vehicle to the server center by GPS positioning, therefore, the terminals can be coordinated properly.

IV. BLOCK DIAGRAM

The typical block diagram consist of ARM-9 SAMSUNG MINI 2440, Microsoft VGA Camera , SIM –COM 300 GSM Module PROGIN GPS module, 3.5 inch TFT display, 4 Wire resistive touch screen, Reset, Buzzer and my SQL data base.

We are using a 4wire touch screen with 3.5 inch TFD display with camera instead of a “Mobile vehicle checker”. The ARM memory is loaded with a list of vehicles which need to check for theft or other problems. We try to match the video image data with the above database and the GPS location is tracked. Messages are sent through GSM.

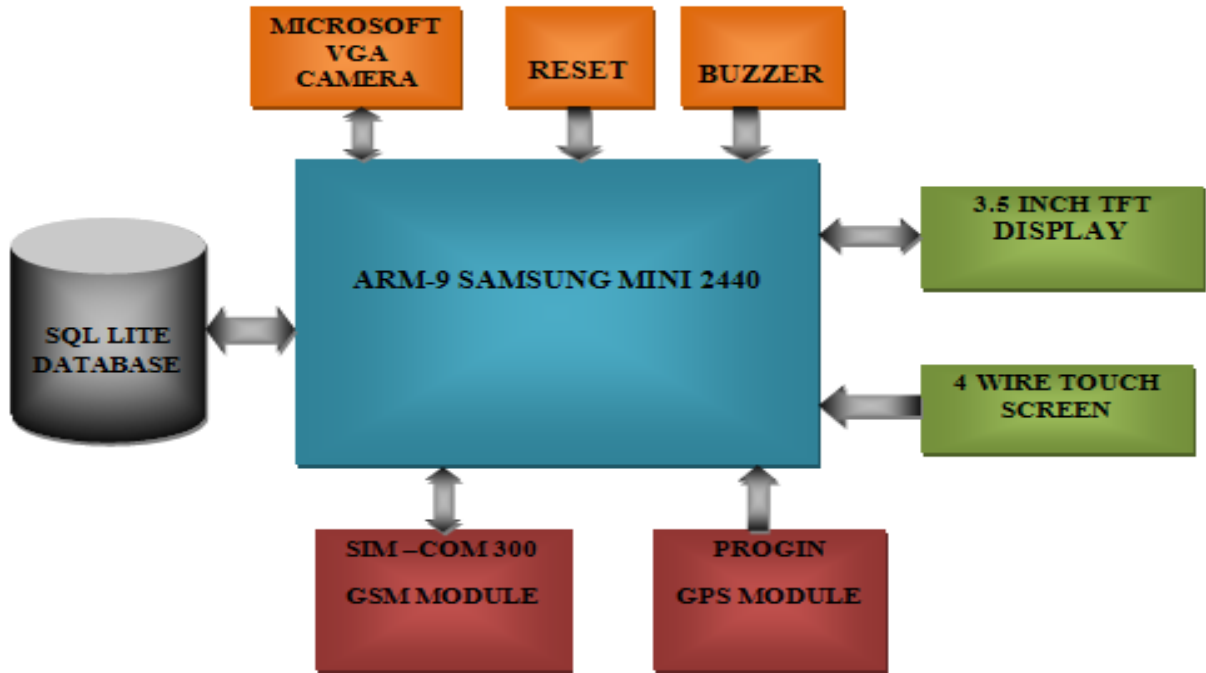


Figure 1 Block diagram of the system

The ARM controller used here is ARM-9 SAMSUNG MINI 2440 it has the following features ARM stands for Advanced RISC Machine the ARM-9 SAMSUNG MINI 2440 microcontrollers from Samsung are based on a 32-bit ARM-9 SAMSUNG MINI 2440 CPU with real-time emulation that combines the microcontroller with 32 MB of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

V. PRINCIPLE OF OPERATION

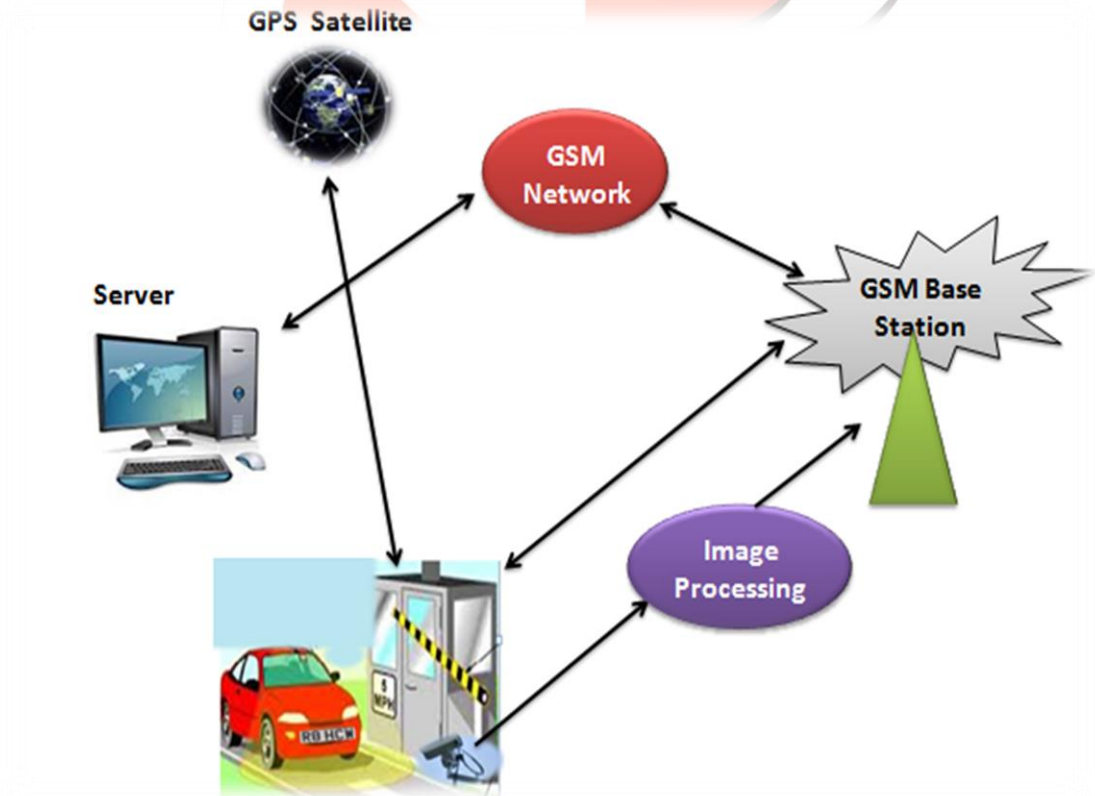


Figure 2 Working Principle

A. Video capture

When the system works, the camera in the front of the Vehicle Tracker collects the opposite coming vehicle image automatically and saves it in the video buffer. A database of Vehicle numbers, license details etc., is already uploaded in the ARM Controller.

B. Image processing

The captured image is processed using Open CV, the particular number plate is recognized by the OCR it convert image in to text format. The converted text will compare with details which are already loaded in the ARM using C sharp programming.

Let's now move on to higher-level methods that treat the images as images, and not just as arrays of colored (or grayscale) values. When we say "image processing", we mean just that: using higher-level operators that are defined on image structures in order to accomplish tasks whose meaning is naturally defined in the context of graphical, visual images.

C. Communication function

The details about the particular vehicle present in the ARM will be sent to the owner of that vehicle. If the particular scanned vehicle is found that it is black listed then, the system does not check for any other conditions such as whether it has undergone emission test or not and whether the insurance is renewed or not, it will just send the message as "violation of rules, the vehicle is black listed" to the owner of the vehicle.

If the vehicle is not black listed then the system checks for the other conditional details such as whether it has undergone carbon emission test and whether the insurance of the vehicle is renewed are not and sends a message to the owner of the vehicle along with the time and position.

D. Why ARM 9?

This is Real time project so it needs high processing speed as well instead of using Controller and computer this processor is comfortable. It can support 4 UART so easy to interface multiple devices.

E. Why Open CV?

Speed:

Matlab is built on Java, and Java is built upon C.

So when user runs a Matlab program, computer is busy trying to interpret all that Matlab code. Then it turns it into Java, and then finally executes the code. Open CV, on the other hand, is basically a library of functions written in C/C++. User is close to directly provide machine language code to the computer to get executed. So ultimately user can get more image processing done for computers processing cycles, and not more interpreting. As a result of this, programs written in Open CV run much faster than similar programs written in Matlab.

So, conclusion? Open CV is damn fast when it comes to speed of execution. For example, writing a small program to detect people's smiles in a sequence of video frames. Using Matlab typically get 3-4 frames analyzed per second. In Open CV, would get at least 30 frames per second, resulting in real-time detection.

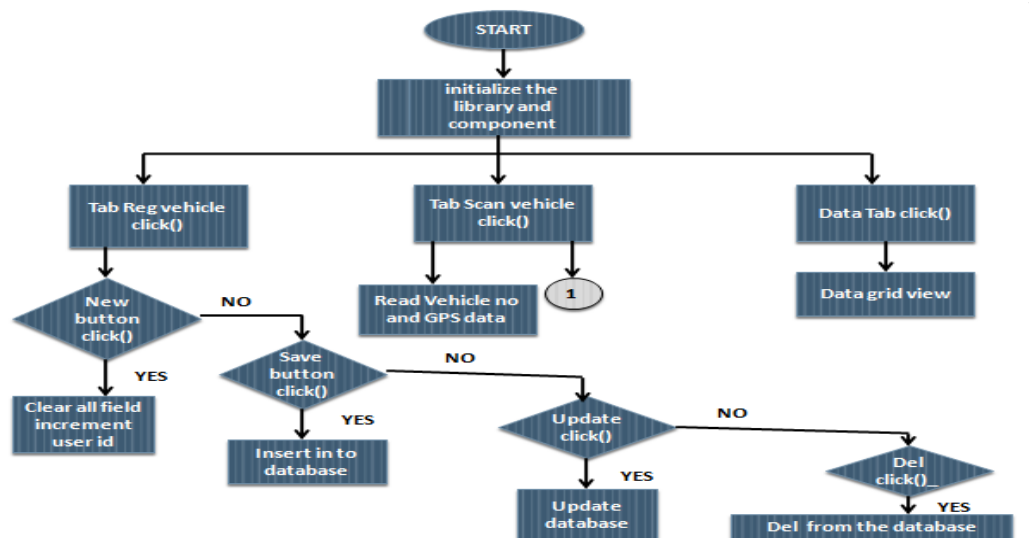
Resources needed

Due to the high level nature of Matlab, it uses a lot of systems resources. And Matlab code requires over a gig of RAM to run through video. In comparison, typical Open CV programs only require ~70mb of RAM to run in real-time.

Portability

MATLAB and Open CV run equally well on Windows, Linux and MacOS.

VI. FLOW CHART



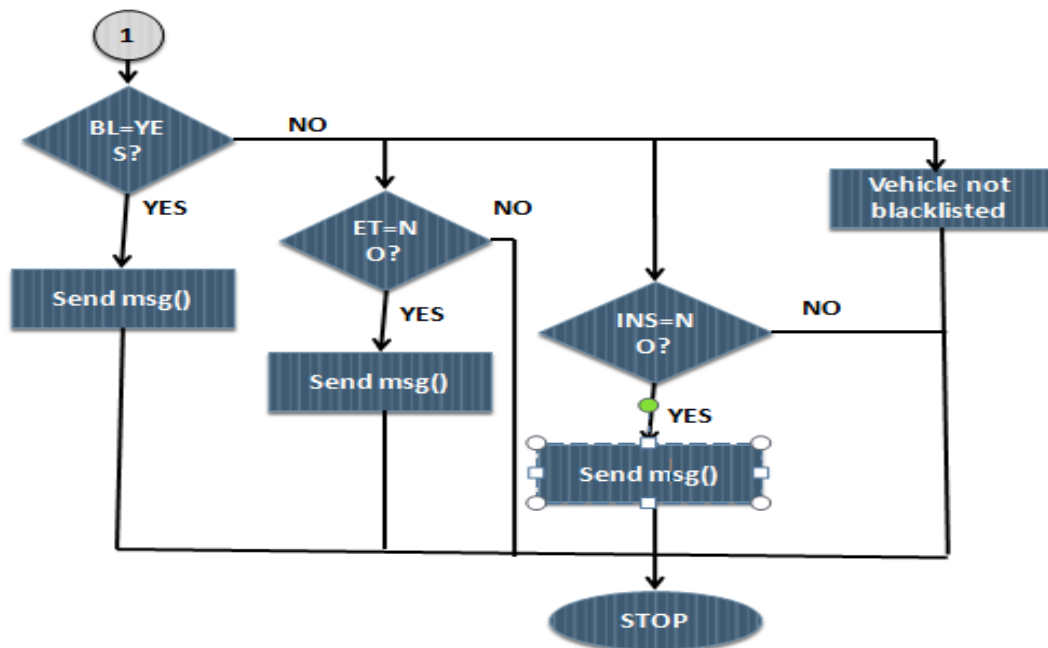


Figure 3 Flow Chart

VII. ADVANTAGES

- Small size: The entire modules used in the system are of small size and fits in a small area.
- Full featured: System can provide the detail information on a black listed vehicle, regarding vehicle under gone carbon emission test and insurance details along its location
- Powerful expansibility: Since the system is mobile in nature it can cover a wider area compared to traditional ways of vehicle checking.
- Huge memory storage capacity: It is possible to store many of details of vehicle in data base using ARM9 controller.
- More secured: integrating this technology in access control application together with traditional control device .
- Provide good time management: It reduces the time wasted by the department of police to checking each and every vehicle manually.
- Easy of tracking: It is easy to track illegal vehicles or stolen vehicles.
- Easy of communication: Using GSM the communication is very easy.
- High processing speed: Using ARM9 we can get high processing speed.
- Accurate identification: Using OCR we can get accurate identification.
- Better resolution: the resolution of camera is comparatively better.
- Low costs: Cost of this system is comparatively low.

VIII. DISADVANTAGES

- Due to network jams the intimation to the authorities may get delayed.

IX. APPLICATIONS

- It plays an important role in tracking of blacklisted and stolen vehicles
- It can be used to reduce manual risk of traffic department.
- It can used to reduces traffic jams
- It can be used to reduce air pollution by informing regarding carbon emission test.
- It can be used to remember about insurance renew.
- It can be used in defense and high confidential functions

X. LIST OF COMPONENTS

A. Hardware Used

- Microcontroller-ARM9 SAMSUNG MINI 2440
- 3.5 inch TFD display
- 4 wire touch screen
- GSM
- GPS
- Power Supply
- Buzzer
- Microsoft VGA Camera

B. Software Used

- Open CV
- C Sharp

XI. CONCLUSION

Thus “VEHICLE CHECKING SYSTEM USING OPEN CV FOR IMAGE PROCESSING” project helps to build high tech traffic system. It is also used in the traffic department to overcome the violations of the traffic rules, by detecting and informing to the owner of that particular vehicle by using many advanced techniques. It also reduces the manual risk of traffic department with many advantages. Our project has literally shown the output to be positive. The future enhancements as proposed in this project will be more effective for the traffic department.

XII. FUTURE ENHANCEMENTS

In our project we are able to capture one license plate at a time, as the future enhancement we should improve the system such that it should be able to capture simultaneously many license plates.

XIII. REFERENCES

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