



AUTOMATIC NUMBER PLATE RECOGNITION

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ABSTRACT

Automatic Number Plate Recognition system is a python based utility that captures live traffic, detects the number plate of the oncoming vehicles and stores the data into a database automatically, saving a lot of manual labour and doing the all important job of security surveillance.

PROJECT MOTIVATION

The world is developing fast. With increasing population and cluster development, public safety has become more and more important, and at the same time it has become quite tedious. Keeping the records of inflow and outflow from various public places is a source of headache and thus a threat to a safe environment. So, we decided to develop a system, which can be used at numerous places, works on very simple principles and can be a life saviour for the law enforcement

department. A system to enable complete automatic recording of vehicles based on a factor that helps identify each vehicle uniquely - their Number Plate.

WORKFLOW

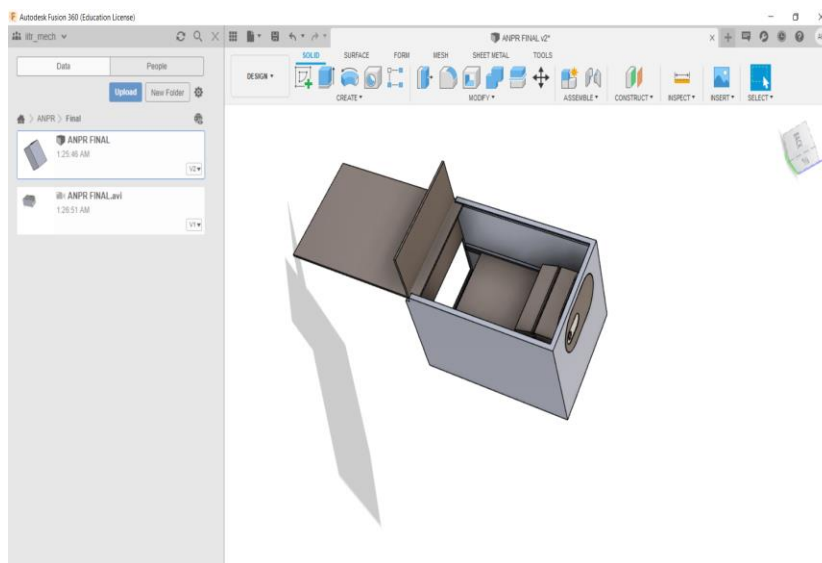


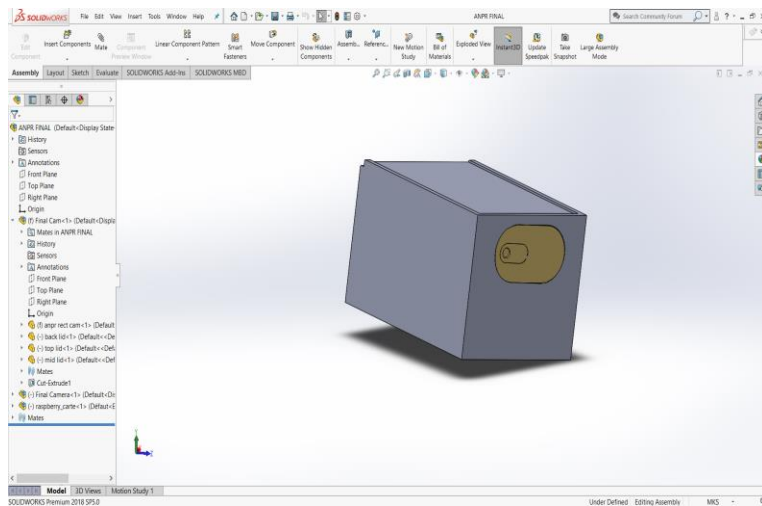
- The entire process is broadly divided into 4 above-mentioned categories.
- When a vehicle is in the field of the camera's view, it detects it and runs the program uploaded in the CPU(Raspberry pi used here)
- The program, after successfully detecting the vehicle next moves onto the localizing Number Plate.
- After isolating it, it applies bunch of functions, enabling character segmentation, which allows the final part of program to come into play
- After segregation, 'pytesseract', a library is enforced which, from a pre-existing database, compares segregated characters and converts them and writes them into a txt format, which acts as the stored data and which can be used later.

MECHANICAL ASPECTS OF THE DESIGN

1. Structure

The model is a simple box, having dimensions $17 \times 11 \times 10 \text{ cm}^3$, with slots to fit 3 small sliding planks, namely the top lid, mid lid and back lid. These lids enclose the box and create a partially closed partition, that separates the Camera and Pi. This carefully thought structure can be easily fabricated via 3-d printing or via CNC and Press machine, without the hassles of machining or sticky adhesives. The slot in the front ensures the camera fit properly, and the closed box give a pleasant aesthetic feel.





These screenshots give a good glimpse of the model.

ELECTRONIC ASPECTS OF THE DESIGN

The electronics composition of this model is rather easy, containing only 3 components, all of which have been mentioned above. They are:

1. Raspberry Pi

This acts as the CPU of system, runs on battery and has the programs pre-uploaded along with required libraries, and is easily acquired online and in electronics stores



2. Logitech USB Camera

The eyes of the system, this is connected to the pi via USB 2.0 ports which live feeds what it sees to the program, which is later sent for character recognition.



3. 12V Battery

This battery kept inside the box powers the Pi via MicroUSB 2.0 cable.

COST STRUCTURE

Components	Cost(INR)
Raspberry Pi	3830
Logitech Cam	3500
Battery	1500
<i>Total</i>	<i>8830</i>

APPLICATIONS

Shopping Malls:

A place of heavy hustle-bustle, with high inflow and outflow vehicles in parking, these automatic systems work like a charm here, to keep a check and record of the vehicles entering the parking premises, and the authorities are able to confirm data easily in case of any unfortunate mishaps.

Toll Plaza:

Highways and State-Borders equipped with such technologies find it extremely easy to ensure no illicit activities are carried on the highways, which would rather be very difficult if the data was handled manually.

Parking Plaza:

The places, now in abundance in densely populated cities, easily calculate fares and taxes, along with keeping record with help of such ANPR systems

Educations/Government Institutes:

Most sensitive areas in a locality, these systems ensure only authorized vehicles enter the premises and alert the law enforcements in case uninvited visitors pose a danger to the members of above mentioned institutions.

LIMITATIONS

The field of ML/DL, the basis of the code that powers this system, is still in developing phase and thus hasn't yet reached the peak of accuracy and gives plenty of errors in steps of detections and character conversion. Also poor camera quality and resolution hampers the accuracy of output.



FUTURE IMPROVEMENTS

- As mentioned above, the development ML/DL will ensure more precise and accurate outputs in future.
- Better camera lenses in the present space constraint will also greatly improve the accuracy of this system.
- Better microprocessors, smaller and faster will surely be a boon for ANPR.

ACKNOWLEDGEMENT

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