2nd May 2016

Traffic Light Admin

Automated Traffic Light Adminstration system(ATLAS)

Inspiration

the project was initiated to solve the growing problem of traffic light violation, the massive traffic jams in Delhi. Also, some motivation was from , the everyday growing news headlines regarding road rage , accidents (Danger to life).

MENTOR- **Dr. Alexander Fell**

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TEAM PHOTO

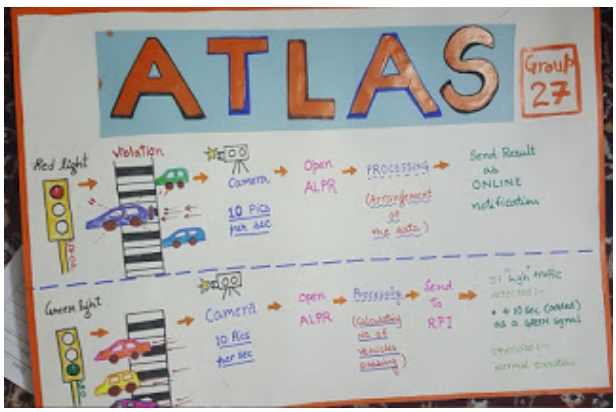
[https://3.bp.blogspot.com/-z2ZEPdiPyog/Vye58n9I2PI/AAAAAAAAAD0/mLLDlFDCCwEywScq2PvaEflNnz3YRFkHgCLcB/s1600/20160502_191200.jpg]

(from left to right) Dewansh gautam, Rajat Kumar, Vaibhav Kashyap,Saurav Kumar

Member roles and responsibilities

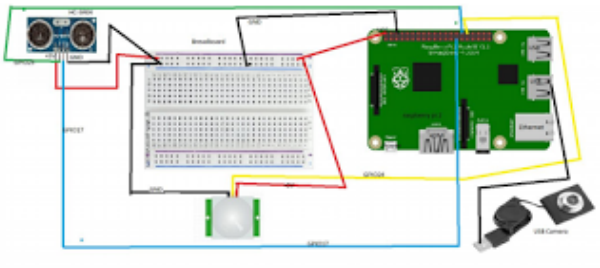
Dewansh Gautam(2015025)- python scripts for Rpi, training open alpr,Blog,setup, info gathering .
Rajat Kumar(2015163)-shell scripting , training open alpr,setup,pin diagram,info gathering .
Saurav Kumar(2015174)-camera setup, video input ,pin diagram,shell scripting,info gathering.
Vaibhav Kashyap(2015111)- notification generation, pin diagram,info gathering.
social networks - crowd sourcing the images

Block diagram



[https://4.bp.blogspot.com/-kMJyqnIFDIo/Vye_7dhQX4I/AAAAAAAAAEM/TjcwgazxL-4jXtTCus2xhNjR25pxUoOOwCLcB/s1600/20160503_020847.jpg]

Pin Diagram



[https://3.bp.blogspot.com/-ZIId9eNPVNg/VyfAjDPQN0I/AAAAAAAAAEU/kKcF9nFtwIMVfX8Tg43A27KS9SJpqjHxgCLcB/s1600/desktop.png]

Advantages (Design wise)- 1) once made it is easy to replicate .
2) complexity due to wire etc is minimal

Lessons learnt

1)Learnt about handling an AI algorithm (computer vision Algorithm). And appreciate the fact how optical characters were extracted from an image efficiently

2)Handling Open alpr on linux and windows both

3)Learnt how to train an algorithm which learns from its sample data

4)Racing against time when facing a real world and real time problem

5)Basics of rasperry pi

6)You have to be creative when problem occurs

PRACTICAL USAGE (Project scope)
On a large scale by using this project we can detect all the violators who broke the traffic rules.
1)If implemented correctly can be helpful for the citizen as they would have to face lesser jams due to the feature of density control in our project.

2) notification generation

3)The government officials would be happy to have things done automatically . And fine the violators would become a piece of cake . No more duty while adverse weather conditions are there.

CHALLENGES FACED
1) Firstly, we were facing a problem that how to scan all Indian number plates, as many of Indian number plate have different patterns, doesn't have a fix pattern ,so all number plate scans by
fixing a single pattern is not possible. Talking in terms of probability it was very hard to find correlation between the pattern and the fonts of number plates .

2)Training open ALPR was a heck of a job . we had approx 400 images . it took us about 30-40 hrs of labour to get the data out of them and train the

3)Taking the data sample . It was little bit risky to get clear cut images of number plates to train the ALPR. as someone would shout from the back " hey what are you doing?" while click the pictures.

4)The algorithm is very intelligent but it confuses between letters which are/are not in the english text format. for example a squeezed "M" can be considered as M or can also be confused with H , I etc

5) More training = better results . does not hold true .you need to have clear ,cropped images . catch here is quality not quantity

6)We also have to train openALPR with all patters to detect all indian number plates. losening the bounds for height and width of the license number plate does not help . you need to be precise .
which requires actual measurement of number plate .

7) working with an algo which is still in progress of development on developer level. There are issues related to dependencies . one update comes and "pofff" all that is gone . start installing
a fresh copy of open alpr that too the hard way as given on github .Because training can only be done if all the dependencies(almost 10) are manually compiled

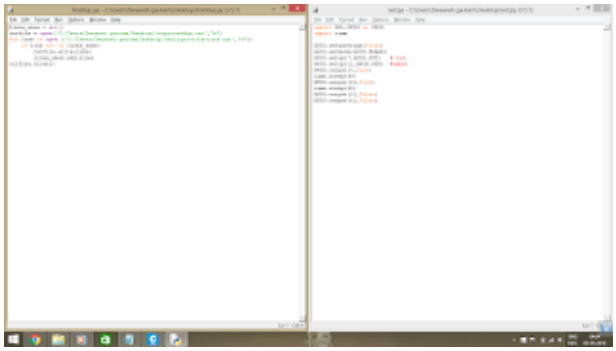
8)In the starting , we had some idea to which country the indian number plates are similar to. namely eurpean type. so we had directly put the alpr on work . it gave us 10 % accuracy . After
making configuration files it improved to about 30% but the major boom came when actual training began.

9)The number plates of only those cars which jumped the crossings.

10) ssh. do not play with ip address . if one netmask is set incorrectly you would probably be going to waste a lot of time.

11) camera setup is a lengthy process

code snippets



[https://3.bp.blogspot.com/-SUSPGvKlkfE/VyfW4AJGWQI/AAAAAAAAAEs/zwvbLvah8zMZb4QNkbMi-8yqN3nzvPN5wCLcB/s1600/scripts.png]

Milestones achieved

1)significant number plate detection rate .(about 60-70%)

2) We also succeeded in detecting traffic violator and storring their vehicle's number in a single text file and uploading it on internet.

3)We are able to do above thing automatically so any one dont have to anything.

4)simulate traffic light on breadboard

5) density control(partial)

List of components

1)RPI+memory card- FLIPKART

2)Camera-LOCAL seller

3)connecting wires - Local seller

4)LED's, breadboards etc -local seller

TOOLS APPS Software needed-
1)open alpr with all dependencies
2)python
3) psftp,
4) phpmailer .

Initial Approach to execution of project

initially we had thought of a completely different approach of doing the project with rf-ids.Then we changed to do it whole through image processing (openALPR). Hardware was not a problem . the main problem lied in software and the correct algorithm execution .

NOVEL approch-
abstaract- see India as a mixture of number plates from font styles from all around the world
.the Idea is simple but it took a lot of research and readings about the number plates to come up on this result . Rather than brute forcefully training the alpr . the alpr comes with data of 6 countries already trained to very high levels of accuracy . what we did was we used that data in
addition to the indian number plates data which we had made before .

journey summary -
we had started our project from a very different approch , we were thinking of doing it with RF-id with lots of assumptions . But then after Dr. Alex had helped us to overcome those assumptions and make a real time project . working on different operating system led to different results . True test of patience when everything is dependend on the quality of image, IP addresses and timing . keeping everyone in touch and incorporated in the project was also a difficult task.
On the whole, the journey was difficult and surely we learnt a lot of things .In this we would like to add that SM notes were pretty handy for us.

new method used- same as novel approch

Final stages video-
ATLAS [https://www.youtube.com/watch?v=Wczxk_3ad70]

references-
Motivation [https://www.youtube.com/watch?v=bphXHnLmmP0]
Open alpr [https://github.com/openalpr/openalpr]

Posted 2nd May 2016 by Dewansh Gautam

2 View comments

Priya Kannan 16 June 2017 at 00:34

This is an awesome post.Really very informative and creative contents. These concept is a good way to enhance the knowledge.I like it and help me to development very well.Thank you for this brief explanation and very nice information.Well, got a good knowledge.
Python Training in Chennai

Reply

Rakesh Goyal 23 June 2017 at 05:15

Hey Dewansh, Awesome Job. Could you please share Indian Vehicle training data.

Reply

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