Team Meet notes

# Date: 10/06/2020

## Work Allotted

This work was divided among the members seeing their enthusiasm in the departments.

### IP = Akash and Shubham

#### Work done till now:

Made a basic program that can classify the objects in the images and output their numbers.

#### Work to do:

1. Attempt to use multiprocessing so that all cores can be utilised for the work. Check if it's faster. Apply if it is faster. Allotted to: Shubham
2. Make a modification for detecting if the cars that are standing at the light are crossing a certain threshold - decided by the range of the camera. Allotted to: On hold
3. Discuss and try the program on the night life. Allotted to: Akash

### Traffic Light Research = Mayur and Akash

#### Work done till now:

Null

#### Work to do:

1. Study the field of traffic lights and how is time allotted to traffic lights that are being used in the current system. Allotted to: Both will work.
2. Communicate some training data for the pre trained model, being developed by the ML team. Allotted to: Both will work.

### ML = Tanmay and Shubham

#### Work done till now:

Null

#### Work to do:

1. Make a basic pre-trained model using that can output the time of the intersection. Allotted to: On Hold
2. Make a model such that every intersection has its own weights for making it specific to that intersection. Allotted to: Both will work collectively.

### Traffic Program = Akash and Shubham

#### Work done till now:

Made a traffic program that takes in the time input of the ML program, and allots different light times according to the time array.

#### Work to do:

1. Apply the threshold functionality in the program. By threshold we mean that if the camera can’t detect any more vehicles, that way should be immediately cleared - all others should be put on hold. Allotted to: On Hold

### Emergency Detection Circuit = Akash and Mayur

#### Work done:

Decided to use an active RFID circuit to recognise and handle the emergency vehicles.

#### Work to do:

1. Implement the circuit. Finding the various parts and the costs for the system. May redefine the whole idea if the active RFID idea doesn’t work well. Allotted to: Both will work.

Detail of work: Finding out if it can be practically implemented or not. This includes the time and delay of the circuit.

### Database Management and Intercommunication = Tanmay and Shubham

#### Work done:

Null

#### Work to do:

1. Figuring out a database system and finding out all the requirements of the storage required for the system. Allotted to: Both will work.
2. Building a framework that handles all the communication between the different departments. Allotted to: Both will work.

### Other decisions

1. Make a presentation for the final meet.
2. Having a team meet everyday at 9:30 PM. Zoom links will be shared at slack only.

# Date: 02/06/2020

So first we need to decide the framework of the project. We have two things to decide frontend and backend development.

## Frontend

Handles how the project will be displayed. We want to deal with it later.

We have to decide which approach to take. Some of the points are:

1. We have to give an output. First decide what is that output? How to show that output. Some ways can be:
   1. Make an app that displays the timer and the traffic lights at the intersection.
   2. If you want the direct practical approach, we need to think of making a complete traffic light from the board computer (which we still have to decide). Also if you go with the full approach you need to come up with a circuit to handle all these things.
2. What will be used for the framework for communicating between the frontend and the backend. Options:
   1. Django = but i think it only makes web applications (Tanmay ??)

### Decided in Meeting:

1. Tanmay and Shubham will explore various ways we can build a framework such that all the programs will communicate with each other.
   1. First, we build a small framework that connects the IP and ML part.
   2. We will first use a django framework, and try to bring up a framework that can easily exchange values.
   3. Build a small database that will manage all the data.

## Backend

Handles all the work displayed by the frontend part. It contains three major branches.

### ML = Tanmay and Mayur

Some of the points raised:

1. Have you found out some training data for your algorithm? - understand the data that will be provided
2. Have you decided what type of algorithm for your model? - supervised, unsupervised, semi-supervised or reinforcement.
3. Have you made something that the whole team can see? Or maybe some small program.

Decided in meet:

1. Brush up the basics of ML from [Andrew Ng course on youtube](https://www.youtube.com/playlist?list=PLLssT5z_DsK-h9vYZkQkYNWcItqhlRJLN). Also read up the book on ML.

I recommend leaving 3.1 to 3.6, 5.1 to 6.7, 8.1 to 9.8, 12.1 to 13.5. I don't know about the rest.

1. Find some of the training data for actually defining. **This is really important.**
2. Explore as many algorithms as you can via implementing it.

### IP = Akash and Shubham

Some of the points raised:

1. What should be the input of the camera - video or photos?
   1. Photos - easy to compute on.
   2. Videos - much more difficult to code, computationally heavy, bad quality image
2. How will you decrease the time of your algorithm? It is the bottleneck of the whole operation. Answers:
   1. We can make our own model from scratch but that will take a lot of time and a lot of data on our side. The bigger problem is time.
   2. We could train over the YOLOv3 model we have been using. We will produce reduced weights and get better times.
   3. We could also use something called a YOLOv3 tiny. It is small and we are avoiding that just because of less accuracy
3. How will we manage nightlife? Due to reduced picture quality, will we be able to detect the cars and all the systems clearly. Answers:
   1. We still have to test it. Will proceed to another solution if this one fails. Unable to procure data due to the lockdown
4. What quality of photo would you require?Answers:
   1. Maybe not that much. I will look into it.
5. How often would you take pictures?

Ex, A vehicle may come in the view while taking the photo and covers the whole image. so we need to make sure it doesn't happen or we won't have a proper count. Suggested solution: Repetitively take image of the road.

Decided in meet:

1. Decide a little bit on the camera placement.
2. Decide on how to manage the system at night.

### Emergency Detection System = ?

Some of the points raised:

1. How will we detect the vehicles?
   1. Via IP - we would have to train our model (YOLO or our own). Problems:
      1. Difficult to code (training nuh nuh), also its accuracy may not be that good for this, resulting in failure of the whole traffic light.
      2. Vehicle may be out of range for our camera
   2. Hardware system - a new hardware system to detect vehicles.
      1. Completely new thing - taking output, deciding what to use and not, learning that, implementing

Decided in meeting:

We haven’t decided on an approach to the emergency detection system. But we all are briefed on what each system is and what are their advantages and disadvantages.

## Traffic Program

Decided in meetings:

1. All of us will read a little about the traffic systems around the world.
2. Shubham is writing a basic traffic program. (anyone else can also volunteer to do the task with me)

## Hardware

We have mainly two things we need to decide upon:

1. Board computer

This is something small and can handle computations very well. We need to strike a balance for the price too.

Some of the options can be found at: <https://www.seeedstudio.com/blog/2019/11/20/best-single-board-computers-of-2019/>

1. Camera

Its quality and price depends only on IP

1. Other hardware

This can include making of all other equipment required for a traffic light.

Raised in team meet -

Cost and quality of project - choosing board. If we can just run the program on pc rather than a board.