**LINE FOLLOWING ROBOT USING IMAGE PROCESSING**

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**WEEKLY PEPORT**

This week has been utilised for getting familiarised with raspberry pi. The version of raspberry pi that is being used is raspberry pi 3 model B+. Raspbian stretch OS is installed in the raspberry pi. The installation is done through SSH, which is Secure Shell protocol, which enables to communicate between devices securely through an unsecured network. MobaXterm is used as SSH server instead putty due to some network problems. MobaXterm can be used both as SSH server and as remote desktop for raspberry pi. But VNC is being used to view the desktop of the raspberry pi, remotely.

The main part of this project is Rpi camera module. This is because the line will be read through the camera and processed through image processing. This has advantages over conventional usage of IR sensor. With this, line with color other than black can be detected. Image processing allows to calculate the contours of the object which will enable to program the bot to follow other objects like ball for example, in addition to lines. The camera that is being used in this project is of 5MP resolution, capable of taking images and capturing image. Unfortunately, it can’t record sound. As desktop of raspberry pi is being viewed remotely, the video captured and recorded can’t be viewed from a remote desktop that is being used. Remotely the video can be viewed by streaming video through browser or apps such as vlc player. Successfully streamed video through vlc player by running following in the raspberry pi terminal –

raspivid -o - -t 0 -hf -w 800 -h 400 -fps 24 |cvlc -vvv stream:///dev/stdin --sout '[#standard](https://www.youtube.com/results?search_query=%23standard){access=http,mux=ts,dst=:8160}' :demux=h264

Then vlc video can be viewed through vlc player by typing the ip address of the raspberry pi

ALGORITHM FOR THE BOT:

1. Start the camera
2. Get the image, resize it if required
3. Set the frame rate of the video.
4. Convert the frame into grayscale
5. Use GaussianBlur to reduce noise of the frame.
6. If the color of the line is any color other than black describe the lowest and highest range of the particular color that can be detected. The use inRange to create mask the frame with the lowest and highest range.
7. If the line is black create mask using threshold, which simply convert the pixels of certain range to a particular value set.
8. Find the contours of the image
9. For reducing the noise related to the contours, calculate the area of the contours.
10. Then find the moments of the contours.
11. With moments found centroid of the contours can be found
12. Using these contours range for right, left, and straight can be defined

Next week, coding for the bot will be started. Simultaneously, components will assembled for the bot.