SELF-DRIVING TOY CAR

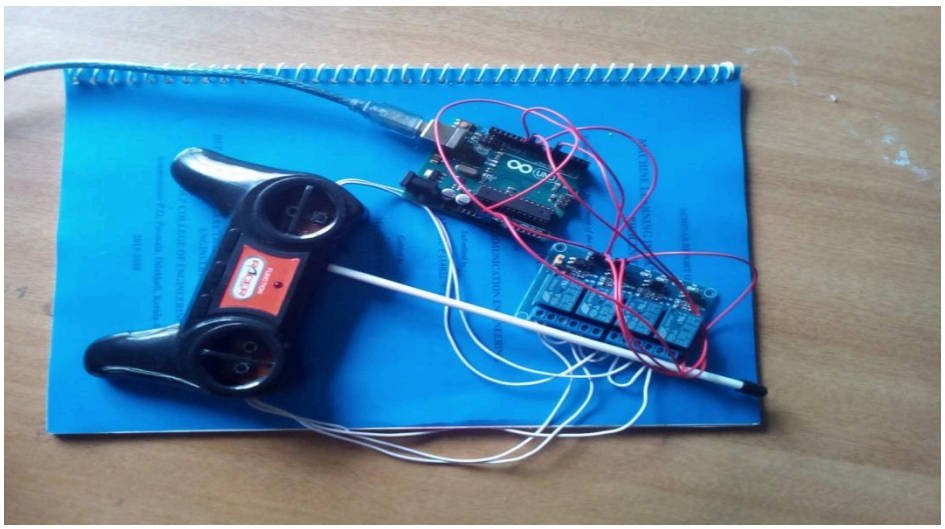


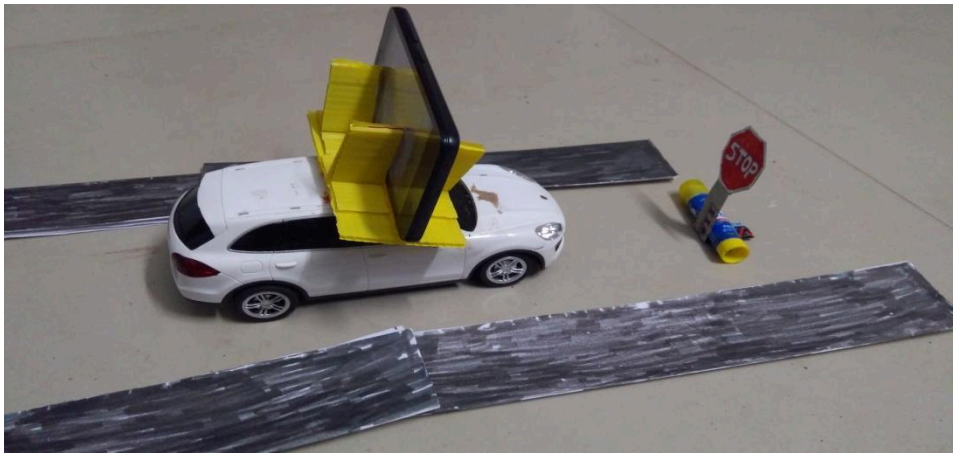
Development phase

- **Assembling of hardware**
- **Collecting data**
- **Training model**

Assembling of hardware

This project used a type of robotic car kit as a self-driving car. The main processing module, the android phone, its camera is used for capturing images and is placed on top of this robotic car kit, phone was placed on top of the car horizontally. The laptop, joystick, and Arduino were connected according to the architecture. The design outlook of the car and controller is as in the following images





Collecting data

With the smartphone and the car holder attached to the roof of the car, we will be able to see what's in front of the car. Using an android app that allows us to get the image of the camera from a URL and a REST API.

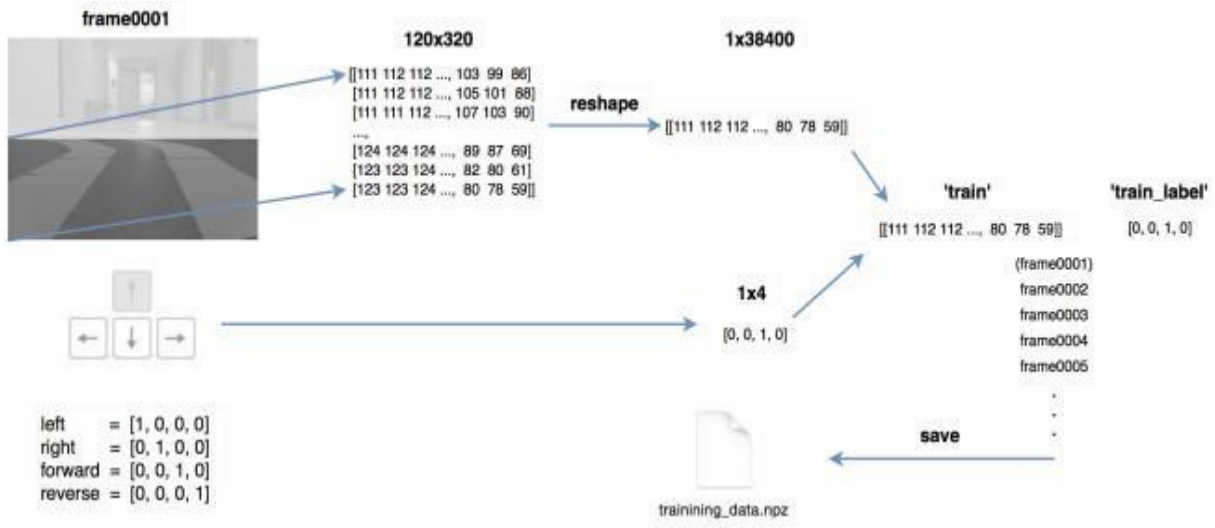
Library used for collecting data

- **Python, OpenCV**

  The streaming video in the android which is placed on top of the car will be captured in the computer using python, pyserial(for serial communication with joystick), and OpenCV to save video frames with labels into a numerical form as our training data.

- **PYGAME**

For detecting key press in the computer left, right, forward, or backward this will be the label for each frame in our captured video frame as our training data



Training

We first load and process the previously saved images generated while driving the car manually and use them as our training set. Then train the model and save it for later**.**

Object detection using the camera

This project adapted the shape-based approach and used Haar feature-based cascade classifier for object detection. Since each object requires its classifier and follows the same process in training and detection, this project only focused on a stop sign. OpenCV provides a trainer as well as a detector. Positive samples (containing the target object) were acquired

using a cell phone and were cropped so that only desired object is visible. Negative samples (without target object) on the other hand, were collected randomly. The same negative sample dataset was used for a stop sign.

