# System Specification for a Colored Lines Following Autonomous Vehicle

## Overview

It is an autonomous vehicle which can follow colored lines on the ground using a camera, sensors and a motor controller. It can detect different colors of lines and adjust its speed and direction accordingly. The system can also avoid obstacles and stop at any given destination.

# Requirements

- The vehicle must be able to follow colored lines on the ground using a camera, sensors and a motor controller.

- The vehicle must be able to detect different colors of lines and adjust its speed and direction accordingly.

- The vehicle must be able to avoid obstacles and stop at any given destination.

- The vehicle must be able to communicate with a remote controller via Bluetooth or Wi-Fi.

- The vehicle must be able to operate on battery power for at least 30 minutes.

##Components

- The vehicle consists of the following components:

- A chassis with four wheels and a differential drive mechanism.

- A camera and sensors mounted on the front of the chassis that can capture images of the ground in front of the vehicle.

- A motor controller that can control the speed and direction of the wheels based on the input from the camera and the remote controller.

- A microcontroller or Arduino that can process the images from the camera and send commands to the motor controller.

- A battery pack that can provide power to the microcontroller/ Arduino, the motor controller, and the camera.

- A Bluetooth or Wi-Fi module that can communicate with a remote controller.

# Functions

- The vehicle performs the following functions:

- Image processing: The system processes the images from the camera and extracts the color and position of the line on the ground. The system also detects any obstacles or intersections in the path of the vehicle.

- Line following: The vehicle follows the line on the ground by adjusting its speed and direction based on the color and position of the line. The vehicle follows different rules for different colors of lines, such as:

- Red: Stop at intersections and wait for a signal from the remote controller to proceed.

- Green: Go straight at intersections and maintain a constant speed.

- Yellow: Slow down at intersections and turn left or right based on the signal from the remote controller.

- Blue: Speed up at intersections and turn left or right randomly.

- Obstacle avoidance: The vehicle avoids any obstacles in its path by changing its direction or stopping if necessary. The vehicle also alerts the remote controller of any obstacles encountered.

- Remote control: The vehicle communicates with a remote controller via Bluetooth or Wi-Fi. The remote controller can send commands to the system, such as:

- Start: Start following the line on the ground.

- Stop: Stop following the line and stay in place.

- Turn left: Turn left at the next intersection or obstacle.

- Turn right: Turn right at the next intersection or obstacle.

- Speed up: Increase the speed of the vehicle by 10%.

- Slow down: Decrease the speed of the vehicle by 10%.

- Battery level: Request the battery level of the vehicle.