

SM2716

Project Proposal - Car

1. What will we build

We are going to create a car with two operating methods including automatic detection and remote control with an app via Bluetooth connection. For the automatic detection, the car will detect the distance between it and objects in the surrounding. If the distance of them is shorter than a certain number, the car will turn to another direction in order to prevent from crushing. For the remote control, a player can operate the car with an app after he connects the smartphone to the car by Bluetooth. Players can choose the obstacle avoiding mode or the Bluetooth controlling mode by pressing a button on the car. Also, we will build a road on which some light source shines upward. There is a light sensor under the car. Hence, when the car is passing the lighting part of road, it triggers the motors of its tires to rotate faster so as to accelerate the car movement.

2. How will we do it

- Main components -

LDR sensor, 3 Ping (for front and sides), 2 DC Motors, Bluetooth Serial Module, 12V Battery, Arduino, Switch Button

- Building Method-

DC Motor:

2 DC motors will be connected with 2 wheels on 2 sides of the car respectively. To move forward, two motors will on at the same time in one direction. To turn left, only the motor on the right will on and to turn right, only motor on the left will on.

12V Battery:

Providing voltage.

Ping:

Ping can detect the distance of the closest object by sending and receiving the echo wave of ultrasound from the object. Therefore, the car will be installed 3 pings at the front and two sides of the car in order to detect the distance and then avoid the objects from the front, left and right. If the car and objects is closer than certain distances, the motors will on or off respectively to adjust the direction and avoid hitting it.

Bluetooth serial module:

Insert Bluetooth function into the car so that it can connect to the phone's Bluetooth. Using the Bluetooth connection and an app to activate the remote control function.

Switch button:

Switches the mode between remote control and auto detection.

LDR:

Detects the light and triggers the motors to get more voltage to move faster.

Arduino:

Give information for the pin and control the voltage to the LDR, motors and pings.

- Difficulties and resolution-

a. Finding a suitable app to connect the Bluetooth module.

After searching on the internet and considering different Bluetooth controlling app, we decide to use the GoBle app because it is user friendly and efficient to run.

b. Finding the Bluetooth serial module.

We can buy it on Sham Shui Po.

c. Changing the mode of the car.

We can use switch mode on Arduino to switch two modes.

d. Finding the suitable distance between the car and obstacles for turning the direction.

We will try different possible distance to confirm the car can turn the direction with enough space.

e. Sensitivity of a LDR sensor may not good enough

We will put more LDR sensors under the car and set more light source on the road to ensure the sensors can sense it.

- Development plan -

Week 11:

Research and collecting tools

Week12:

Starting to install the car with motors, ping and LDR and type in pin control information to Arduino. (Auto detection part)

Week13:

Installing the car with Bluetooth module and type in pin control information to Arduino. (remote control part) And setting switch mode of the button.

Week14:

Testing the car and correct the errors and film a video about the product.

3. Why it is interesting / awesome

We find the car interesting and awesome due to several reasons. Firstly, it is highly interactive. The car in obstacle avoiding mode interacts with the environment by sensing and avoiding objects around it. The car in Bluetooth controlling mode interacts with humans as they control its direction to move. Secondly, there is two modes for selection. Competition for 2 or more cars can be conducted even if there is only one player as long as he set other cars to obstacle avoiding mode. Therefore, the players will be less easily bored with it. Thirdly, it is playful. Users can have fun with it by conducting completion or game. Also, it can be useful at the same time since it can transport small object from one place to the other place. Moreover, it is a low cost remote control car compared with those sold in the market.

4. Who has done similar things

In fact, there are many similar Arduino project done by others before.

a. Examples of Bluetooth controlling car:

- i.) [Creative Engineer](https://www.youtube.com/watch?v=yytX2sceH-8&feature=youtu.be) – Bluetooth controlling car
- ii.) [Tinkernut](https://www.tinkernut.com/2014/03/control-rc-car-smartphone/) – DIY Smartphone Controlled RC Car
- iii.) [Ardumotive com](http://www.instructables.com/id/Arduino-Bluetooth-RC-Car-Android-Controlled/) - Arduino Bluetooth RC Car

b. Examples of obstacle avoiding car:

- i.) [RoyPe'er](https://www.youtube.com/watch?v=t3kXWSctj2Q&t=234s) - Obstacle Avoiding Robot
- ii.) [Mert Arduino and Tech](https://www.youtube.com/watch?v=jQwYBc7YBXs) - Obstacle Avoiding Robot

They demonstrate the production process which is useful and clears our confusion. We will take them as reference for our project.