



SYSTEM DYNAMICS & CONTROL COMPONENT

Car Project



Team Members:

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Components:

Car body: -

Car design is very simple it contains of 2 Wheels and costar and a plastic body to put all components which we will use.



DC Motors: -

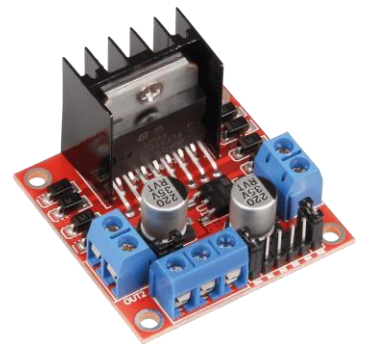
Two DC Motors are connected to wheels to rotate it and it gets its power and signals from Motor Driver.

It can operate with 3-6volts.



Motor Driver: -

We are using it to control the motors and because the output voltage from Arduino is very small and can't be enough to rotate the motors.



IR sensor: -

IR sensor is an electronic device, that emits the light to sense objects of the surroundings.



Ultrasonic sensor: -

electronic device that can measure the distance of target object.



Battery: -

we used two batteries each one 3.7volts with total voltage 7.4volt.



Arduino uno: -

we use Arduino uno to control all this component and make it work together.

It has a micro controller from family called ATmega it has ATmega328P.



Moving Machine and the principal operation

First, we upload the code to the microcontroller after writing it in the Arduino IDE.

Arduino controls all of the system's components, including the motor driver and IR and ultrasonic sensors.

The IR sensor will start sending signals to the microcontroller and emitting IR Leds.

Following that, the microcontroller starts transmitting signals to the motor driver, who then controls the speed at which the motors rotate.

The IR sensor will signal that the two motors will go forward if there is no black line to the right or left, or if there is an intersection of two black lines.

The right motor will begin moving backward and the left motor will begin revolving forward if the right sensor detects a black line (and vice versa if there is black line on the left sensor)

The microcontroller is programmed to apply a specific mechanism (the car turns left, then turns right, then turns right, then turns left) and after doing this mechanism, the IR sensors back to work again and indictee the black line to make the car back to track and complete moving.

When ultrasonic indicates objects in front of the car: First, it indicates the distance between the car and the object, then it sends signals to the microcontroller, the microcontroller is programmed to apply this mechanism



Problems and solutions:

In the part of Ultra Sonic when we applied the same time in delay function the car doesn't avoid the obstacle perfectly

Solved by different time in each delay.

Sharp edges we cannot solve.

Costs

Robot platform (2 Gear Motors + 2 Wheels + Castor)

EGP 230.00

Ultrasonic Sensor Module

EGP 45.00

Male-Male jumper wire- 200mm

EGP 7.50

Male-Female jumper wire- 200mm

EGP 7.50

Arduino UNO

EGP 390.00

IR Infrared tracking Sensor

EGP 40.00

Lithium Battery

EGP 40.00

Acylic Car Chassis

EGP 55.00



Arduino Driver Shield

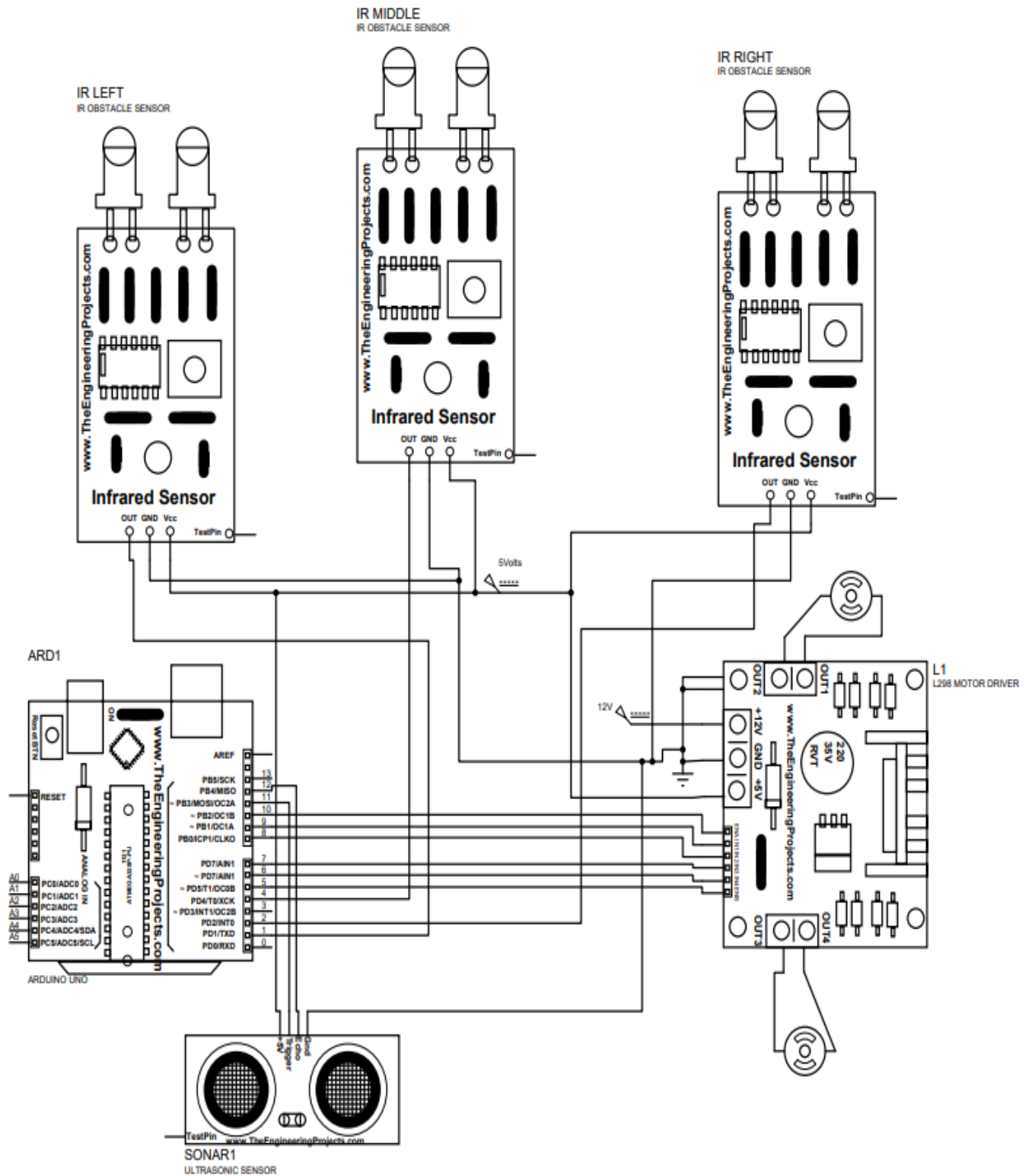
EGP 65.00

Total cost: 870 EGP

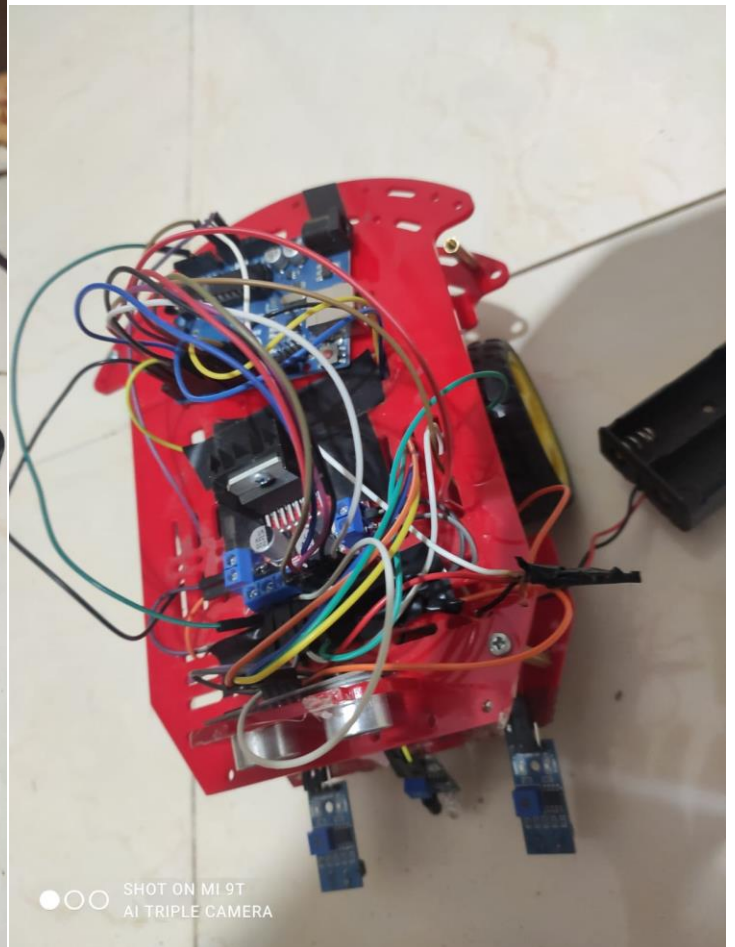
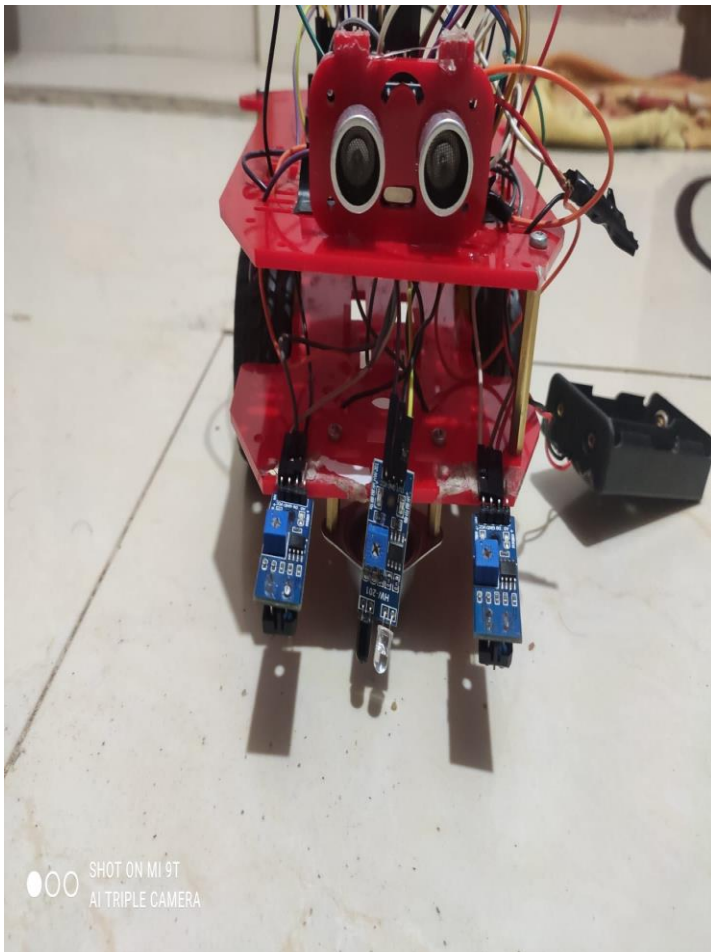
The code & video:

<https://drive.google.com/drive/folders/1neMXXIR8DjhkLTfg9rRua8JbnduwmvEU?usp=sharing>

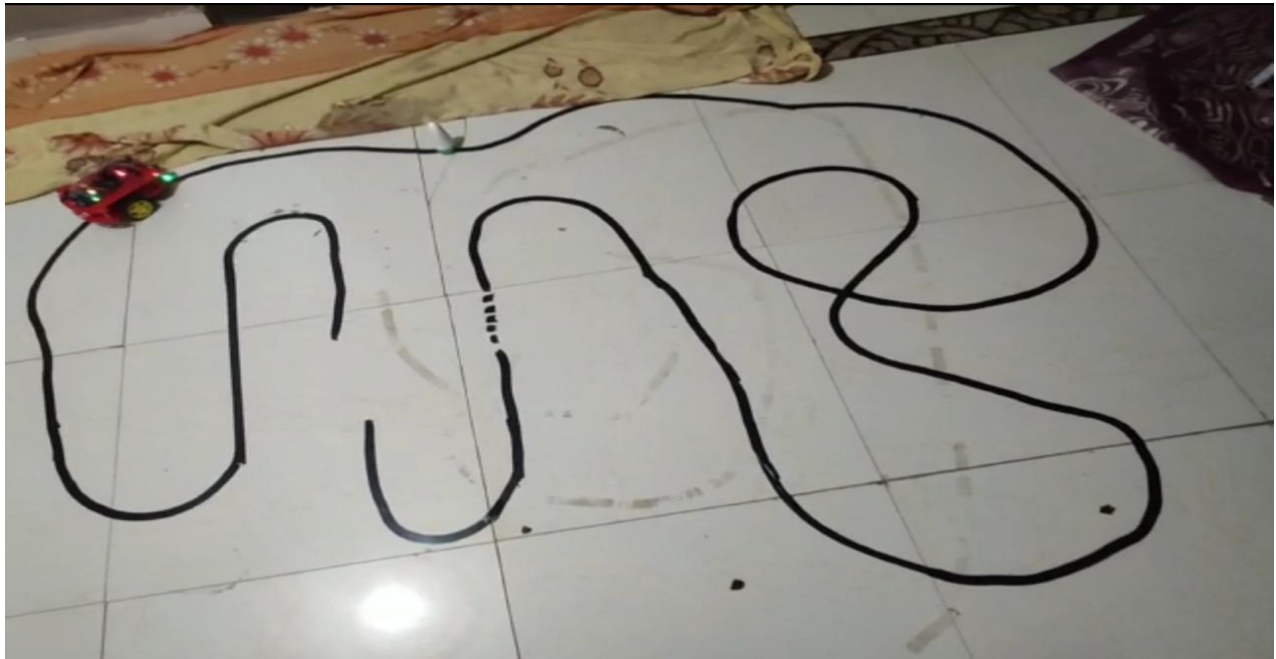
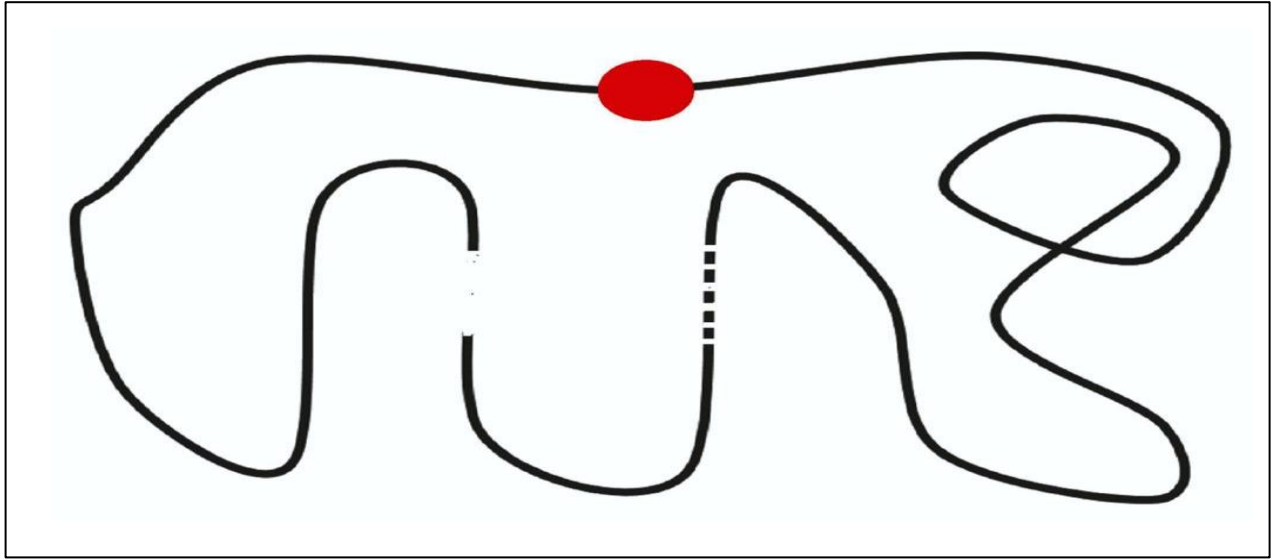
Circuit Diagram



Our Car



Track



Answering the questions:

How many motor did you use in your car?

⇒ We used two dc motors

How many batteries did you use? and how much voltage did they produce as an overall voltage?

⇒ We used 2 batteries each battery produces 3.7 volt with total voltage 7.4volts

Are all the batteries are connected and supply the same output?

⇒ All batteries are connected in series and supply the same output

How many sensors did you use in your car and where did you place it?

⇒ We use 3 IR sensors placed them in the front of the car

⇒ One Ultrasonic sensor placed it in the front.

What should your car do if it faces an obstacle?

⇒ It displays the distance between the car and the object, then sends signals to a microcontroller, which is programmed to apply a specific mechanism (the car turns right, then turns left, then turns left, then turns right), after which the IR sensors resume working and indicate the black line to allow the car to resume tracking and finish moving.

Explain the obstacle dimensions and why this dimension?

⇒ We used the (Deodorant) as the obstacle and we put the delay to be suitable to this obstacle to turn around it perfectly .