Autonomous Car Simulation

Code description:

This code is controlling a robot with three sensors: two IR sensors for detecting obstacles on the sides, and an ultrasonic sensor for detecting obstacles in front of the robot. The connections for the sensors and motor controller are defined using the following pin definitions:

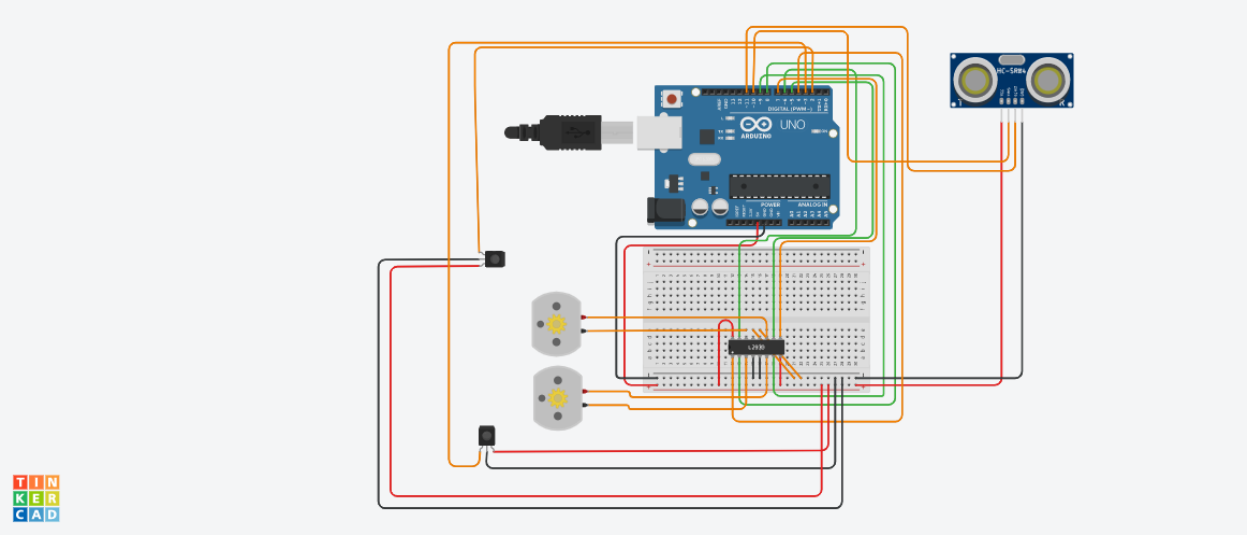
Connections:

- IR_SENSOR_LEFT is connected to pin 2 of the Arduino
- IR_SENSOR_RIGHT is connected to pin 3 of the Arduino
- MOTOR_LEFT_ENABLE is connected to pin 4 of the Arduino
- MOTOR_LEFT_FORWARD is connected to pin 5 of the Arduino
- MOTOR_LEFT_BACKWARD is connected to pin 6 of the Arduino
- MOTOR_RIGHT_ENABLE is connected to pin 7 of the Arduino
- MOTOR_RIGHT_FORWARD is connected to pin 8 of the Arduino
- MOTOR_RIGHT_BACKWARD is connected to pin 9 of the Arduino
- ULTRASONIC_TRIGGER is connected to pin 10 of the Arduino
- ULTRASONIC_ECHO is connected to pin 11 of the Arduino

In the setup() function, the pins are initialized as inputs or outputs using the pinMode() function, and the initial motor speeds are set to 0 using analogWrite().

In the loop() function, the IR sensor values are read using digitalRead(), and if both sensors detect an obstacle, the motors are stopped by setting the enable pins to 0 using analogWrite(). If an obstacle is not detected by the IR sensors, the ultrasonic sensor is used to measure the distance to any obstacle in front of the robot. If the distance is less than or equal to the OBSTACLE_DISTANCE_THRESHOLD (30 cm), the motors are stopped. Otherwise, the motors are moved forward by setting the enable pins to 255 and the forward and backward pins to the appropriate values using analogWrite().

Circuit:



Code for the project

```
// Define pins for IR sensors
#define IR_SENSOR_LEFT 2
#define IR_SENSOR_RIGHT 3

// Define pins for L293D motor controller
#define MOTOR_LEFT_ENABLE 4
#define MOTOR_LEFT_FORWARD 5
#define MOTOR_LEFT_BACKWARD 6
#define MOTOR_RIGHT_ENABLE 7
#define MOTOR_RIGHT_FORWARD 8
```

```
#define MOTOR_RIGHT_BACKWARD 9

// Define pins for ultrasonic sensor
#define ULTRASONIC_TRIGGER 10
#define ULTRASONIC_ECHO 11

// Define constants for obstacle detection
#define OBSTACLE_DISTANCE_THRESHOLD 30 // cm

void setup() {
  // Initialize IR sensor pins as inputs
  pinMode(IR_SENSOR_LEFT, INPUT);
  pinMode(IR_SENSOR_RIGHT, INPUT);

  // Initialize L293D motor control pins as outputs
  pinMode(MOTOR_LEFT_ENABLE, OUTPUT);
  pinMode(MOTOR_LEFT_FORWARD, OUTPUT);
  pinMode(MOTOR_LEFT_BACKWARD, OUTPUT);
  pinMode(MOTOR_RIGHT_ENABLE, OUTPUT);
  pinMode(MOTOR_RIGHT_FORWARD, OUTPUT);
  pinMode(MOTOR_RIGHT_BACKWARD, OUTPUT);

  // Initialize ultrasonic sensor pins
  pinMode(ULTRASONIC_TRIGGER, OUTPUT);
  pinMode(ULTRASONIC_ECHO, INPUT);

  // Set initial motor speeds
  analogWrite(MOTOR_LEFT_ENABLE, 0);
  analogWrite(MOTOR_RIGHT_ENABLE, 0);
```

```
}

void loop() {
  // Read IR sensor values
  int irLeftValue = digitalRead(IR_SENSOR_LEFT);
  int irRightValue = digitalRead(IR_SENSOR_RIGHT);

  // Check if obstacle is detected by IR sensors
  if (irLeftValue == LOW && irRightValue == LOW) {
    // Stop motors
    analogWrite(MOTOR_LEFT_ENABLE, 0);
    analogWrite(MOTOR_RIGHT_ENABLE, 0);
  } else {
    // Read ultrasonic sensor distance
    long duration, distance;
    digitalWrite(ULTRASONIC_TRIGGER, LOW);
    delayMicroseconds(2);
    digitalWrite(ULTRASONIC_TRIGGER, HIGH);
    delayMicroseconds(10);
    digitalWrite(ULTRASONIC_TRIGGER, LOW);
    duration = pulseIn(ULTRASONIC_ECHO, HIGH);
    distance = duration / 58.2;

    // Check if obstacle is too close
    if (distance <= OBSTACLE_DISTANCE_THRESHOLD) {
      // Stop motors
      analogWrite(MOTOR_LEFT_ENABLE, 0);
      analogWrite(MOTOR_RIGHT_ENABLE, 0);
    } else {
```

```
    // Move motors forward
    analogWrite(MOTOR_LEFT_ENABLE, 255);
    analogWrite(MOTOR_LEFT_FORWARD, HIGH);
    analogWrite(MOTOR_LEFT_BACKWARD, LOW);
    analogWrite(MOTOR_RIGHT_ENABLE, 255);
    analogWrite(MOTOR_RIGHT_FORWARD, HIGH);
    analogWrite(MOTOR_RIGHT_BACKWARD, LOW);
   }
  }
}
```