ARDUINO-BASED AUTOMATIC CAR

Objective

To design and implement an autonomous robotic car using Arduino that moves forward and automatically avoids obstacles using an ultrasonic sensor and servo motor

Component	**Quantity**
Arduino Uno	1
Ultrasonic Sensor	1
Servo Motor	1
DC Motors	2
Motor Driver	1
Wheels	2
Jumper Wires	Several
LED (for alert)	1

Working

1. **Ultrasonic Sensing**: The ultrasonic sensor continuously measures the distance to obstacles in front of the car.
2. **Obstacle Detection**: If the distance is less than a defined 40 cm, the car stops and changes direction.
3. **Servo Scanning**: The servo motor rotates to scan surroundings, though in your current code it's static at 90° during an obstacle event.
4. **Movement Control**: Based on the obstacle, the car either:
    - Moves forward when path is clear.
    - Turns right if an obstacle is detected ahead.

CODE

```
#include <Servo.h>          // Include Servo library
Servo eby;                  // Create a Servo object
#define trigPin 6           // Ultrasonic trigger pin
#define echoPin 7           // Ultrasonic echo pin

// Motor driver pins
int motor1pin1 = 2;
int motor1pin2 = 3;
int motor2pin1 = 4;
int motor2pin2 = 5;
int duration, distance;

void setup() {
  Serial.begin(9600);
  eby.attach(8);          // Attach servo to pin 8
  eby.write(0);           // Initialize servo to 0 degrees

  // Ultrasonic sensor setup
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);

  // LED indicator setup
  pinMode(13, OUTPUT);

  // Motor pins setup
  pinMode(motor1pin1, OUTPUT);
  pinMode(motor1pin2, OUTPUT);
  pinMode(motor2pin1, OUTPUT);
  pinMode(motor2pin2, OUTPUT);
}
```

```
void loop () {
  // Trigger the ultrasonic sensor
  digitalWrite(trigPin, HIGH);
  _delay_ms(500);
  digitalWrite(trigPin, LOW);

  duration = pulseIn(echoPin, HIGH);  // Read echo time
  distance = duration * 0.034 / 2;    // Calculate distance in cm
  Serial.println(distance);

  if (distance < 40) {
    // Obstacle detected
    digitalWrite(13, HIGH);           // Turn on LED as indicator
    eby.write(90);                    // Turn servo to 90° (middle scan position), Along with ultrasonic sensor

    // Turn right
    digitalWrite(motor1pin1, HIGH);
    digitalWrite(motor1pin2, LOW);
    digitalWrite(motor2pin1, LOW);
    digitalWrite(motor2pin2, LOW);
    delay(3000);
  }
  else {
    // Clear path, move forward
    digitalWrite(13, LOW);            // Turn off LED
    eby.write(0);                     // Reset servo

    digitalWrite(motor1pin1, HIGH);
    digitalWrite(motor1pin2, LOW);
    digitalWrite(motor2pin1, HIGH);
    digitalWrite(motor2pin2, LOW);
  }
}
```

Relevance and Applications

This project introduces key concepts in **robotics, automation, and sensor integration**, which are highly relevant in:

- **Autonomous vehicle development**
- **Industrial automation**
- **Smart delivery robots**
- **Security patrolling systems**
- **Educational robotics platforms**