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//Hoang Nguyen
//This is the project that the robot can follow the black line, using the Shield Bot from Parallax
//The LDR and white LED are attached together, and put face towards the ground
//The LED will emit light and ground will reflect that light. Finally, LDR will measure that intensity of a light
//black color will absorb most of the light, returning low value readed by LDR; we save that value in the variable name "threshold"
//There will be two pairs of "sensor": left and right
//If left one is inside and the right one is outside the black line; we maked the bot turn left and vice versa...
//If both outside, it's mean it has reached the end of the line, or being put outside of black line, the bot will stop
//If both "sensor" are inside, go straightforward

#include <Servo.h>                          // Include servo library

Servo servoLeft;                            // Declare left and right servos
Servo servoRight;
const int photoLeft = A1;
const int photoRight = A2;
const int threshold  = 13;   //value for black line: 0-5

void setup()                                // Built-in initialization block
{
  pinMode(9, OUTPUT);  pinMode(8, OUTPUT);    //LED
  pinMode(photoLeft, INPUT);  pinMode(photoRight, INPUT);
  digitalWrite(8, HIGH);   //turn on both LEDs
  digitalWrite(9, HIGH);
  servoLeft.attach(13);                     // Attach left signal to pin 13
  servoRight.attach(12);                    // Attach right signal to pin 12
 Serial.begin(9600);
}

void loop()                                 // Main loop auto-repeats
{
  int valLeft = analogRead(photoLeft);
  int valRight = analogRead(photoRight);
  Serial.print("valLeft: ");
  Serial.print(valLeft);
  Serial.print("       ");
  Serial.print("valRight: ");
  Serial.println(valRight);
  if (valLeft > threshold && valRight < threshold ) //left is outside, right is inside
     maneuver(200, -200, 20);               // Right for 20 ms
  if (valRight > threshold && valLeft < threshold) //Right is outside, left is inside
     maneuver(-200, 200, 20);               // Left for 20 ms
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  if (valRight > threshold && valLeft > threshold)    //if both outside, stop
      maneuver(0, 0, 20);   //stop
  if (valRight < threshold && valLeft < threshold)    // if both inside, go straight forward
    maneuver(200,200,20);   //go straigh for 20ms*/
}



void maneuver(int speedLeft, int speedRight, int msTime)
{
  // speedLeft, speedRight ranges: Backward  Linear  Stop  Linear   Forward
  //                              -200      -100......0......100       200
  servoLeft.writeMicroseconds(1500 + speedLeft);   // Set left servo speed
  servoRight.writeMicroseconds(1500 - speedRight); // Set right servo speed
  if (msTime == -1)                               // if msTime = -1
  {
    servoLeft.detach();                            // Stop servo signals
    servoRight.detach();
  }
  delay(msTime);                                  // Delay for msTime
}
```