1 LIGHT SENSOR

1.1 Tasks:

1. Construct the light sensor according to video and scheme. Add also the light bulb which will help to lightning the area beneath the robot.

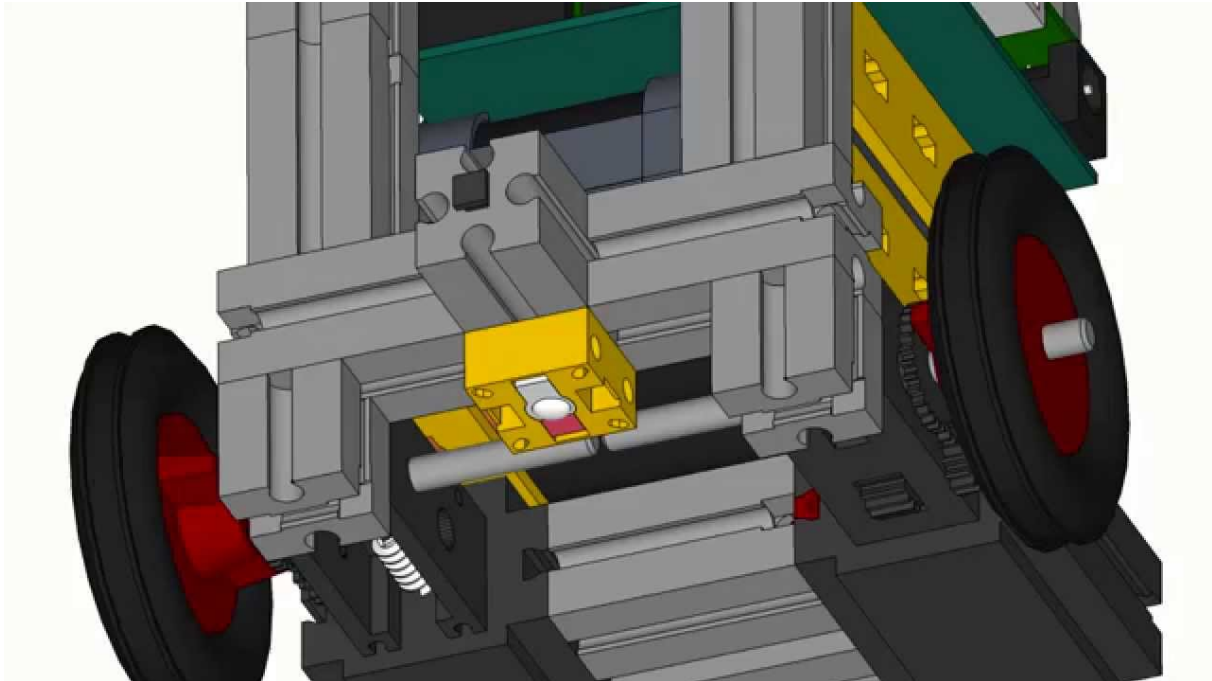**Figure 1:** Mounting a light sensor.

1. To test the light sensor and light bulb test this example code and check the reported serial data.

Program 1: Ligth Sensor.

```arduino
const int LIGHT_SENSOR_PIN = A0;

void setup()
{
  pinMode(LIGHT_SENSOR_PIN , INPUT);
  Serial.begin(9600);
}

void loop()
{
  int light_sensor_value = analogRead(LIGHT_SENSOR_PIN );
  Serial.println(light_sensor_value );
  delay(200);
}
```

2. Try different resistors (1k, 10k, 100k, 1M) and find out at which the sensitivity of the sensor is greatest.

Table 1: Testing the sensitivity of the light sensor.

Resistance	(black) Sensor value	(whithe) Sensor value	Sensor difference
1 kOhm			
10 kOhm			
100 kOhm			
1 MOhm			

1.2 Questions:

1. What is the value of the sensor when the robot is over white/black area?

   - ADC value on white:
   - ADC value on black:

2. Calculate the average between those two values.

   - Average is:

1.3 Summary:

1.3.1 Sensors

Sensors are electronic devices which convert physical quantity into electrical quantity (usually voltage). In simplest setup, sensor can be constructed as voltage divider with two resistors - R_1 and R_2. One of the resistors is resistor with fixed resistance value (eg. $R_1 = 10k\Omega$). The second one is a bit special and it's resistance depends on some physical quantity (e.g. light, temperature, humidity...). When combining those two resistors into such voltage divider the output of the voltage divider can be calculated as:

$$U_{Out} = \frac{R_1}{R_1 + R_2}U_0$$

1.4 Issues:

1.4.1 *Value of the sensor is very small*

If the value of the sensor is less than 100 the resistance of R_2 (connected to GND) is to low in comparismant to the resistance of R_1 (connected to +5V).

1.4.2 *Value of the sensor is large*

If the value of the sensor is grater than 900 the resistance of R_2 (connected to GND) is to hi in comparismant to the resistance of R_1 (connected to +5V).