1 ANALOG INPUT

In general, controllers are equipped with `Analog to Digital Converters` or short `ADC`. This internal devices converts voltage potencial into numeric value which can be further used by written program. This is also the case in Arduino UNO converter by the function `analogRead(pin_number)`. In this case the voltage range $[0.0\,V..+5.0\,V]$ is converted in to range of numbers $[0..1024]$.

1.1 Tasks:

1. Unmount robot's bumper and all connections to the switch.
2. Equip the robot with distance sensor according to video and scheme (see fig. 1).
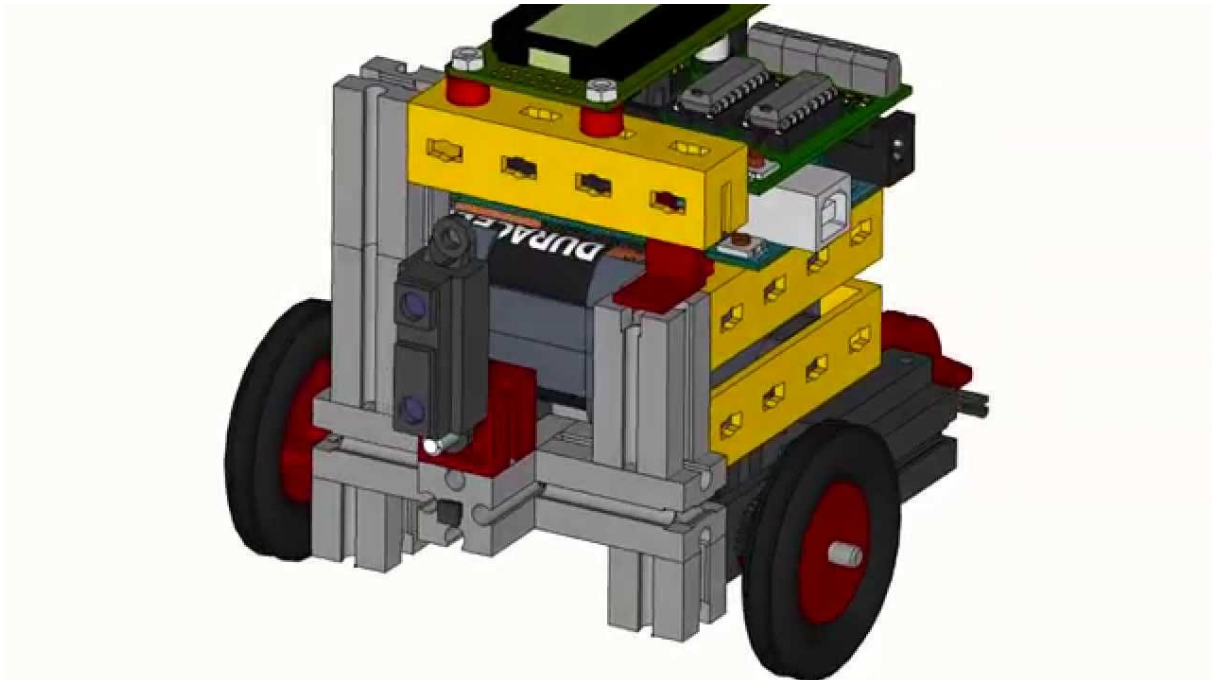

Figure 1: Mounting possition of analog distance sensor.

3. Try next prog. 1 and check the output of distance sensor in Serial monitor.

Program 1: Analog Input.

```
1   const int DIST_SEN_PIN = A0;
2   void setup()
3   {
4     pinMode(DIST_SEN_PIN, INPUT);
5    Serial.begin(9600);
6   }
7
8   void loop()
9   {
10    int adc_value = analogRead(DIST_SEN_PIN);
11   Serial.println(adc_value);
12   delay(1000);
13   }
```

4. Convert the `analog_sensor_value` into `input_voltage` and measure the input voltage potencial with volt-meter. The formula for conversion can be programmed as:

```
1   float input_voltage = 5.0/1024 * adc_value;
```

5. From the datasheet for the distance sensor try to code the function for measuring the distance in cm. According to documentation there is almost linear trend between output voltage and $distance^{-1}$. Thus we can get good result with eq. 1.

$$distance^{-1}[cm] = 0.045V_{out} \tag{1}$$

Next example can be your guide to code the function.

```
1   float getDistance_cm()
2   {
3     int adc_value = analogRead(DIST_SEN_PIN);
4     float input_voltage = 5.0/1024 * adc_value;
5     float distance = 1/(0.045 * input_voltage);
6     return distance;
7   }
```

1.2 Questions:

1. What kind of values do you getting from the reading of the distance sensor with the function `analogRead(A0)`?
2. Find the reasonable value where you should stop the robot.
3. Measure the voltage potencial of the sensor's output.

1.3 Summary:

1.3.1 Analog to digital converter - ADC

ADC is an electronic sistem that converts analog signal (voltage) to a digitalized values. In our particular case the range of an analog voltage from 0V to 5V is converted to range of numbers from 0 to 1024.

1.4 Issues:

1.4.1 <++>

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