6.5 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].

6.5.1 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).

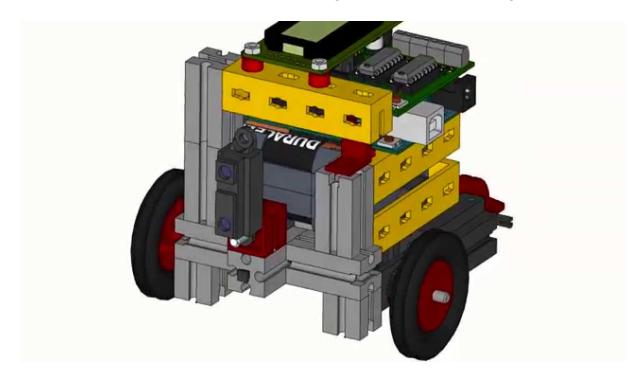


Figure 1: Mounting possition of analog distance sensor.

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

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Program 1: Analog Input.

```
1
       const int DIST_SEN_PIN = A0;
2
       void setup()
3
         pinMode(DIST_SEN_PIN, INPUT);
4
5
        Serial.begin(9600);
6
7
      void loop()
8
9
         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:

```
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.

```
float getDistance_cm()
{
   int adc_value = analogRead(DIST_SEN_PIN);
   float input_voltage = 5.0/1024 * adc_value;
   float distance = 1/(0.045 * input_voltage);
   return distance;
}
```

6.5.2 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.

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6.5.3 Summary:

6.5.3.1 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.

6.5.4 Issues:

6.5.4.1 <++> <++>

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