Telecommunication Programming Projects with Arduino - Exercises

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Link to our github repository!!.

Exercise 9

9a

The conversion formula from the 10-bit ADC which operates at a reference voltage of 5V, value to Voltage (V):

$$V = \texttt{analogRead}(A0) \cdot \frac{5}{1023}$$

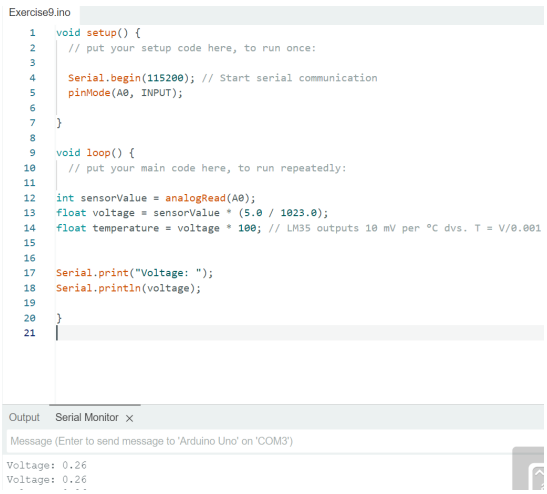
9b

We intialize variable `c`, and it is then redefined in the for loop and printed with every iteration (in total 4 iterations). `c = '0' + i * 2` is '0' (ASCII 48) and is then incremented two times the loop index. The resulting values have the ASCII codes, '0', '2', '4', '6'. These four values are printed used `Serial.print(c)`, along with `Serial.write(176)`, which writes the ASCII code 176 which is the degree symbol °.

9c

print() if able to format the output, while write() just prints the characters it is given.

9d-9e



(a) Screenshot of program

(b) Screenshot of program

Figure 1: Output of program

We should at most get a reading of 1V from the LM35 since it can read temperatures from 0C° to 100C° and the output of the sensor is 0.0mV + 10.0mV/C°. This corresponds to voltages from 0V to 1V. To covert the read voltage into degrees C°, we use a mapping $f : [0, 1] \to [0, 100]$ defined as

$$f(v) = 100v,$$

where v is the read voltage. This function satisfies that $f(0) = 0$ and $f(1) = 100$. We can use this to read values from the temperature sensor and output them to the serial monitor.
(The degree symbol '°' has ASCII index 176)

9f

[Video can be found in zip file]

Exercise 10

10a-10b

[Video can be found on github under DAY4]

Exercise 11

11a

I2C is communication where a single controller or a target device is sending data on the bus at a time, using only two wires: SDA (data line) and SCL (clock line).

11b

Instead of updating every iteration, we can instead choose to update only when the temperature (or whatever we need to display) changes/updates. If the values instead fluctuate a lot, an averaging might be necessary.

11c

Figure 2: Picture of LCD.

Exercise 12

To view the video of the game play through, a Doxygen and other fun stuff, go through our the github link, under the Exercise 12 folder DAY4 folder.