

IUPUI ꝥ CSCI 43300 ꝥ Fall 2021

Homework 1 (Due: 9/18/2021)

Note: All homework assignments require typed solution, and need to be submitted online via Canvas.

1. (60 points) Search online and study at least three different types of sensors and actuators (including at least one type of actuator) that can be used with IoT nodes, such as Arduino and R Pi platforms. (If you plan to choose to use Arduino in your projects, you should include MCP9700 analog temperature sensor in your study, while if you plan to choose R Pi platform, you should include DS18B20 digital temperature sensor in your study.) Write a summary of your studied sensors and actuators, such as their functions, types (analog or digital, etc.), accuracy, the power voltage to connect, etc. from their data sheets.
2. (20 points) Consider to connect a GPIO pin to a LED of yellow color to light the LED up. The voltage of the GPIO pin is 5V when the output is in high state, and the maximum current you can draw from the GPIO pin is 20mA. Please show your LED interface circuit. Do you need to use any resistor in your connection? If yes, compute the value of resistor.
3. (20 points) Given an analog sensor whose output voltage range is [0V, 3V]. If the required sampling accuracy is, at least, 2mV, then which ADC you should choose: 8 bits, 10 bits or 12 bits? Please justify your solution.