

Lab 1: Introduction to Arduino

In this lab, the main goals are

1. To get familiar with the Arduino IDE
2. To get familiar with the embedded system development environment
3. To learn about GPIO operations
4. To get familiar with serial communication between target and host

Important knowledge

Constants: INPUT, OUTPUT, INPUT_PULLUP, HIGH, LOW, LED_BUILTIN

Functions: pinMode, digitalWrite(), digitalRead(), delay(), delayMicroseconds(), analogWrite()

Please make sure you create one sketch for each exercise and copy the code to the report! Do not submit your code directly, the submission only allows doc, docx or pdf.

Exercises

1. **Easy (5 min)**: Try the example code "Blink."
2. **Easy (5 min)**: Try the example code "AnalogReadSerial."
3. **Easy (5 min)**: Create a new sketch file and copy the blink code to your sketch file, update led pin to use the LED_BUILTIN constant.
4. **Easy (5 min)**: Change the blink interval from 1000 ms to 100ms; then change the interval from 100ms to 4000ms. Please add comments to show the first change.
5. **Medium (15 min)**: Write a loop to update the blink interval at from 500ms to 4000ms, with a step-up value of 500ms. At each interval, performs the blink activity for 10 times.
6. **Medium (15 min)**: Report the iterations and blink interval to serial port and capture the received data in your serial monitor.
7. **Medium (15 min)**: Find a way to light the LED at varying brightnesses, you can use existing functions or develop your own function to do it.
8. **Difficult (30+ min)**: Can you read user's input to 1) turn on/off and 2) toggle the LED? Try your best to develop such a sketch (program). "Toggle" means if the LED is on, you turn it off, if the LED is off, you turn it on.
9. **Difficult (30+ min)**: Can you read user's input to blink the LED for a certain times and keep it on after the blink? For example, if user's input is 10, the LED should blink ten times and then keep on.
10. **Difficult (30+ min)**: This is an optional exercise. Please finish this exercise when you have time. Can you read user's input to change the speed of fading the LED's brightness? Please use numbers to indicate the speed.

What to submit

1. Your lab report, please use the template in canvas, and submit in word or pdf.
2. Please do follow the lab report template and don't miss any required content.
3. Please be sure to copy all your code to the report and follow the requirement.