ECEG 201 – Homework 10
Due at noon on 2020-04-06

For the rest of the semester we will assume that you are working as a member of a project team. The team is trying to create an Internet of Things device built around a Feather M0 Express and an ESP-01 module. The project is at an early stage of development, trying to understand how the Feather and the ESP-01 can work together, and identify any potential problems.

You **may not** collaborate with another student or discuss this assigment with another student. If you have questions about what is expected, address them to the instructor. The writing you submit for this assignment must be entirely your own original work.

If (and only if) your major is Electrical Engineering then your role on the design team is to develop, verify, and document the power systems for the project. At the moment, you need to make sure that the Feather can be used to supply power to the ESP-01. This implies that you understand the capabilities of the Feather to provide power as well as the power requirements of the ESP-01 module.

If (and only if) your major is Computer Engineering then your role on the design team is to develop, verify, and document the software interface between the Feather and the ESP-01. At the moment, you need to figure out how to respond to errors that may occur when the Feather is communicating with the ESP-01 using AT commands. You will need a way to indicate error conditions to the user of your device even if an internet connection can not be established, perhaps by blinking LEDs on the Feather. First, you need to understand **how** the ESP-01 might react to various possible error conditions.

You should begin by researching the characteristics and behavior of the devices you have to work with, the Feather and the ESP-01. For the Feather, a good place to start is the Adafruit Feather M0 Express Overview. The heart of the ESP-01 module is the ESP8266 integrated circuit, made by Expressif Systems. For now we will assume that the power requirements for the ESP-01 module are essentially the same as those of the ESP8266 alone.

You are not expected to conduct any experiments or write any code for this report. You should try to get a good understanding of how the Feather and the ESP-01 work and think about how they can work together.

You have one week to deliver a report to your project's Lead Engineer (that's me, the instructor). This will be an informal internal communication, so the emphasis will be on content rather than format and style. You could write your report using a simple text editor, such as *vi* or *emacs* under Linux or *wordpad* under Windows. If you use a word processor then you should resist the urge to do something fancy. You don't need to worry about italics, centering, subscripts, or other formatting issues that we would want in a formal report. A typical report would be one or two pages.

However, one element of formality that is important is that you provide references for the sources of your data. In the narrative part of your report you might say something like "...the ESP8266 datasheet says..." and then at the end of your report give a URL for the datasheet.

If (and only if) your major is Electrical Engineering then you should talk about the peak and average power requirements for the ESP module and about the characteristics of the $3.3\,\text{V}$ supply available from the Feather. Talk about whether you think the team can use these two modules together and if there are any special considerations that will need to be addressed during the design phase.

If (and only if) your major is Computer Engineering then you should talk about a few scenarios where the Feather itself continues to function but it is unable to publish data to the cloud, then explain how the Feather might be able to detect that there is a problem. Finally, suggest how the Feather could communicate its status to someone standing near the IoT device.