

ECEG 201 – FINAL PROJECT

Due by midnight EDT on 2020-05-01

For the final project/report in this class you will rewrite the test procedure you wrote for Homework 11.

In addition to the guidance provided in this document, you should revisit the guidance and information provided in:

- the original Homework 11 handout,
- the document named “ECEG 201_Homework11s.pdf” that I emailed to you on 2020-04-06,
- my email of 2020-04-10 regarding the Homework 11 report format, and
- for Computer Engineers, my email of 2020-04-06 with IoT code for the Feather.

1. General guidance

- (a) You must provide a diagram (not a photograph or Fritzing cartoon) showing how everything (including the Feather and AD2) should be connected.
- (b) Your instructions must be **explicit** and **specific**. Don't expect the technician to make any decisions or choices about how to run the test. The technician doesn't know anything about how your code works and doesn't know the electrical characteristics of the Feather.
You can assume that the technician knows how to connect modules and components using a breadboard, if given a good diagram and clear description of the marked names of the signals/wires to connect. Look at your Feather and AD2 to see how they are actually marked.
- (c) You must provide a reference to the relevant tutorial(s) or instructions for using the AD2 as you need to use it for your test.
- (d) Your instructions should be very specific about pass/fail. "The Feather passes this test if... The Feather fails this test if...."
- (e) Your step-by-step procedure should not contain any words like "approximately", "appropriate", "around", "about", "close to", "near". Your procedure should contain words like "less than", "not less than", "more than", and "not more than".
- (f) The step-by-step procedure must not require that the technician refer to the background or introduction sections. All of the information needed for the test must be part of the step-by-step procedure.
- (g) During the step-by-step procedure, do not discuss **why** you are doing something or the **meaning** of a particular test result except to say whether the Feather passes the test or fails the test. These sort of discussions and explanations should be in the background section of your document.
- (h) Before turning in your report you should try going through the step-by-step procedure yourself. Make sure that the list of steps is complete and in the correct order.

2. Guidance for electrical engineers

- (a) Remember that you are testing to make sure that the Feather can supply **no less than** the maximum current required by the ESP-01 while maintaining a supply voltage that is **no less than** the minimum voltage required by the ESP-01. You need to specify resistor values such that when the voltage across the resistor is equal to the minimum acceptable supply voltage for the ESP-01 then the current through the resistor will be **not less than** the desired test current
- (b) Since you can not get exact resistor values, you must specify an acceptable **range** of values. At the minimum supply voltage it must be true that the current is **not less than** the desired test current for **any** resistance value in that range.

- (c) You may assume that the technician knows how to measure resistors and has a good assortment of resistors. You specify a resistance **range of values** and assume that the technician will find a single resistor in that range.
- (d) In the background section you should explain your thought process and show all of your work for the calculations of the resistor values to be used in the test. Explain how you satisfy all of the requirements discussed above for selecting the resistor value(s).
- (e) In the background section of the procedure you should be very explicit about where you found the power supply current numbers for the ESP-01 or ESP8266. Specify where (document or web site) you found each number. If the source has numbered sections, tables, or figures then provide the number of the section, table, or figure where we can find that number.
- (f) When running the test for **average** current you should probably wait a minute or so to allow the Feather to come to thermal equilibrium. When running the test for the **maximum** transient current you can make the test as fast as you can read the instruments.

3. Guidance for computer engineers

- (a) Remember that you are testing the (hopefully) final version of your Feather code. You **can not** change the code during the test or load any special test code. The only thing you can do is press the reset button on the Feather to restart it.
- (b) You must use the AD2 to provide simulated responses when the Feather issues an AT command. You can't use a real ESP-01 because you need to verify that the Feather detects all possible error conditions. The ESP-01 module will not be connected to the Feather or to the AD2 during this test.
- (c) Your background section must include a table that provides the response that you expect from the ESP-01 module for each of the tested AT messages when that message was executed successfully by the ESP-01 module.
- (d) Your background section must clearly and explicitly describe how the Feather should behave if it does not receive a response after sending an AT command and how the Feather should behave if it receives an unexpected or incorrect response.

Your step-by-step procedure must then verify that the Feather behaves correctly when it receives a response indicating success, when it receives an invalid/error response, and when it receives no response within a specified time.

- (e) You must explicitly and separately test each of the three specified AT commands. You can not assume that if the Feather detects a problem with one AT command that it will also detect problems with any other AT command. The procedure must be specific about the steps for testing each of these commands.

So, for example, if you want to test the AT+CIPMUX command you must somehow get to the point where the Feather sends "AT+CIPMUX=1" and you observe that message on the AD2. Only then can you try issuing a response that means success or failure. Note that you will need to reset the Feather and use the AD2 to provide "success" messages to the Feather until the Feather sends the specific AT command that you want to test.

- (f) Be very specific about which LED the technician should observe, if any, and exactly how the LED will behave. There multiple LEDs on the Feather and one or more LEDs in the AD2. Remember that you are running production code so if the Feather doesn't detect an error it just keeps running the program.
- (g) Sometimes the manufacturer changes the command/response messages for the AT commands on the ESP8266. Be sure to reference the specific document from the manufacturer that you used to determine what the command/response messages should be.

You **may not** collaborate with another student or discuss this assignment 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.

Your report **must** be delivered in the form of a pdf file. **Do not** send a word processor document (docx or rtf). The pdf file should be emailed to the instructor as an attachment.

If you are not sure what you should do, ask questions!