Assignment #3

Due: 11:59 PM Friday May 3, 2019

Instructions:

1. You must do this assignment in teams of 2 students. No other team size is allowed. There are 20 students in the class and so this should result in 10 teams. You'd be submitting the pdf on Gradescope and the videos and zip files in the video submission drive under your name folder:
   a. Your written answers in a file assignment.pdf (please start answers to each problem on a fresh page, and make sure to write names of both students in the submitted pdf at the top of the first page)
   b. Your code in a file assignment3.zip which should expand to a folder named assignment3 and inside which you would have a bunch of zip files named properly for problem 1 and problem 2 corresponding to the code for various problems as described below, as well as file team.txt listing full name of each team member, one per line.
2. It is important that one and only one person per team submits.

Problem 1: Synchronized Hexiwears

Implement a system consisting of two Hexiwear units (referred to as H1 and H2) and an internet-connected RPiZW unit (referred to as R), functioning as follows:

1. H1 and H2 should each display a string corresponding to the local time of day in resolution of 0.1s expressed in the format "HH:MM:SS.S".
2. In your code configure PTA10/PWM as a digital output on both H1 and H2, and at every one second boundary of the displayed time set the pin to logic 0 if the seconds value (after transition) is even and to logic 1 if the seconds value (after transition) is odd.

Your goal is accuracy, i.e. both H1 and H2 should display time that is near-identical to each other and to the time on RPiZW, and the pin PTA10/PWM signals should be near identical.

Your code for Hexiwears should be a .bin file which will be loaded onto both H1 and H2. Please ensure that the code is independent of the specific Hexiwear devices used.

The code on RPiZW should be in the form of a folder called assignment3 containing a executable files "run", a file "mac.txt", and any other files. We will edit mac.txt to have two lines, each line listing the MAC address of a Hexiwear unit. Then we will execute "run", which should take care of any configuration. You can only assume that the RPiZW has the standard course image.

Put your answers in assignment3.pdf starting from a fresh page. In the write-up describe your strategy.

Problem 2: From Sensors to the Cloud

Implement a system consisting of a Hexiwear and an internet-connected RPiZW to publish on the free HiveMQ MQTT broker (http://www.mqtt-dashboard.com) events corresponding to button presses on the Hexiwear unit. Specifically, everytime any button is pressed, you should publish a message "event b" where b is string up/down/left/right corresponding to the button on to the topic ecem119/2019s/hexiwear/x where x should be the MAC address of the Hexiwear. You should also provide a client program that monitors all topics of the form "ecem119/2019s/hexiwear/x" and prints "event b @ x" where b and x.

Your code for Hexiwears should be a .bin file which will be loaded onto a Hexiwear. Please ensure that the code is independent of the specific Hexiwear device used.

The code on RPiZW should be in the form of a folder called assignment3 containing two executable files "publisher" and "client", and, a file "mac.txt", and any other files. We will edit mac.txt to have one line listing the MAC address of the Hexiwear unit. Then we will execute "publisher" in one window, and "client" in another. You can only assume that the RPiZW has the standard course image.

Your goal should be to minimize latency from button press to publication.

You would find http://www.steves-internet-guide.com useful for code examples relating to MQTT.

What to submit?

Put your answers in assignment3.pdf starting from a fresh page. In the write-up describe your strategy.