

ECE 411 Industry Design Processes: Assignment #5

Due on Monday, November 17th, 2014

Faust 2:00pm

Team: To8

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<https://github.com/DroningOn/ECE411>

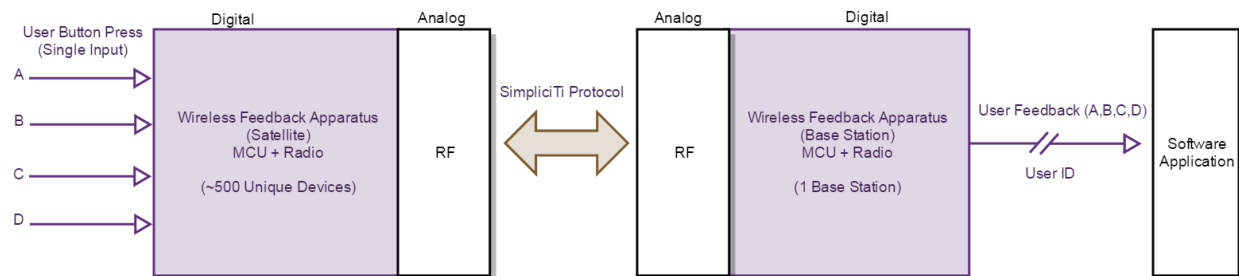
Homework #5 Due Monday November 17th, 2014

Please submit problems into the team wiki homework #5 folder on GitHub as well as a paper copy in class.

Problem 1:

Draw a level-0 block diagram of your term practicum project. Draw a level-1 block diagram of your term project. Draw a level-0 block diagram of each sub-component in your level-1 block diagram. Be sure to describe all inputs, outputs, and functionality.

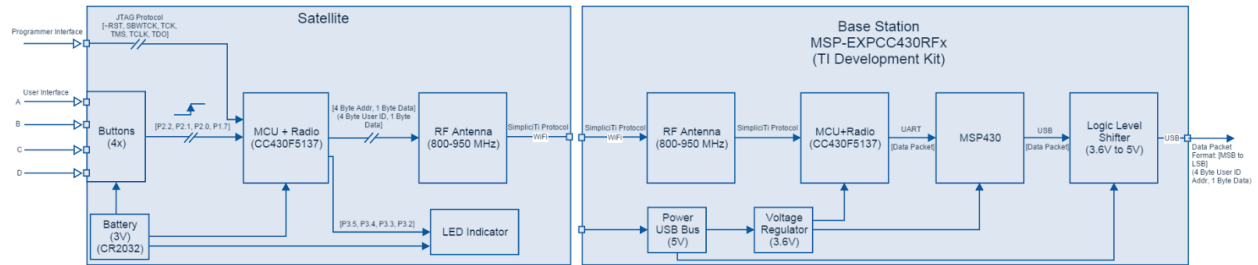
Wireless Feedback Apparatus Level 0



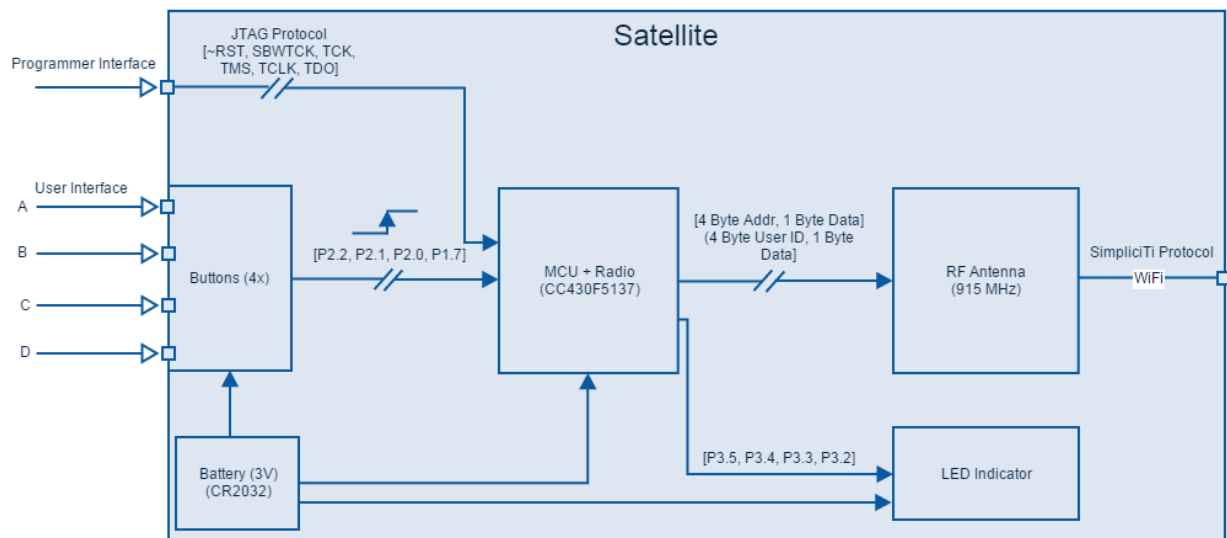
Module	Wireless Feedback Apparatus
Inputs	Touch Buttons (4x)
Outputs	-User ID (4 Byte) -User button choice (1 Byte)
Functionality	Takes 1 of 4 user inputs and wirelessly transmits the selected input to a central hub where a results are serialized and handed off to software.

¹ *Hint: The level of detail of the description (particularly the inputs and outputs) should enable someone to do the detailed design of a module that interfaces to the module being described. Imagine you're that person. Do you have enough information about the inputs to generate them? Is the input an analog signal? Digital? How many bits? What is the representation/encoding?*

Wireless Feedback Apparatus Level I



Level I Breakdown



Module	Buttons
Inputs	-User touch on conductive pad -Battery Power
Outputs	[P2.2, P2.1, P2.0, P1.7]
Functionality	User touches desired input

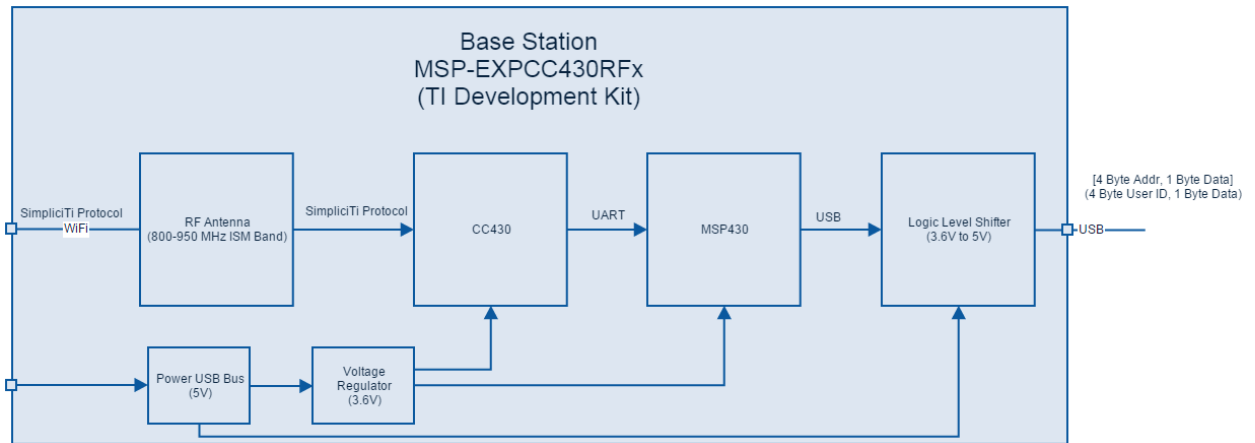
Module	Battery (3V) (CR2032)
Inputs	-N/A
Outputs	3V
Functionality	Battery supplies power to Buttons (4x), CC430 and the LED Indicator

Module	CC430F5137
Inputs	-JTAG, 6-wire programming interface -[P2.2, P2.1, P2.0, P1.7] -CR2032 Battery (3V nominal)
Outputs	-Analog encoded UserID (using SimpliciTi Protocol) -Analog encoded User Input (using SimpliciTi Protocol) -LED Indicator
Functionality	TI MCU + Radio SOC

Module	RF Antenna
Inputs	-User Input (1 Byte) -User ID (4 Byte)
Outputs	-WiFi (SimpliciTi Protocol)
Functionality	RF Antenna transmits out 5 Byte packet with 4 Byte for address and 1 Byte for Data in the unlicensed 800-950 MHz ISM band.

Module	LED Indicator
Inputs	-[P3.5, P3.4, P3.3, P3.2] -CR2032 battery (3V nominal)
Outputs	-LED Light
Functionality	LED used to indicate to user which choice has been read by the local MCU as well as provide confirmation that Data has been sent/received

Base Station Level 1



Module	RF Antenna
Inputs	SimpliciTi Protocol
Outputs	SimpliciTi Protocol
Functionality	RF Antenna receives the packet sent from the Satellite and sends the data to the CC430

Module	CC430
Inputs	SimpliciTi Protocol
Outputs	UART
Functionality	Capture all radio transmissions from each satellite and serialize the data using UART comm protocol

Module	MSP 430
Inputs	Serial UART data containing 4 Bytes of UserID and 1 Byte of choice data per satellite.
Outputs	USB Serial data
Functionality	Converts the UART into USB data for portability and connectivity with external control systems

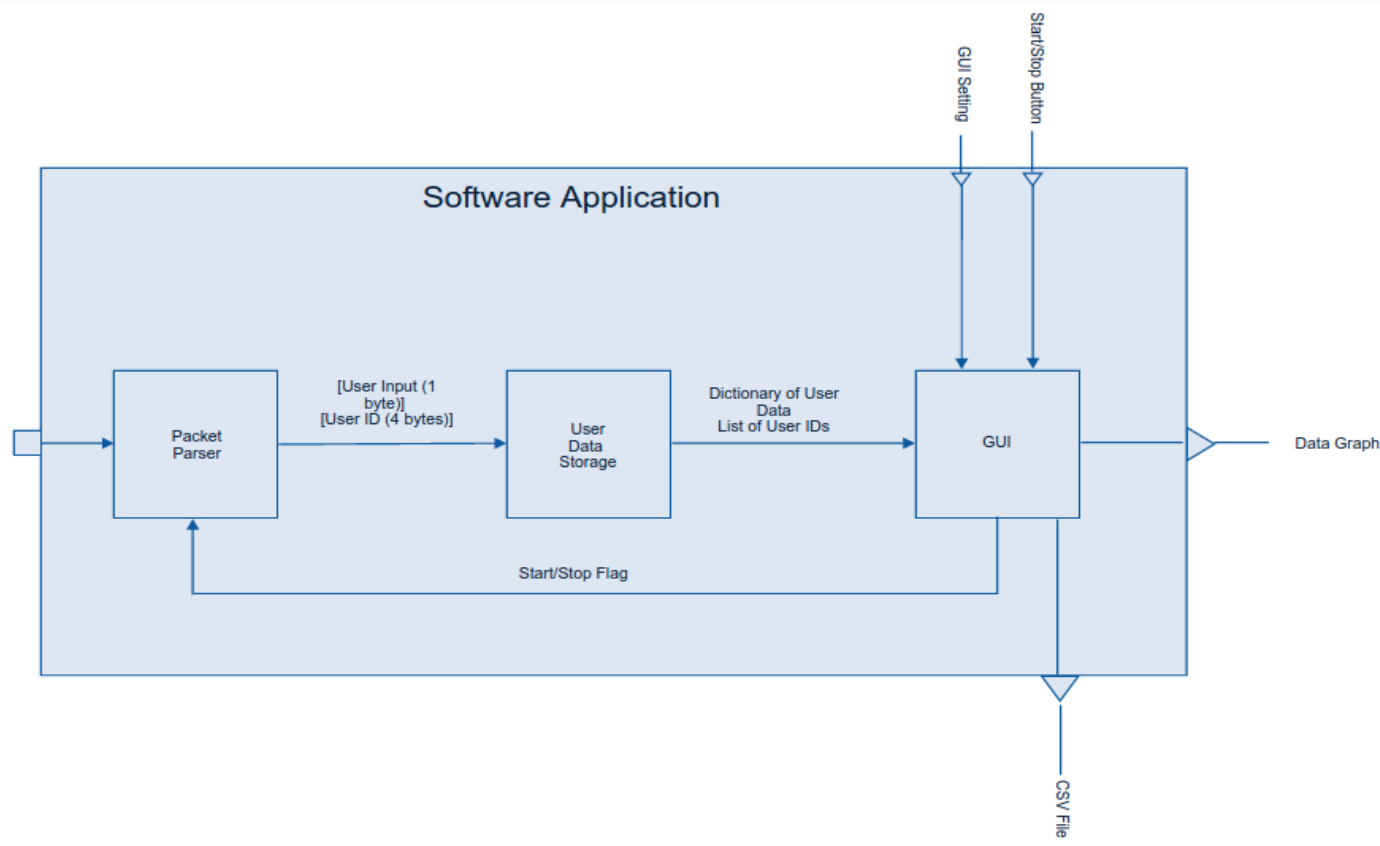
Module	Logic Level Shifter (TUSB3410)
Inputs	-User Input (1 Byte) @ 3.6V Logic Level -User ID (4 Byte) @ 3.6V Logic Level

Outputs	-User Input (1 Byte) @ 5V Logic Level -User ID (4 Byte) @ 5V Logic Level
Functionality	Shifts the Logic Level from 3.6V to 5V for USB.

Module	Power USB Bus
Inputs	USB 5V
Outputs	USB 5V
Functionality	Receives Power from Computer

Module	Voltage Regulator
Inputs	USB 5V
Outputs	3.6V
Functionality	Regulates the 5V input from the USB at 3.6V

Software Application



Module	Packet Parser (Python)
Inputs	-User Input and User ID packet (5 bytes) [4 Byte, 1 Byte] -Start/Stop Command
Outputs	-User Input (1 byte) -User ID (4 bytes)
Functionality	Takes incoming serial data packets from the base station and puts them in separate packets to be used by the GUI

Module	User Data Storage (Python)
Inputs	-User Input (1 byte) -User ID (4 bytes)
Outputs	-Dictionary of User Data -List of User IDs
Functionality	Takes the separate User Input and User ID packets and puts them into a dictionary with the ID as the key and Input as the data, and also puts the User IDs in a list for later accessing the dictionary

Module	GUI (Python)
Inputs	-Dictionary of User Data -List of User IDs -GUI Settings -Start/Stop Button
Outputs	-Data Graph -Start/Stop Command
Functionality	Accesses the dictionary of user data and displays it in a graph.

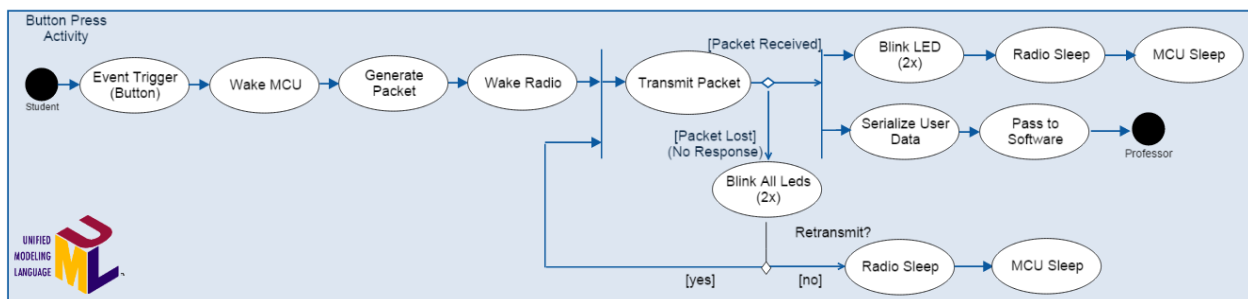
Problem 2:

Describe your system or one of its major subsystems using two different views from among the six UML views described in class and in the textbook. The objective is to use UML to describe that functionality of the system or subsystem. Be sure to clearly indicate what project you're using.

Project: Wireless Feedback Apparatus

View 1: Activity View

Process: Button Press



View 2: Interaction View

Process: Button Press

