EE/CprE/SE 492 – Bi-Weeky Status Report

09/27/2021 – 10/08/2021

Group sddec21-proj07

Beaglebone Green Gateway IoT Hub

Client: Texas Instruments

Faculty Advisor: Nathan Neihart

Members:

Parker Larsen – Hardware design, Communications Lead

Taylor Weil – Software design, Meetings Scribe

Sean Griffen – Software design, Documentations Lead

Sterling Hulling – Hardware design, Meetings Scribe

Period Summary:

Hardware:

Hardware is currently waiting for our first revision of the Zigbee cape to come back from JLCPCB. In the meantime we are continuing to develop a relay board and a switch board to communicate with the ZigBee cape. The first revision of both boards are complete and we are working on perfecting the designs. The documentation for the cape has also been completed.

Another feature that has been discussed during this period was the ability to run the bootloader over UART or SPI. In order for this to be possible, a few pins need to be moved over. The board that is currently being fabricated can be modified to make these changes using additional wires but a second revision will be needed to make these changes permanent.

Lastly, it has been decided that the process to combine the ZigBee cape with daughter boards will be easier and make the design more modular. Hardware has also been looking into a few designs to make this easier.

Software:

Software continued working through TI's example projects for ZStack zigbee networking. Basic UART communication is working and is ready for use in testing the completed hardware when it gets here, and work has been started on extending that functionality to JSON strings. Also, work has been started researching and implementing use of the cc1352's UART bootloader as a way to flash the cape's microchip with the Beaglebone alongside using TI's Launchpad with Uniflash.

Understanding of the Zigbee interface is continuing to progress but showing issues at the same time. Connecting two devices on demo applications are showing more problems than hoped for. The plan moving forward is to figure out if the issue is a device, software, or environment issue.

Work has started for putting together a final web application for demonstration at the end of the project. This has not been a focus thus far and will be worked on more once communication is more stable.

Pending Issues:

Hardware:

Hardware does not have any pending issues but this is likely to change once the first revision of the ZigBee Cape comes in.

Software:

String UART communication is not fully working between the cc1352 and the Beaglebone. This is integral to the project and is a first priority. Second, as a helpful but not necessary tool, flashing the CC1352 rom with a binary from the Beaglebone using it's UART bootloader would be a helpful feature to have, but is also not currently working.

When connecting to a zigbee network, it is unknown why the device enters a state of "unsecured join". There does not seem to be any issues with security keys in the software, this issue will continue to be looked into in the future.

Goals:

Hardware:

The Goal is to assemble the first revision of the Cape and complete the testing process and find out any modifications that need to be made to this board. In addition to testing and assembling the cape, it will also be a priority to send out the other two boards to be fabricated to make sure that there is enough time to assemble and test them before the end of the semester.

Software:

Goal is to get UART and Zigbee communication standards working between the Beaglebone, the cape, and the data devices. Specifically with UART, a goal is to have an example project working to test the developed cape design and validate that it works as intended. A stretch goal for UART communication is to be able to flash the CC1352 over UART using the chip's bootloader.

The standalone zigbee goal is to send a string message over the zigbee network and display that information on the UI of the receiving device. This should not be far behind the current state once the demo applications are able to reliably communicate properly.

Member Contributions:

Name	Contributions	Period Hours	Cumulative Hours (F21)
Parker Larsen	- Attended required meetings - Ordered the first revision of the cape and completed the supporting documentation - Completed the switch board schematic and started working on the BOM - Discussed daughterboard design and architecture with software	14	45
Taylor Weil	- Attended Meetings - Worked through TI example projects for ZStack development on the CC1552 platform - Started demo application	15	25
Sean Griffen	- Attended required meetings - Established UART communication link between Beaglebone and CC1352 - Began to implement string-based communication between Beaglebone and CC13552 - Discussed daughterboard design and architecture with hardware	5	20
Sterling Hulling	- Attended required meetings - Completed first pass of relay daughterboard schematic	4	13

Advisor Meeting Summary

Discussed how cape development was doing and about the switch in PCB fabricators. Discussed schedules for the semester, and ongoing progress with zigbee networking, UART communication, bootloader flashing functionality, and daughterboard design.