**WNR (Wireless Neural Recorder)**

Rice University

Weekly Progress Report 11

11/13/2015 - 11/24/2015

**Agenda for meetings**

Undergraduate Meeting:

1. Discuss new wireless subsystem
2. Discuss differential signalling for analog front end Intan Chip

Mentor Meeting:

1. Analog front-end updates with Intan Chip and LVDS converter.
2. Issues with MSP430F5438A in wireless communications.
3. Compression Updates
4. Next steps

**Activities this week**

1. Purchased parts for the new wireless subsystem, which will be based off of Bluetooth Classic
   1. TI CC2564 Bluetooth module + MSP430F5438 MCU
2. Both the new components and the Intan Chip + LVDS converter came in after purchase, so development began

**Problems encountered**

1. Reading data from Intan Chip is difficult; SPI communication with the device is nontrivial.
   1. So far, only zeroes are being read from the chip
   2. Could be related to the LVDS converter; unsure whether or not the LVDS was correctly soldered, so we soldered multiple boards
2. TI CC2564 + TI MSP430F5438 cannot be programmed at the moment
   1. The stack provided by TI seems to not compile, and cannot be loaded onto the MSP using the free CCS IDE.

**Time devoted to project this week**

|  |  |  |
| --- | --- | --- |
| **Name** | **Tasks Accomplished** | **Hours Spent** |
| Stephen Xia | * TI MSP430F5438 + TI CC2564 Bluetooth development | 10 |
| Tingkai Liu | * Intan RHD2000 series analog front-end development | 10 |
| Xin Huang | * Exploration into alternative wireless protocols | 3 |
| Yuan Gao | * Huffman Encoding/Compression test and effectiveness characterization | 5 |
|  | **Team Total** | 28 |

**Meetings Minutes**

Undergraduate Meeting – 11/16/2015, 6:30 - 7:30 PM

Attendees: Stephen Xia, Tingkai Liu, Xin Huang, Yuan Gao

Location: Lovett Commons

Completed objectives:

1. Wireless Transmission: Will use Bluetooth Classic for now
   1. Cannot continue to use CC2650 because of the two boards we bought, one has stopped working
   2. Decide to purchase TI CC2654 Bluetooth module, but it does not come with MCU
   3. Decide to purchase TI MSP430F5438 to operate the CC2654
      1. Decide between F5438 and F5529
         1. F5438 has smaller bare die (7 x 7 mm vs 12 x 12 mm), so we decide on the F5438
2. Analog Front-End
   1. Will buy a TI LVDS chip suggested by Reid Harrison: TI SN65LVDT41QPWREP
3. Reaffirm tasks:
   1. Analog Front-end: Tingkai Liu
   2. Wireless Transmission: Xin Huang + Stephen Xia
   3. Compression and terminal application: Yuan Gao

Mentor Meeting – 11/24/2015, 12:30PM - 1:30 PM

Attendees: Stephen Xia, Tingkai Liu, Xin Huang, Yuan Gao, Gary Woods, Hamed Rahmani

Location: OEDK 101

Completed objectives:

1. Analog Front-End:
   1. Cannot read data from the Intan Chip: returns 0s
      1. At first, the application was hanging, but that turned out to be a SPI problem
   2. Powering the LVDS chip from the board
      1. Will look into possibly a power issue, where the voltage is getting dividing between all the components.
2. Wireless Transmission
   1. The environment has not been successfully set up. There is a compilation issue, where we cannot load the code onto the MSP430 because the compiled output file is larger than 16 KB; will look into getting rid of this limit by using a full version of CCS or downgrading to CCS 5.0 rather than using the latest CCS.
3. Compression:
   1. Huffman Encoding seems to compress by a little more than 40%, which could reduce our required data rate from 2 Mb/s to 1 Mb/s. However, this is still not enough to warrant the use of BLE.
   2. Will continue to test some more.

**Expenditures**

* 1 x Texas Instruments SN65LVDT41QPWREP: $6.95
* 4 x BOB-00495 (LVDS breakout board): 4 x $3.95
* 3 x 595-CC2564MODNEM: 3 x $19.99
* 3 x 595-MSP-EXP430F5438: 3 x $175
* Total: **$607.72**

**Action items list**

|  |  |  |  |
| --- | --- | --- | --- |
| **Action item** | **Owner** | **Due date** | **Status** |
| Research Wi-Fi Protocol and Components | Xin Huang | 12/11/2015 | 100% |
| Research compression algorithms | Yuan Gao | 12/11/2015 | 70% |
| TI MSP430F5438 + TI CC2564 Bluetooth Development | Stephen Xia | 12/11/2015 | 5% |
| Intan RHD2000 series development | Tingkai liu | 12/11/2015 | 10% |

**Additional Comments/Questions for Mentors**

* The meeting, originally scheduled for November 19, was pushed back to Tuesday, November 24 because the undergraduate team members did not have much of an update; additionally, Professor Woods had a conflict with the original time anyways.