



31 Oct 16

MEMORANDUM FOR RECORD

FROM: CHRISTOPHER ASKINGS  
FORREST GATES  
NATHAN RUPRECHT

SUBJECT: LiMoST-Net Progress - Week 5

1. The purpose of this memorandum is to report our progress in accordance with our predetermined schedule.
2. The specific purpose of this memorandum is to review the objectives of week 5 and what we have accomplished.
3. Over the course of the week, we went off on our own time to accomplish what we could for the projected goals, then came back together to consolidate our efforts. This utilized our free time since our schedules usually conflict. We worked based off of the Week 5 Schedule:

| <i>Week</i> | <i>Date</i> | <i>Projected Goals</i>                                                | <i>Comments</i>                                                                                                                                        |
|-------------|-------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5           | 10/23/16    | Test Components<br><br>Code:<br>Code familiarization<br>Template code | Small scale component construction.<br>Verify component specs in the real world. Become familiar with coding on the microcontroller and microcomputer. |

4. There are 2 options being pursued: making our own development kit from scratch, or ordering a dev kit and learning from it. Both would have its pros and cons, but the main point is to find which option that will bear the most fruit for learning VLC.
  - a. For ordering a dev kit and learning VLC using it, we recommend ordering Dev Kit 1 (from last week's report) from India that would cost \$83.65 and uses Arduino. We have not met with Nick about using department funds to order this dev kit.

b. Building a dev kit from scratch, we already took steps and ordered parts to make our initial circuit.

i. SFH 229 - Photodiode that has a more accurate sensing of the RGB wavelengths. Photodiodes were recommended over photoresistors or phototransistors since they are more likely to help us sense RGB and not just all ambient light. A number of photodiodes were looked at, the criteria was the best reception of the individual red, green, and blue wavelengths. Most photodiodes seemed to be made for IR but this was the best option with blue being the lowest (~20% of original signal strength).

ii. MSP430FR2311 - a variant of the MSP430 that has a built in transimpedance amplifier (TIA). Photodiodes output current. We need voltage fed into the ADC for signal processing. TIA takes current input, converts to voltage, and amplifies so we have a range of voltage to work with. We have TI launch pads that will work for TX, this MSP430 will be good for RX because of the TIA.

iii. R50RGB - 4 prong RGB LED that will transmit our data. It has a prong for each color and a common. Its power efficient but has a different voltage range between red vs blue/green.

iv. Chris also got a Raspberry Pi 3 and is looking at other parts we could use as a final product. The above parts are cheap and easy to get which will serve as an early prototype.

5. Parts were ordered over the weekend and are scheduled to be in by 1 November. Code Composer Studio (CCS) will be the primary program to code with and we have used it in the past (although not directly with the MSP430 family). We did not do code familiarization during Week 5.

6. If you have any questions, comments, or concerns, please feel free to contact us at:

- Chris Askings: (817) 367 – 8273 or via email at [chrisaskings@gmail.com](mailto:chrisaskings@gmail.com)
- Forrest Gates: (979) 733 – 2454 or via email at [forrestgates2016@gmail.com](mailto:forrestgates2016@gmail.com)
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1 Attachment:  
Documentation

Documentation:

All materials can be found on the shared Google drive at:

<https://drive.google.com/drive/folders/0By7y3FFBUvR4SVNmVHlfZjVmZ0U>

Articles in “References” folder used in this week’s report:

Parts – MSP430FR2311 Tech Doc

Parts – MSP430FR2311 User Guide

Parts – R50RGB Tech Doc

Parts – SFH299 Tech Doc