

## **EE/CprE/SE 491 WEEKLY REPORT 6**

**03/06/2024 – 03/19/2024**

**Group number: 6**

**Project title: Video Pipeline for Machine Vision**

**Client &/Advisor: JR Spidell / Mohammad Tayeb Al Qaseer**

**Team Members/Role: Deniz Tazegul (Video Stream to FPGA), Liam Janda (VDMA to DDRM), Taylor Johnson (DDRM to output display), Ritwesh Kumar (Video Stream to FPGA)**

### **o Weekly Summary**

This week, team 6 focused on the individual components used in the project in preparation for gaining access to the Ultra96-v2 board.

### **o Past week accomplishments**

- Deniz: Researched previous teams' code base on the monitoring script for the CSI and D-PHY controllers. The monitoring script prints out the value of the status register bits and organizes them in a readable format. Updated the slide show for the component details and code details to reference new information.
- Liam: Understood the used register values of the frame buffer from the previous team and began to formulate the VDMA driver. Researched more in-depth into VDMA S2MM Memory write I/O and AXI-Lite configurations in preparation for connecting the component to DDRM. Started to use the Ultra96-v2 board and getting comfortable using the available software.
- Taylor: Focused on building the DisplayPort in Vivado to better understand the connection between IPs and how the data will be flowing. Taylor learned that some of the connections for the displayport will need to be changed in order to support adding a machine learning algorithm. The processor will need to be connected to the output display rather than the AXI4-Stream to video out. The video timing controller IP may be able to be removed.
- Ritwesh: worked on the IMX219 image sensor driver and test files. Ritwesh has uploaded these files to the team's shared Google Drive Senior Design folder and the team's GitHub repository. The code he made for the IMX219 driver file is based on the previous's teams work for the OV5647 driver file. In addition, the test file he made was created to read, write, and reset using single data addresses or register values.

He also corrected information on the team's component slide presentation with key register addresses to send data to the correct I2C port.

- Group: The team has received a response from Dr. Jones and will need to set up a schedule to meet with him regularly for technical advice on the project.

o **Pending issues**

- Deniz: Waiting for hardware set up and environment to run code
- Liam: Need to understand how to communicate with the TPG through memory.
- Taylor: Need to determine how to reconfigure the DisplayPort to support the ML algorithm.
- Ritwesh: will need more time to find the exact register values and memory addresses to configure the IMX219 to a desired resolution and frame rate setting. Also, he is still waiting for the Ultra-96 to be set up to run the code from the past team and the new code he created.

o **Individual contributions**

<b><u>NAME</u></b>	<b><u>Individual Contributions</u></b>	<b><u>Hours this week</u></b>	<b><u>HOURS cumulative</u></b>
Deniz	Researched MIPI monitoring code, Updated appropriate slide shows	6	37
Liam	Research into S2MM mem write, AXI-Lite I/O, and framebuffer driver, Ultra96-v2 introduction	8	41
Taylor	Created a project and built the DisplayPort in Vivado. Further reviewed the IP connections to understand the flow of data. Reviewed/updated component slides. Shared component presentation with the team.	6	37
Ritwesh	Created and uploaded an IMX219 driver and test file to the team's Github repository and Google Drive folder. He also made some corrections to his part of the team's components slides.	8	44

o **Plans for the upcoming week**

- Deniz: Work with the client to set up a working environment to run existing code on hardware once set up
- Liam: Finally start to use the Ultra96-v2 board and create a tutorial on how to use it. Continue to research the AXI-Lite and S2MM memory write.
- Taylor: Will be working with the client to determine how to best re-work the DisplayPort. Will also review the PYNQ library functions to determine memory allocation and accessing DDR memory.
- Ritwesh: Continue building on the IMX219 driver and test files for configuring the IMX219 properly.

Action Item	Task Owner	Expected Date
Set up the hardware and connect to wifi	Liam	3/24/24
Learn how to communicate with the camera by running the prior team's code (Be able to send & configure the camera using I2C using the code from before)	Ritwesh	4/14/24
Run the existing code on the hardware and observe how the registers are updating for MIPI controllers	Deniz	4/14/24
Load an image to an SD card and get the image to display on a monitor using the FPGA	Taylor	4/14/2024
Map each section's inputs and outputs to determine appropriate data widths across sections/roles.	All	4/1/24

o **Summary of weekly advisor meeting**

There was no advisor meeting this week, but we have begun discussing with Dr. Jones to set up future advising sessions for this project.