

EE/CprE/SE 491 WEEKLY REPORT 7

03/20/2024 – 03/26/2024

Group number: 6

Project title: Video Pipeline for Machine Vision

Client &/Advisor: JR Spidell / Dr. Philip Jones

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 received the Ultra-96 FPGA board and began learning how to run code on the board. In addition, the team completed giving presentations for each component of the video pipeline. Finally, the team has finalized scheduling weekly advisor meetings with Dr. Phillip Jones with the first meeting starting next week.

o Past week accomplishments

- Deniz: This week, Deniz began to learn how to use the board via Liam's presentation and set up what was needed to properly run code on the machine. Really studied previous team's code to understand how exactly it works and what to look for when running code for the first time.
- Liam: This week, Liam got a chance to use the Ultra96-v2 board and view the different code files available on it. Created a presentation on how to get started with the board and how to begin coding. Liam also began to look at the previous team's code to find out the issues with it.
- Taylor: Taylor reviewed the documentation for the pynq library functions that could be used to retrieve data from the DDRM. Specifically, the buffer.Pynq module/class for allocating memory for a framebuffer. Additionally, Taylor reviewed the code created by the previous team, TPG_VDMA, this code has an error when the VDMA attempts to read the frame. The error appears to be due to the TPG initially being disabled.
- Ritwesh: This week, Ritwesh updated the code for the IMX219 image sensor driver and test files to configure the camera to 1920x1080p at 48 fps and read from specific registers to verify communication is established properly with the correct I2C port on the Ultra-96 FPGA board or IMX219. He also used this information to update the team's code details slides.
- Group: The team received the Ultra-96 board and is beginning to learn how to run code on it. In addition, the team has finalized weekly faculty advisor meetings with Dr. Phillip Jones starting next week.

o Pending issues

- Deniz: None
- Liam: None
- Taylor: None
- Ritwesh: None

o Individual contributions

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Deniz	Preparation for getting Ultra96 hands on	6	43
Liam	Presentation on Ultra96-v2 usage, code research	8	49
Taylor	Finished presenting display port components to the team. Read through the PYNQ buffer class documentation. Reviewed the code from the previous team, TPG_VDMA.	3	40
Ritwesh	Updated IMX219 driver and test files to configure the camera for 1920x1080p and 48 fps, began learning specific functions the IMX219 has and how to implement those in code, added new code to the team's code details slides	7	51

o Plans for the upcoming week

- Deniz: Deniz will start working on the Ultra96 board, starting with running the previous teams code, then working to adapt that to work in PYNQ environment
- Liam: Liam will continue to look into and understand the PYNQ code to find any issues with it, as well as document the VDMA I/O in a spreadsheet with the rest of the group.
- Taylor: Taylor will continue looking into reconfiguring the display port to support a machine learning algorithm. Taylor will also begin looking into a linux device driver for the display port.

- Ritwesh: This week, Ritwesh will start working with the Ultra-96 now that it is available. He will work on reading register values from specific registers to verify that communication is established to the correct I2C port and the expected value is read.

Action Item	Task Owner	Expected Date
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**

We did not have a meeting with the advisor this week. The first faculty advisor meeting with Dr. Phillip Jones has been scheduled for next week.