EE/CprE/SE 491 WEEKLY REPORT 4

2/21/2024 – 2/27/2024

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 Display), Ritwesh Kumar (Video Stream to FPGA)

o **Weekly Summary** *(Short summary about what the group did for the week. This should be about a paragraph in length. These are just a few questions to help you get started. What was the overall objective for the week? In general, what tasks were completed? Were there any changes made to the project?)*

This week the team focused their efforts on understanding the previous team's bare metal implementation of the video pipeline. Each member was responsible for reviewing the code relevant to their role and creating a presentation to share with the team. Since the project has changed directions, the team talked with the course professors regarding the possibility of adding a technical advisor to assist with our project.

o **Past week accomplishments** *(Please describe/summarize as to what was done, by whom, when and, collectively as a group. This should be about a paragraph or two in length. Bulleted points are acceptable as well. Please keep only your technical details related to your project. Figures, schematics, flow diagrams, pseudocode, and project related results are acceptable, but please ensure that they are legible (clear enough to read) and to provide an explanation. If researching a topic, please add a few details about what was learned and how it is relevant to the project. If two or more people worked on a single task, be sure to distinguish how each member contributed to the task. Specific details relating to the assistance provided to other members may be included here.* ***Do not include classwork, such as individual reflection assignments, and group meetings as part of your duties.)***

● Deniz: This week Deniz read more on the CSI-2 and D-PHY controllers and created a presentation to share with the team. The slides consisted of a brief overview of the block diagram for the components, then a look a the important register values that need to be updated to initialize the controllers. Deniz also read up on the Sony Image sensor that will be sent to the team and created similar slide sheets for that. Deniz then created a short presentation on the existing code and how the previous team was able to update the required

register values.

● Liam:

- Received Ultra96-v2 board from JR
- Began to view and understand the code from the previous group
- Created a more in-depth block diagram of the Ultra-96-v2 board

● Taylor: This week Taylor finished reviewing the prior team's code for the test pattern generator and display pipeline. The information gathered was added to the team's slide breaking down how the code works.

● Ritwesh: This week Ritwesh navigated through sections of a datasheet for an image sensor (0V5647) and created slides on how a prior team accomplished configuring the sensor using Python. He created a slideshow for finding registers in the datasheet and a spreadsheet provided by the client along with a few specific initialization registers. Ritwesh added to the team's Components and Code slideshows with this information.

●Group: Met up with the professor regarding the status of our project and got an introduction to the code given to us.

o **Pending issues** *(If applicable: Were there any unexpected complications? Please elaborate.)*

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

o **Individual contributions** *(Creating this section is optional, but it is **Required to include the "Hours Worked for the Week" and their "Total Cumulative Hours" for the project for each member somewhere relevant in your report. Your individual weekly hours should be at a minimum of 6-8 hours for this course. So please manage your time well. Also, ensure that individual contributions support your claim to the weekly hours. Be honest with the reports.**)*

NAME	Individual Contributions *(Quick list of contributions. This should be short.)*	Hours this week	HOURS cumulative
Deniz	Presentations on controllers, image sensor, and code	7	25
Liam	In-depth Ultra96-v2 block diagram	7	27
Taylor	Created presentation based on the display code	7	25
Ritwesh	Adding to the team's Code and Components slides and creating a	6.5	26

	Register information slideshow		

o **Comments and extended discussion** *(Optional) Feel free to discuss non-technical issues related to your project.*

The team met with the course professors to discuss either switching advisors or adding a technical advisor for the project since the project is outside the current advisor's area of expertise. The team also needs to decide how everyone will have access to the hardware equipment.

o **Plans for the upcoming week** *(Please describe duties for the upcoming week for each member. What is(are) the task(s)?, Who will contribute to it? Be as concise as possible.)*

- Deniz: Deniz will keep reading up on the Sony sensor to gain a better understanding of what needs to happen to switch sensors. Deniz will need to collaborate with Ritwesh to learn about the current image sensor and how the previous team was able to configure it.
- Liam: Begin to use the Ultra96-v2 board and get used to the OS and used software. Meet with JR and set up the hardware and wifi. Share block diagram and add anything that is necessary from the other team members.
- Taylor: Will need to complete component presentation for the video display. Taylor also plans on digging into understanding memory allocation for the output display using PYQN. Taylor will begin to understand the hardware that was sent by the sponsor to see if an image can be displayed from an SD card through the FPGA to a display.
- Ritwesh: Finalize slides covering the OV5647 image sensor if needed and begin creating slides on the IMX219 image sensor the team will use for this project. Begin thinking about how to write code for the IMX219 image sensor initialization and configuration. Furthermore, once the hardware is working well, try running a test file using code for the OV5647 image sensor and verify that there is communication with the Ultra96-v2 board.

Action Item	**Task Owner**	**Expected Date**
Finish reviewing project code	All	3/3/24
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	Deniz	4/14/24

controllers		
Load an image to an SD card and get the image to display on a monitor using the FPGA	Taylor	4/14/2024
Fill out register presentation	All	3/10/24

o **Summary of weekly advisor meeting**

The team did not meet with the advisor this week.