

# Weekly Project Report – Week 3

## Overall Team Progress

This week, we concentrated on getting everybody's work combined into one place to form a beginning version of the whole project. Each of us had our own subsystem up until now, but to complete Week 3, we had to integrated all of our work to determine if our components actually work well together. We created a complete Vivado project that contains the VGA files, keypad decoder, new top level design, and system controller. The project compiles and synthesizes, but we have not thoroughly tested anything. This is something that we will be addressing extensively for Week 4.

We also set up a GitHub repository to keep all the files in one place:

[https://github.com/404JayNotFound/FPGA\\_GameSystem](https://github.com/404JayNotFound/FPGA_GameSystem)

It was done to make it easier for everyone to get the latest version of the project and to make sure that people aren't working on different copies of the same thing. Member C was responsible for the administration of the GitHub for the week, keeping it updated as new files arrived.

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## VGA Display and Clock System (Member A)

Member A was able to complete and share two key VGA files, namely the VGA timing generator and the VGA test pattern. These two components were added to the combined project, and they generated a steady color on the monitor. This reveals that the VGA timing, the sync signals, and the RGB output functions within the combined design.

The current state of the VGA system is a good thing because now we have something to work with. Tilemaps and sprite memory management for VGA have to be done in the future, but for now, this is good enough.

## Notes

The VGA system is yet to be tested, only displaying a test color for now. Detailed work will be done in week 4 and week 5.

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## Input System (Keypad and Joystick) (Member B)

Member B was able to finish working on the keypad decoder, and this week, it was incorporated into the combined project. It scans a keypad and provides a 4-bit key code. The keypad is now connected to the system controller, through which a person can switch from one state to another within the system.

Member B was also planning the joystick module and the flash memory module. These are SPI components and can be added to the system next. The keypad is the only working input device of the system currently.

## Notes

Joysticks and Flash modules are also unfinished, so these components could not be tested. The keypad will be tested thoroughly in Week 4 when the entire system is up and running.

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### Game Core and Top Level Integration (Member C)

Member C began working on the first combined version of the project, where each member's files were combined into one document using the Vivado tool. The top level file was modified such that the VGA modules and keypad decoder connected correctly. Additionally, a basic version of the system controller was programmed, where the system relies on the keypad input and changes from one state to another that we will develop.

The constraints file is cleaned up and updated to conform to the new top-level ports. The entire project synthesizes without serious issues, and this proves that the structure is good for Week 3.

Member C was also responsible for the management of the Github repository.

## Notes

The system controller is simple and will require a lot of changes in the next phases. Flash and the joystick can't be connected until these modules are complete.

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### Issues and Questions

The joystick and flash memory functions are being developed, but these could not be integrated into the full build. Nothing's really been tested because the whole of week 3 was spent combining all of the code. It is necessary to test the VGA tilemap memory prior to implementing graphical work. The actual connections of the PMOD pins for the conclusion of the course have to be verified. It may be necessary to consult the lecturer about the expected usage of the flash memory for our final course task.

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### Plan for Week 4

For week 4, the plan is to test, debug, and incorporate the missing modules.

The key objectives for the upcoming week include:

- Member B shall initiate the Joystick SPI and Flash Memory SPI modules
- Member A can initiate tile-map design or optimize test patterns
- And Member C shall provide the system controller and top level updated after the new modules have been developed.
- Finalize complete pin maps to the constraints file
- Begin testing to make sure that the keypad and VGA work well together
- Attempt to get the first basic interactive behavior working (for example, keypad input triggering VGA output)