

## Mini-project: Extended Abstract

### A “Space Invaders”-like Game: Aiming for Advanced Project

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**Objective and Requirements:** The purpose of this project was to develop a version of the classic “Space Invaders” arcade game in C, and have it run on a DTEK-V board.

Game specifications:

- The player is able to move his spaceship horizontally along the lower edge of the screen and is able to shoot upwards the screen.
- Aliens will descend in a zigzag pattern starting from the top of the screen.
- The game ends when the player kills all aliens or the aliens reach the player.
- The player scores points for every alien he destroys with the spaceship blaster, and we keep a visual scoreboard on the top-right of the screen
- \* After ‘X’ amount of time, a boss appears that shoots towards the player, and takes multiple hits to destroy.
- \* The level is then won, and the next level starts where the aliens move faster.

\* = Not enough time to complete

The game is controlled using the DTEK-V switches and button.

The game is displayed via the DTEK-Vs VGA on an external display.

**Solution:** We wrote all our code in C, and compiled it for execution on the DTEK-V board. We used the addresses for the switches and button for input handling via interrupts. We display our video game by writing to the VGA memory address and sending the VGA information to an external screen.

**Verification:** We tested I/O functionality using first the DTEK-V emulator to see that VGA writing and transmission was correct. After this, we ported the video game logic graphics from a char-output terminal-displayed version to the pixel-output VGA-displayed version. We then ported input handling from keyboard to DTEK-V switches/button. For in-game logic verification, we tested input results when accidentally pressing other switches, without consequence, as expected. When we reached the left or right wall, we stayed in the game. Destroying aliens works correctly. We destroy all aliens or the aliens reach the player, the program correctly stops. We have a max number of allowed active bullets. Our scoreboard works as intended.

#### **Contributions:**

We decided, on a general basis, to not split responsibilities and work through all the mini project together on campus. Therefore, we wrote all code together, on campus, and split code writing evenly, as both were working on the same task at all time, except on output where August had slightly more responsibility and input where Shujin had slightly more responsibility.

#### **Reflections:**

The time constraints were difficult and stressful, and required much more work than a typical lab. We would have preferred the lab sessions to be shifted 1 week earlier, to have 2 weeks for the mini-project, as it took more work than we expected. The mini project was a good way of implementing the course material while giving us freedom to do so creatively.