

# Cole Herrmann

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## EDUCATION

US Citizen

### University of Illinois at Urbana-Champaign

May 2023

Bachelor of Science, Computer Engineering

GPA: 3.65/4.00

## SKILLS

### Languages

- C/C++
- Python
- HTML & CSS
- SystemVerilog

### Tools

- Microsoft Visual Studio
- Intel Quartus Prime
- Xilinx Vitis
- Microsoft VBA

### Design Software

- Autodesk AutoCAD
- Autodesk Inventor
- KiCad
- Creality 3D

## WORK EXPERIENCES

### Kaskaskia Community College IT Department

September 2018 – May 2020

#### Computer Repair Technician Intern

- Communicated with employees having technological issues
- Used network diagnostic tools (toners, testers, etc) to run new network lines.
- Learned basic OS imaging for industrial Windows 10 configurations.

### Parkland College IT Department

February 2021 – Present

#### Technical Client Systems

- Working with client system management software such as Microsoft SCCM, Active Directory, Azure, and Deep Freeze.
- Using Windows Powershell scripting to encrypt laboratory auto login-passwords
- Using Visual Basic to analyze lab usage data and create station report

## PROJECT HIGHLIGHTS

### Hardware Accelerated Camera (Panorama Image Stitcher)

January 2022 – Present

C++, VHDL with Xilinx Vitis and PetaLinux

- Designing a camera with onboard hardware acceleration capability to stitch multiple images into a panorama/map, optimizing the overall image processing.
  - Using a Zynq-7000 SOC, integrating embedded software to PetaLinux on the ARM processor, and pipelining stitching workload to the FPGA.
  - Adding extended storage space to the application by interfacing to an Ext4 external SD card for larger panoramas and map renders.
  - Implementing FAST stitching algorithm for keypoint detection to align images.
- Autonomous UAV Mapper Integration
  - Using a Hex Cube Black (PX4) flight controller to autonomously fly a fixed delta wing plane.
  - Establishing a UART interface between the Zybo 7020 and flight controller to geotag the image's metadata for more accurate and informative map renders.
  - Adding SFTP protocol to live render maps before the flight mission is over.

## **Embedded System FPGA Design: World's Hardest Game**

*November 2021 – January 2022*

*System Verilog HDL with Quartus Prime*

- Designed an SoC implementation of the World's Hardest Game to run on the MAX 10 FPGA architecture.
  - Designed a basic VGA GPU with three memory banks to display game maps with minimal memory usage.
  - Added a NIOS II CPU for easier map development through the Avalon Memory Mapped bus.
  - Implemented hardware accelerated physics for wall detection and obstacle collision.

## **San Francisco Roadmap**

*March 2021 – May 2021*

*C++ and Visual Studio/GDB*

- Worked in a team to create a C++ weighted graph application to take two input coordinates within San Francisco, and calculate the shortest path between the nodes.
  - Generated an adjacency list of connected nodes.
  - Used a DFS Iterator to search the graph and find the goal node.
  - Implemented Dijkstra's Algorithm to return the shortest path between the nodes using the adjacency list.
- Designed and debugged a pixel traversing algorithm to print all nodes and connecting paths onto a PNG image.
  - Traversed each path and colored pixels if they fell within the slope margin.

## **Autonomous Quadcopter Drone**

*December 2019 – May 2020*

*ArduPilot & Autodesk Inventor*

- Coached engineering team in designing a custom FPV quadcopter with a 3D printed frame.
  - Used the PX4 flight controller to control the drone.
  - Added a FRSKY X8R for manual control and added full duplex telemetry to report GPS data.
- Programmed flight missions using waypoints and mapped out flights via Google Maps and Yaapu Telemetry.

## **Automated Irrigation System**

*May 2018 – August 2018*

- Engineered an automated irrigation system to hydrate and fertilize 16,000 chrysanthemums.
- Assembled 120V AC solenoid valves and Wi-Fi relays to be controlled via smartphone app
  - Used Merkurs Smart Plugs to toggle the solenoid valves on and off.
  - Added a 120V contactor to toggle the current-heavy pump.

## **Lightshow Pi Christmas Display**

*December 2018 – August 2018*

*Python and Raspbian*

- Setup Raspberry Pi and LightshowPi (Python) software to run Christmas light shows.
  - Assembled power distribution board from wall outlets and solid state relays to toggle eight power outputs.
  - Added music stream from Pianobar (open source Pandora console) for unlimited music choices.