

# Mark Murnane

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## EDUCATION

University of Maryland, Baltimore County  
B.S. Computer Engineering (VLSI Track) 2018  
M.S. Computer Science In Progress 2019-Present

## SKILLS

### *Programming*

- Languages: Python, C#, C, Javascript, Verilog, x86 ASM
- Frameworks: Flask, Django, Vue, Unity
- Realtime and Embedded Systems, Application Development, Web Development, Game Development
- Many open source contributions to personal and existing projects

### *Linux/Unix:*

- Configuration Management (Salt, Puppet)
- Automated Provisioning, Monitoring and Orchestration (Both of baremetal and cloud systems)
- Significant Experience with RHEL/CentOS, Fedora, Arch, Debian Linux

### *Electronics*

- Digital Circuit Design
- Schematic Design and PCB Layout (KiCad)
- Medium Scale PCB Manufacturing (10,000 units)

## PUBLICATIONS

- HRIVR: Human-Robot Interactions in Virtual Reality  
2021 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), Pending
- Extending CoNavigator into a Collaborative Digital Space  
Companion of the 2020 ACM International Conference on Supporting Group Work
- Virtual Reality and Photogrammetry for Improved Reproducibility of Human-Robot Interaction Studies  
2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), 1092-1093
- Learning from human-robot interactions in modeled scenes  
ACM SIGGRAPH 2019 Posters, 1-2

## EXPERIENCE

*University of Maryland, Baltimore County*

January 2019-Present

Office of Research Development

Core Facility Specialist

- Supported core research facilities by writing software and designing new hardware to support existing researchers while growing facility capabilities and user base
- Ported existing applications to run on the UMBC High-Performance Compute Facility, Taki
- Collaborated with researchers to produce scholarly works

*University of Maryland, Baltimore County*

August 2015-December 2018

Imaging Research Center

Faculty Research Assistant

- Designed and developed software to operate a custom photogrammetry system (web interface, realtime hardware controller, and clustered image processing)
- Wrote WebGL-based model viewer to demonstrate models produced by the photogrammetry system
- Architected and implemented MapTu, a collaborative 3D space with data analysis tools
- Worked with Eric Dyer, a resident artist, to build computer-vision based interactive art

*Direct Dimensions Inc.*

Summer 2015

- Designed and constructed embedded hardware to control a photogrammetry system
- Wrote software to control distributed cameras, flashes, projectors and custom hardware in realtime with sub-millisecond timing

*University of Maryland, Baltimore County*

2012-2016

Computer Science and Electrical Engineering Department

Systems Administrator

- Managed 300+ CentOS Linux and Windows Hosts
- Designed and implemented clustered container environment providing high availability for a number of services
- Built custom imaging software to clone disk images to many hosts simultaneously
- Directly responsible for maintaining critical services for faculty, students, and staff

*MAGFest Inc. (Volunteer Work)*

2012-Present

Department Head, TechOps

Event Chair, MAGStock

Board of Directors Advisory Committee

- Manages a team of more than 150 volunteers through multiple annual events
- Administrates systems supporting 1,700 volunteers and 25,000 attendees
- Spearheaded efforts to enact new policies and practices across the organization including the formation of a task force to address sexual harassment incidents and the development of an Emergency Response Plan
- Designed and manufactured a series of interactive printed circuit board badges to attendees at events. Produced four different designs to suit event needs, with production runs ranging fifty units to several thousand

## Projects

*Tuber* (<https://github.com/magfest/tuber>)

Python, Javascript

Event management software. Tracks volunteer shifts, hotel room placements, and other business logic. Currently used by MAGFest Inc. as part of its infrastructure to track 1,700 volunteers. Includes a multi-threaded web-based roommate matching system that allows for interactive selection of optimal roommates based on arbitrary criteria.

*μCMD* (<https://github.com/bitbyt3r/ucmd>)

Python, Electronics

High altitude balloon tracker and bidirectional message relay system. Combines multiple radio modules with different characteristics to allow messages to be routed quickly and reliably. Has been flown by the UMD Space Systems Lab high altitude balloon program.

*HRIVR* (Currently private, pending publication)

C#, Python, Javascript, Electronics

Simulator for modelling human-robot interactions in VR. Combines a game engine with a robotics simulator and exposes a standard interface allowing physical robots to be fully modelled in virtual reality. Due to COVID-19, the project pivoted to allowing users to be remote from the main simulator while doing local calculation to keep latency low enough for VR.

*Hoverboard* (<https://github.com/bitbyt3r/hoverboard-firmware>)

C, Electronics, CAD, 3D-Printing, Welding

Built my own self-balancing two-wheeled hoverboard. Built from the ground-up from metal stock as an excuse to learn to weld. The control loop is written in C and runs on a BeagleBone Black single-board computer.

*Photogrammetry Rig* (<http://photogrammetry.irc.umbc.edu/>)

C, AVR Assembly, Python, Javascript, Electronics

Built the electronics and software for UMBc's photogrammetry rig. Uses custom circuit boards to perform real-time sequencing of the cameras and ancillary hardware. Uses a distributed system to synchronize camera timing across the network, reconfigure the cameras, transfer images to a Ceph storage cluster and prepare them for processing. Has a web interface for configuration and control.