Project Portfolio

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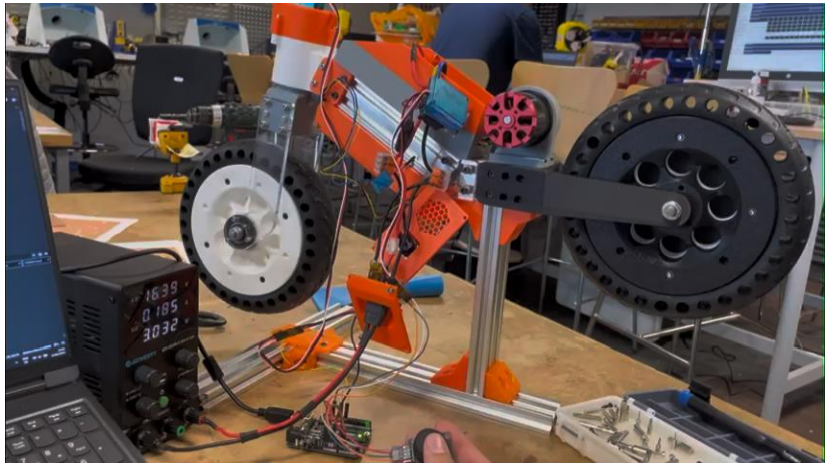
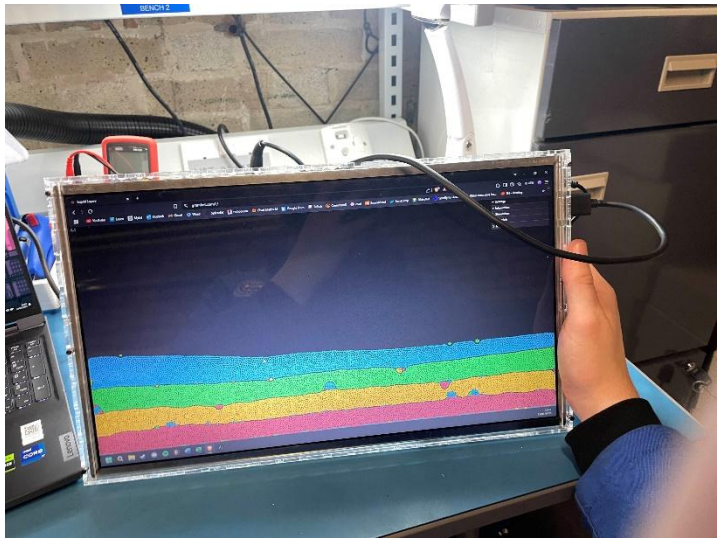
Control system for a robotic bike

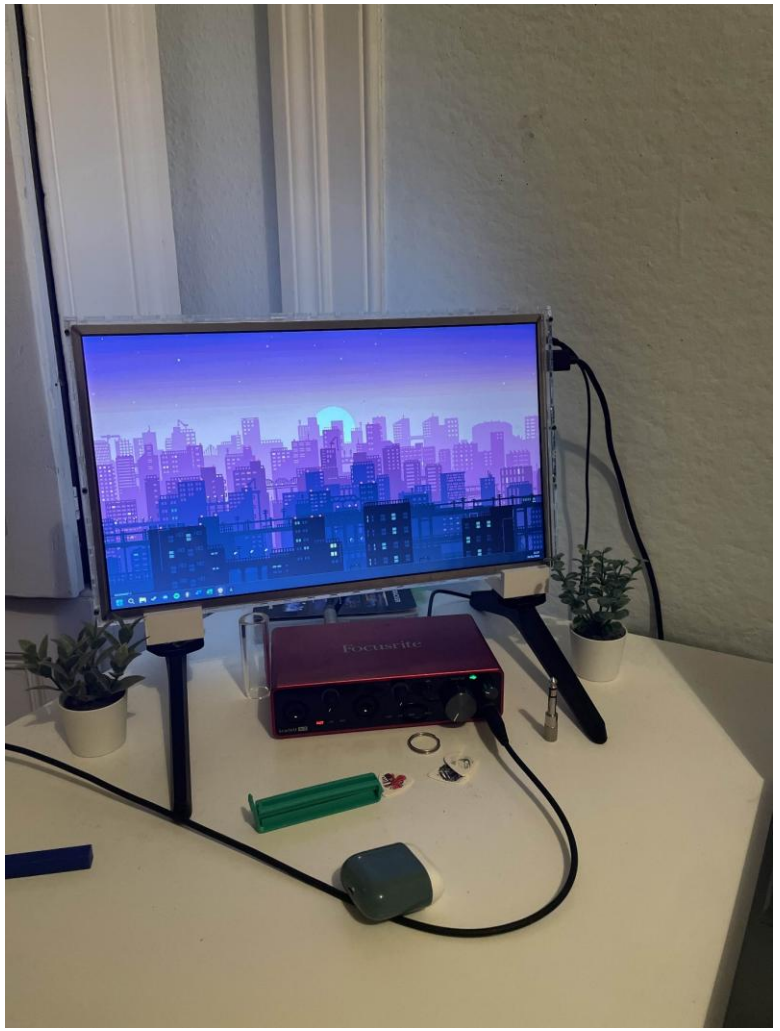
- I made a pair of 2.4GHz transmitter/receivers and the coded the remote control of the bikes motor and steering. The transmitters use SPI between themselves, and the receiver can talk to the bike's on-board Arduino using I2C.
- The radio transmitters have an effective range of 160 metres with line-of-sight. The range without line-of-sight is roughly 80 metres, which is still much further than the bikes intended range (~20m).
- I made a PCB for a controller in KiCAD; however, it was decided that it would not be used in the project.
- The video to the bottom-right demonstrates the control of the bike using a joystick.



17-Inch LCD display

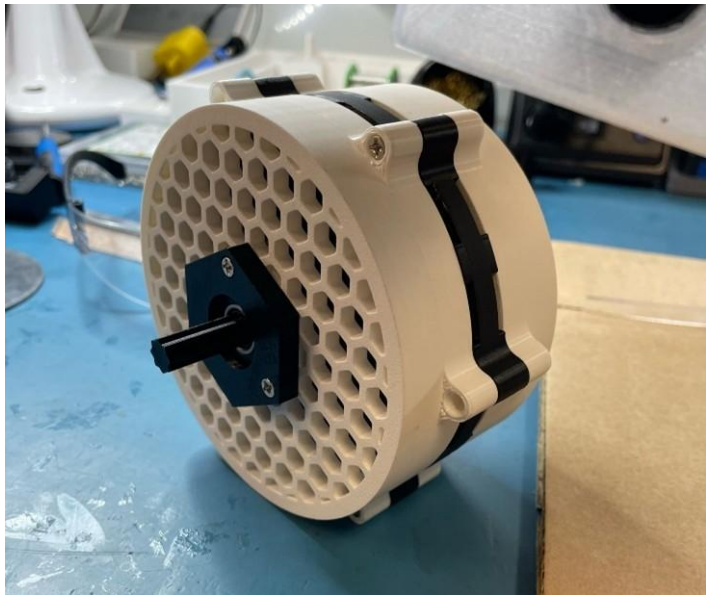
- An old laptop screen that I repurposed into an LCD monitor. My goal was to make a monitor that was cheaper than other commercial options.
- Resourcefulness and re-use are words that come to mind for this project, as many of the components were repurposed from things I already had.
- The case is made from clear, laser-cut acrylic, showing off the electronics of the screen. I had a lot of fun working on the aesthetics of the monitor, and I think it came out nicely.
- The monitor stand was made from the legs of an old TV and a 3D printed holder.
- The screen cost about £40 to make, which Is cheaper than anything I could find at major retailers.

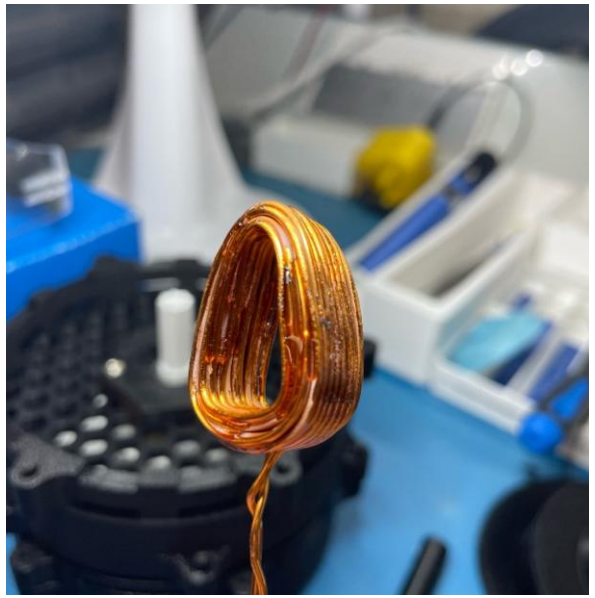


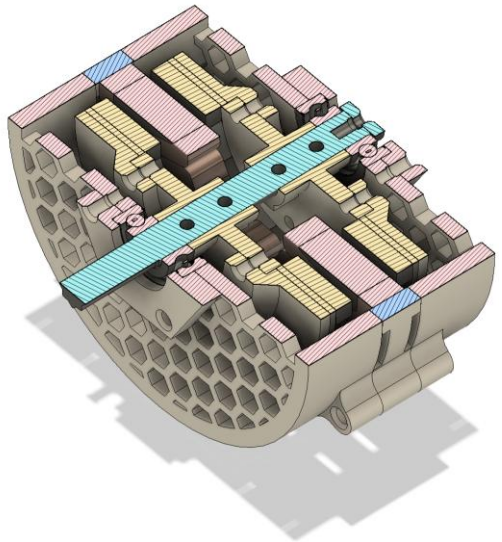


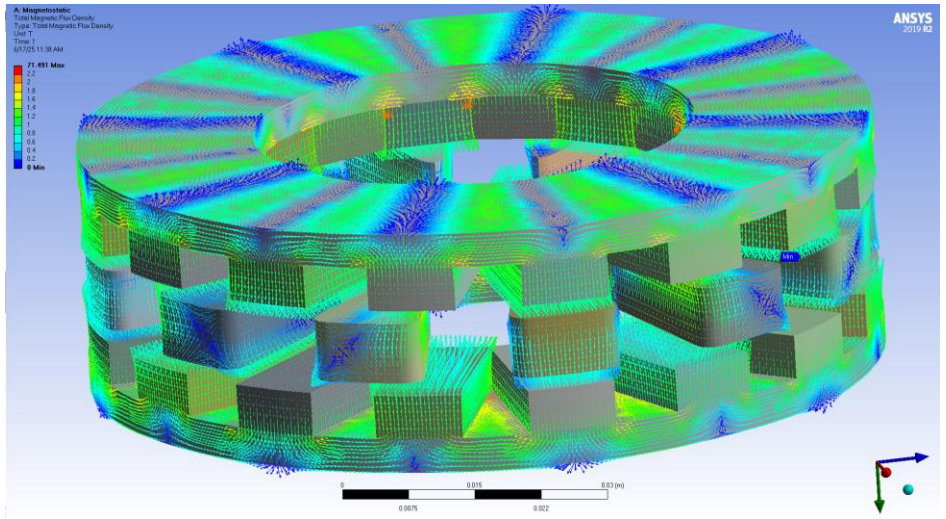
Axial-Flux electric motor

- The second version of a compact 3-phase motor that I built over the summer.
- My efforts for this version focused on making the shaft spin well, creating a strong magnetic field across the airgap, and reducing the internal resistance.
- 3D magnetic simulations were made in ANSYS Workbench to compare my designs and estimate the magnetic field strength in the airgap.
- The internal resistance is 50 times lower than the previous version, with each coil having a resistance of 0.2Ω.
- The theoretical maximum power output is 615W, but with active cooling that figure can be much higher.









Bluetooth panel speaker

- An 80cm x 130cm panel speaker driven by two 20-watt exciters.
- Several panel materials were tested for their acoustic performance, with MDF being chosen as a good mix between cost and sound quality.
- A lot of work went into mitigating unwanted vibrations that cause rattling noises at high volumes, the most common being the speaker cables hitting the panel.
- The video on the right is the speaker at roughly ~60% volume. Low end distortion begins at about 80-90% when playing bass-heavy music, but at that volume your annoyed neighbours would be the biggest problem.
- The speaker costs £80, with a sound quality that rivals much more expensive speakers.