The Failure

My second line-following bot competition at National Kaohsiung University was the stage for my carefully crafted "PathFinder". I had spent the past few weeks tuning and upgrading my bot from the old scrap of 3d printed parts, equipping it with advanced infrared sensors, new and powerful motors, and a base built to flawless the course's turns, and slopes. As I arrived, the venue was alive with competitors prepping their machines, and I felt ready to win.

The first test run revealed a flaw: my infrared sensor sat too low, causing the bot to struggle up the slope. I adjusted its height, and the next run was flawless—the bot zipped through the round corners, powered down straights, and climbed the incline with ease, crossing the finish line perfectly. I could have called it a day, content with the success, but I wanted one more run to be certain.

That decision proved costly. As my bot navigated the elevated track up the slope, a kid who cut in line to test his own bot accidentally bumped it. I watched, helpless, as it went off the edge and crashed to the floor. The impact snapped the wheel clean off the motor shaft, leaving my bot broken. In a panic, I tried super glue to reattach it, but the fix was weak, failing under the slightest strain. With no spare parts or proper tools, I had to withdraw, my hopes crushed by a single moment.

This experience was a harsh lesson: in robotics competitions, success hinges not just on a well-built bot but on being ready for the unexpected. What started as a promising day became a reminder to always plan for the worst.

Possible Accidents in Line-Following Bot Competitions and How to Prepare

- **Sensor Malfunction or Misalignment**: Dust, lighting, or transport vibrations can disrupt sensors, leading to tracking errors. *Preparation*: Bring spare sensors, a portable tester for on-site calibration, and cleaning tools like microfiber cloths or compressed air.

- **Mechanical Breakage from Falls or Collisions**: Bots can break from falls, bumps, or mishandling, damaging wheels or frames. *Preparation*: Pack a repair kit with spare wheels, motors, screws, and epoxy (stronger than super glue); design bots with reinforced chassis or bumpers.

- **Battery Failure or Power Issues**: Batteries may drain quickly or have loose connections under competition stress. *Preparation*: Carry extra charged batteries, a multimeter for voltage checks, and spare wiring; test power needs in practice runs.

- **Programming Glitches or Code Errors**: Bugs can surface during runs, causing the bot to veer off course. *Preparation*: Have a laptop for quick debugging, store backup code on a USB or cloud, and add a reset switch to the bot.

- **Environmental Interference**: Uneven tracks, lighting variations, or nearby devices can affect sensors. *Preparation*: Test on-site early, use shielded cables, and build sensors with adjustable thresholds to adapt to conditions.

- **Theft or Loss of Parts**: Small components like tools or spares can disappear in busy venues. *Preparation*: Use a lockable toolbox, label all items, and keep an inventory; have a teammate watch your gear.

- **Overheating Components**: Motors or circuits may overheat from extended use, causing failures. *Preparation*: Add heat sinks or fans if possible, use an infrared thermometer to monitor, and allow cool-down time between runs.

Some Pictures
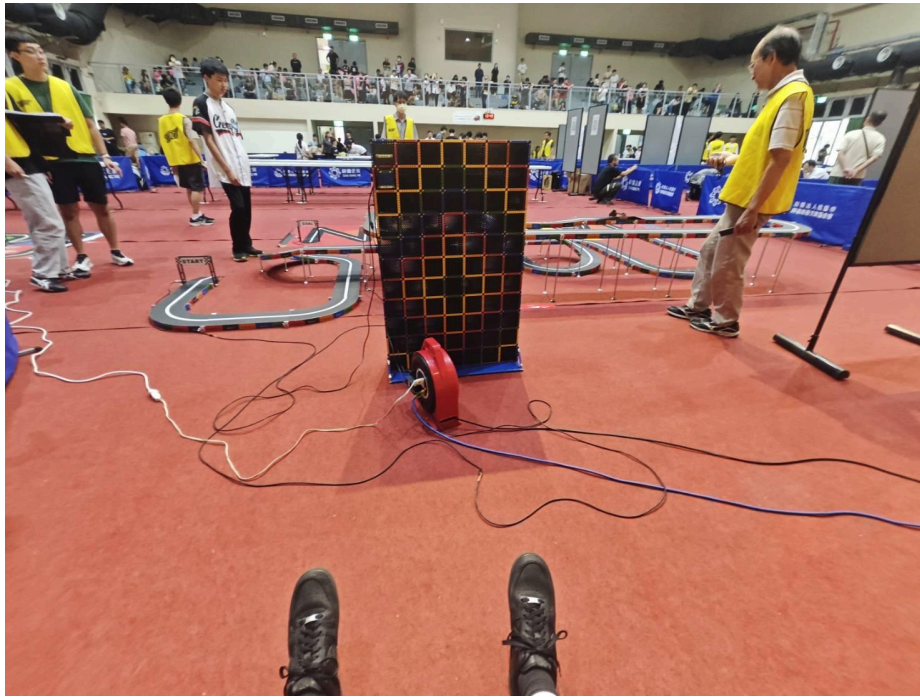
Thoughts

After seeing every competitor's different techniques, I think I will stick with my Pathfinder V2, even though some people used light weight, speed and low center of gravity to maneuver fast, I like the sturdy feeling of my robot, I have strong enough motors to go even faster than them, which they are incapable of due to the reduced weight, and my robot would be more stable throughout the whole course compared to their light weighted versions.