

# RETHINKING MOTION- A New Era of Compact Tactile Robotics

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Small Body. Massive Potential.

What if a dreidel could spin with purpose—powered by WiFi, sensors, and mission control?

Spin. Think. Act. The new language of motion starts here.

### VISION

Not a toy. A platform.

- A robotic system born from a traditional symbol
- Modular, programmable, and scalable
- A stepping stone toward swarm robotics and autonomous mobility
- Bridges educational exploration with real-world application

### TECHNOLOGY

Engineered into 162mm of brilliance.

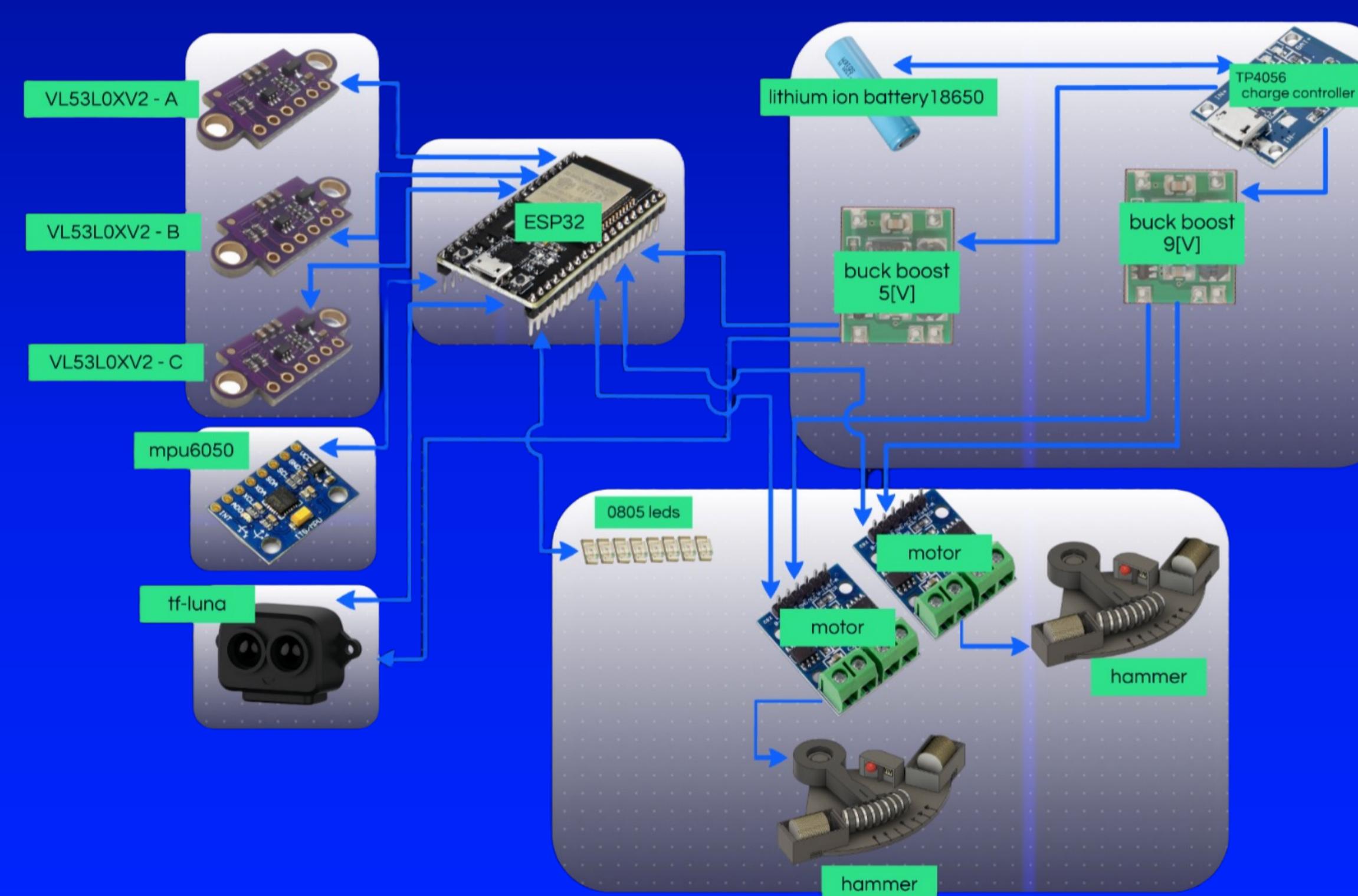
- Palm-sized custom PCB with ESP32
- 3x VL53L0X Time-of-Flight sensors + MPU6050 gyro/accelerometer
- TF-Luna LiDAR for accurate distance mapping
- Dual L9110 motor drivers controlling magnetic hammer coils
- Real-time Wi-Fi communication + onboard web server
- Smart pinout mapping, noise filtering, and power regulation

### PERFORMANCE

Built. Tested. Spinning.

- 30+ seconds of stable spin with full hardware engagement
- Full Built-In Self-Test (BIST) mode per module
- Partial synchronization achieved across sensors, logic, and motors
- Precision physical balancing with custom jig + plasticine
- System robustness demonstrated in repeatable testing

### HARDWARE OVERVIEW



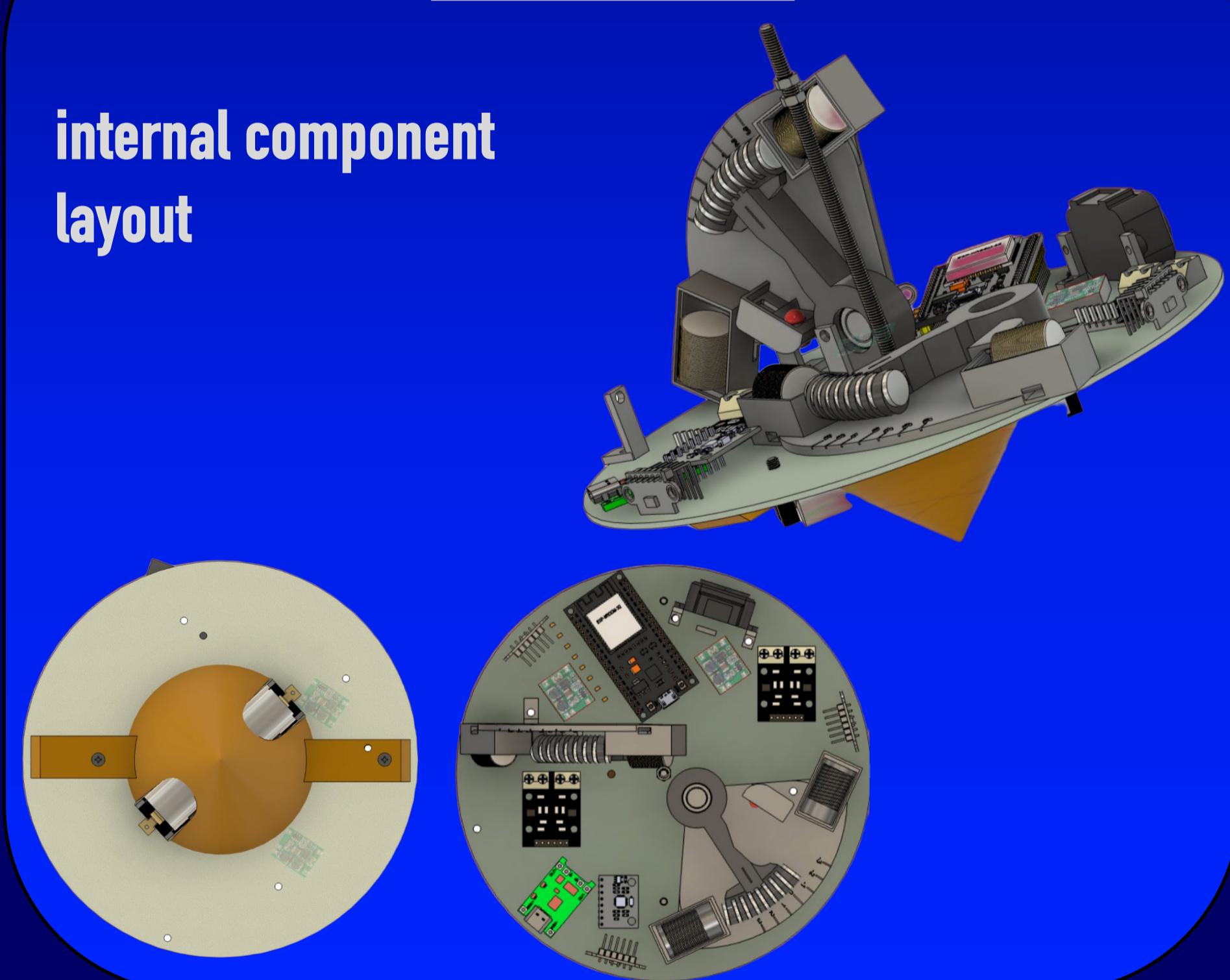
### SOFTWARE OVERVIEW

Brains behind the spin – Embedded C++ on ESP32

- Modular Arduino code structure with sensor, motor, and communication layers
- Hammer activation driven by internal timing cycles and motor phase logic
- Sensor fusion: ToF + LiDAR + MPU6050 for environment & motion awareness
- Live Wi-Fi data logging via ESP32 web server
- UART debug interface & I2C diagnostic routines
- BIST system runs at startup before spin sequence begins

### 3D MODEL

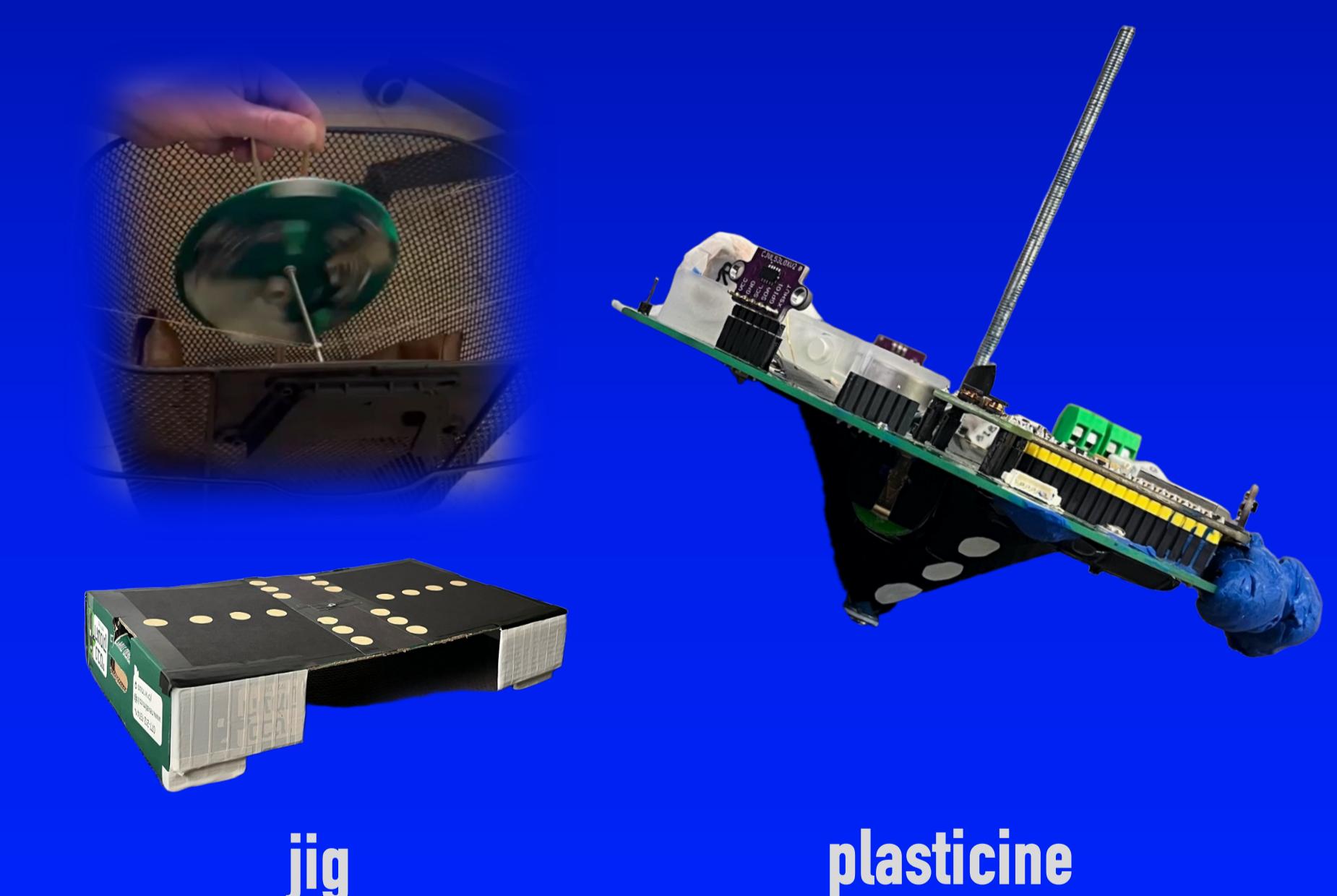
internal component layout



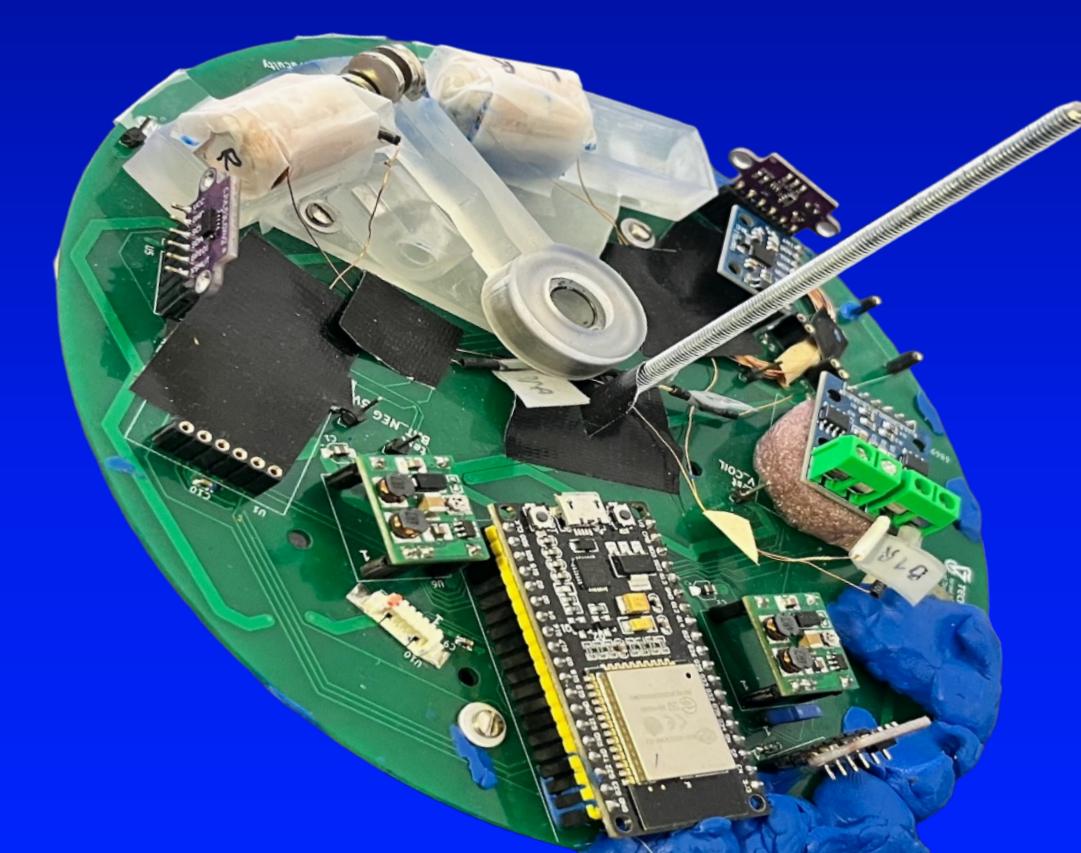
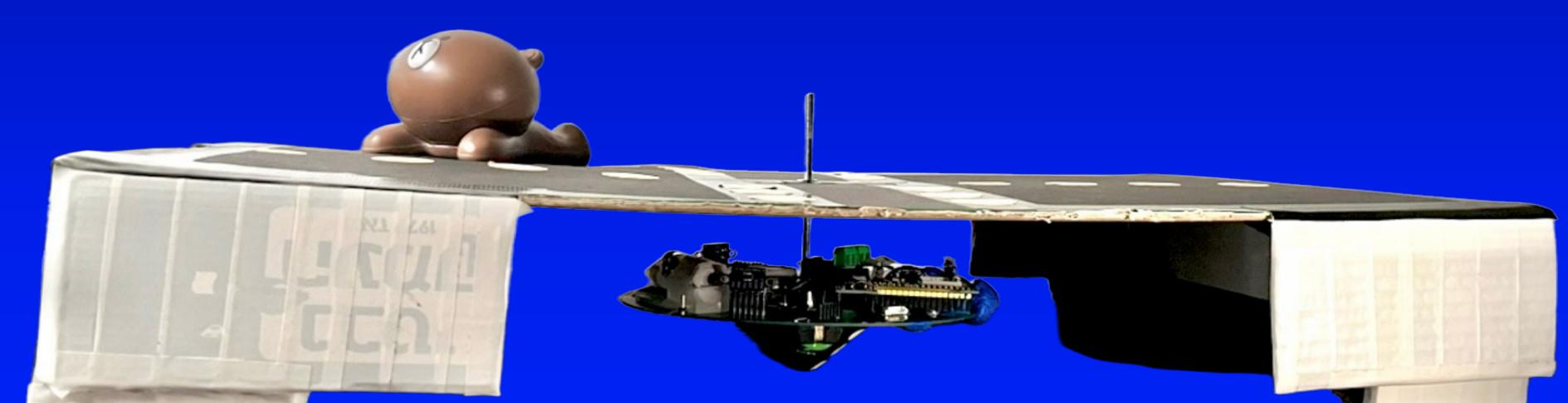
### PCB LAYOUT



### STABILIZATION SYSTEM



### FULLY ASSEMBLED SPINNING-TOP



Full project & source code available at:

[https://github.com/liyakeselman/Spinning\\_Top\\_Hardware\\_Part\\_1](https://github.com/liyakeselman/Spinning_Top_Hardware_Part_1)