



UBC Chem-E-Car: Cascadia

The University of British Columbia | Chem-E-Car Engineering Design Team

Ray Bi, Kyle Como, Athanasios Kritharis, Slang Lim, Ngai To Lo, Mani Massah
Email: team@ubcchemecar.com • Website: www.ubcchemecar.com



Interactive Poster
www.ubcchemecar.com/2017

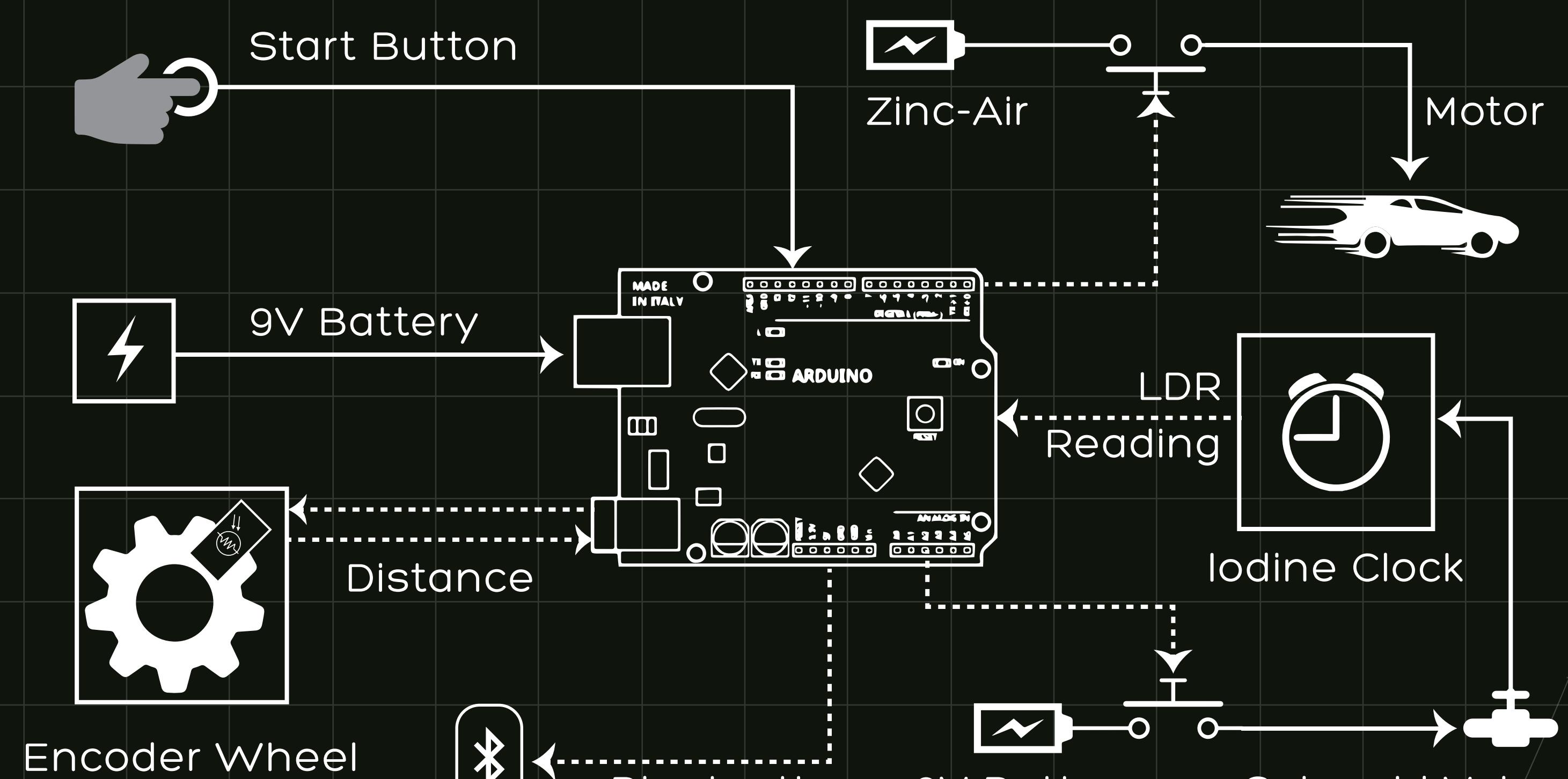
Introduction

- Our zinc-air powered vehicle uses an iodine clock timing reaction. Our vehicle is actuated with an Arduino controller that has custom electronics and an algorithm designed to reduce operational errors. **Safe operation** is emphasized in the design features.

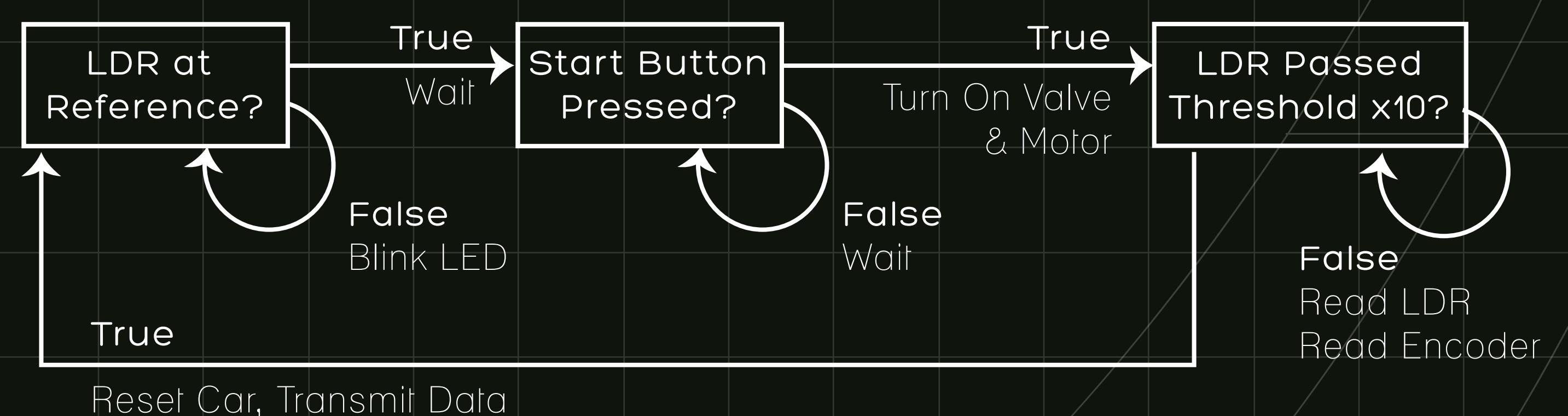
Unique Features

- Isolated casing for electronic components protects against **chemical spills** and **fires**.
- Secure connectors and insulating wires **prevent fires**.
- Secure suspension **ensure consistent steering**.
- High-traction wheels **prevent slipping**.
- Lockable iodine clock secured to base contains any spills.
- Low centre of gravity **prevents tipping**.

Control Mechanism



Control Algorithm



Stopping Mechanism & Calibration Curves

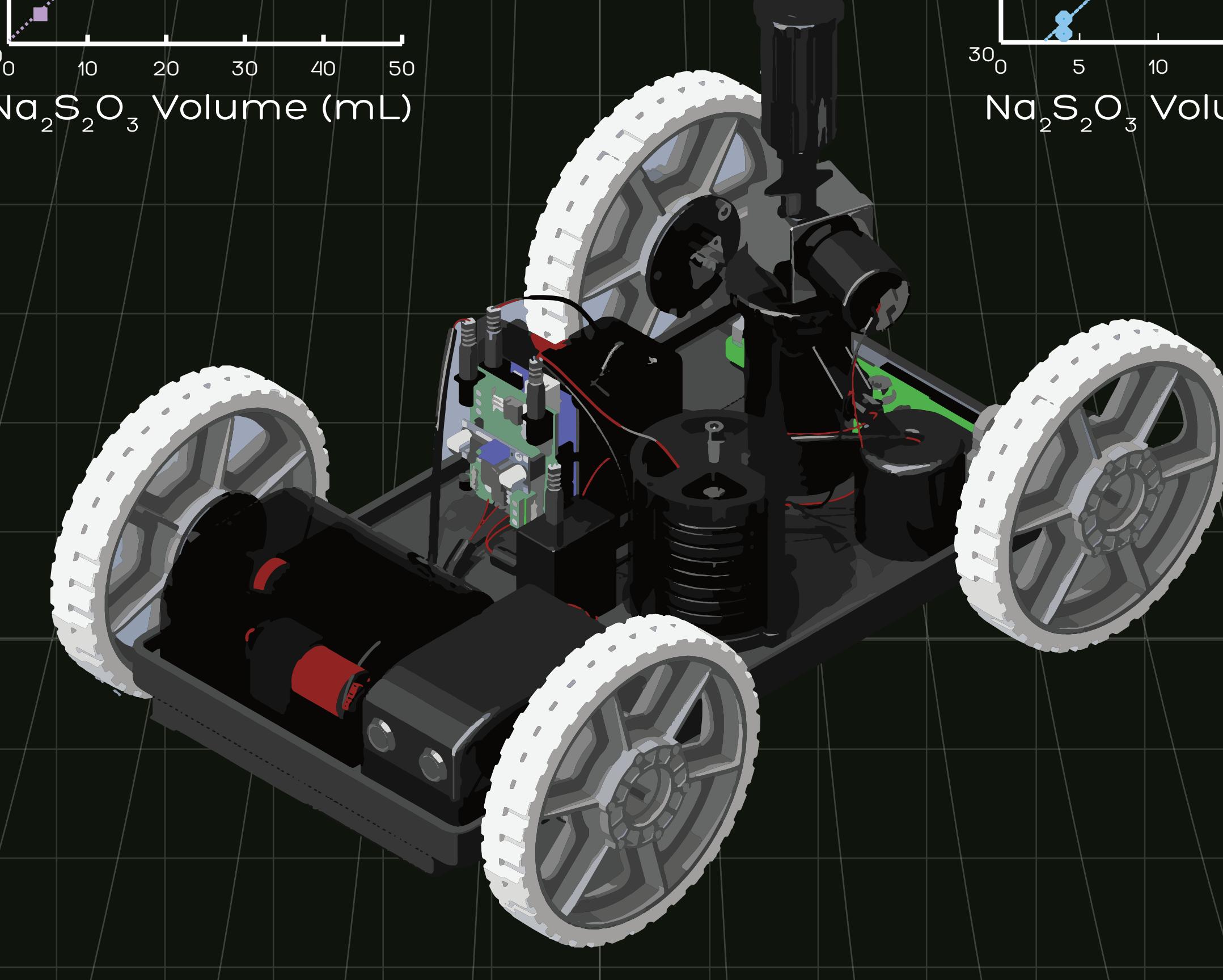
- Slow Reaction



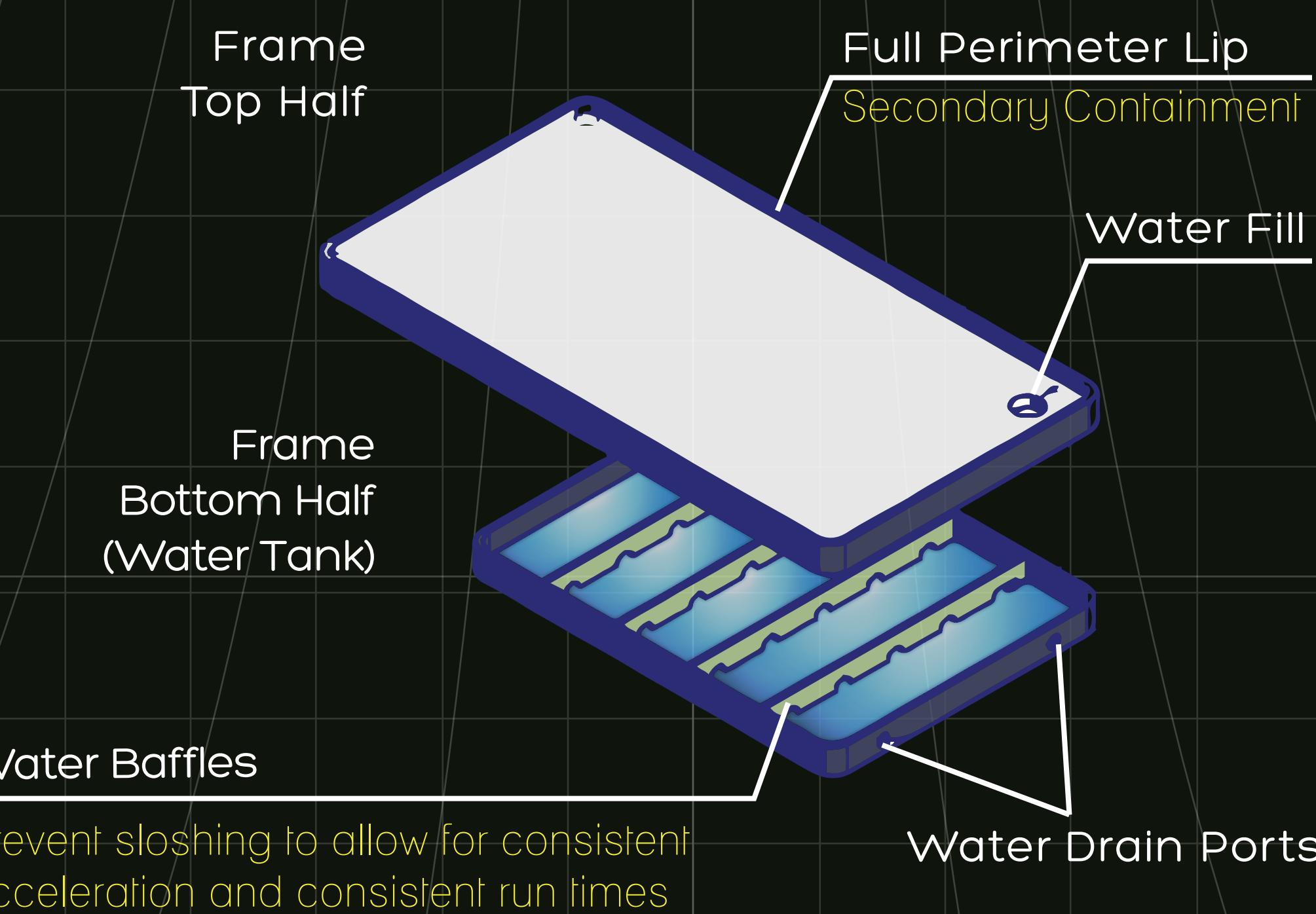
- Fast Reaction



- A tri-iodide starch complex is formed and colored blue.



Integrated Water Tank



Power Source: Zinc-Air Batteries



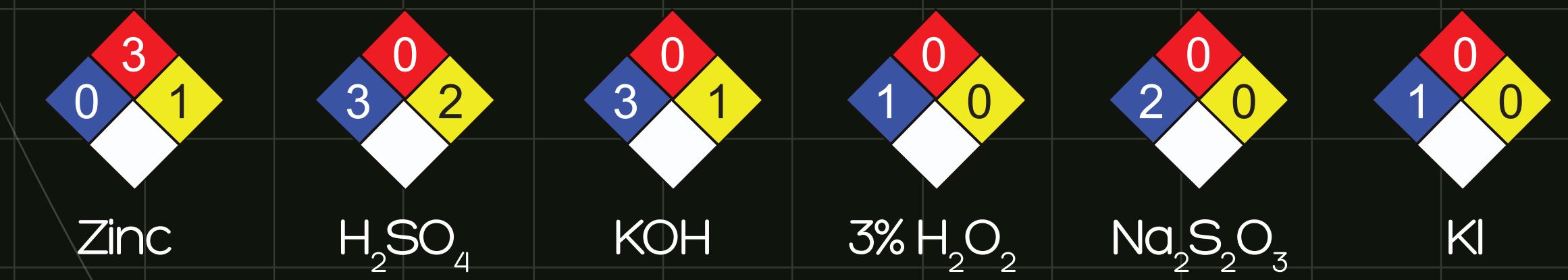
- Oxidation of zinc on the anode releases electrons which pass through an external circuit and travel to the cathode where oxygen is reduced to hydroxide ions.

Open Circuit Potential: 1.59V

- Each individual cell is self-contained in a primary casing to **prevent leakage** of corrosive 6M KOH. A secondary containment tower keeps the cells sealed and secured
- Corrosion-resistant nickel electrodes increase the lifetime of the battery

Safety and Environmental

- Zinc is abundant and **easily recycled**
- Zinc is used in small amounts in primary and secondary casing to minimize risk of fire
- MnO_2 and ZnO are **non-toxic and inert**
- ZnO is used as baby powder and in ceramics
- Spent iodine clock solution is **harmless when neutralized**



Sponsors



