



C7: Slope Stabilizer Bot

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Use Case and Solution Approach

Problem	Solution
<p>Slopes increase spill risks and injuries for workers handling hazardous materials. A safer transport solution is needed to maintain stability and reduce human exposure.</p>	<p>A self-stabilizing delivery robot designed to transport hazardous materials on slopes, adapting to movement and weight shifts to prevent spills and ensure safety.</p>

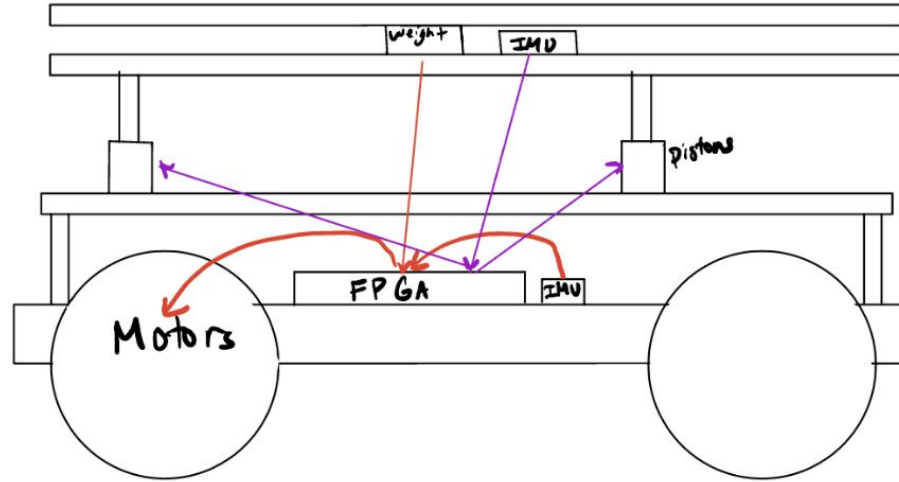


Design Requirements

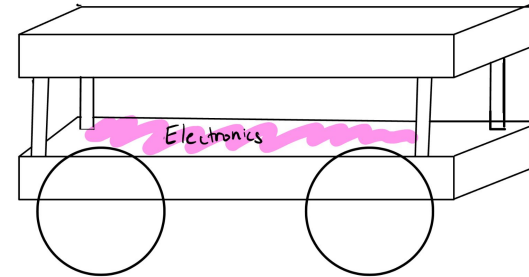
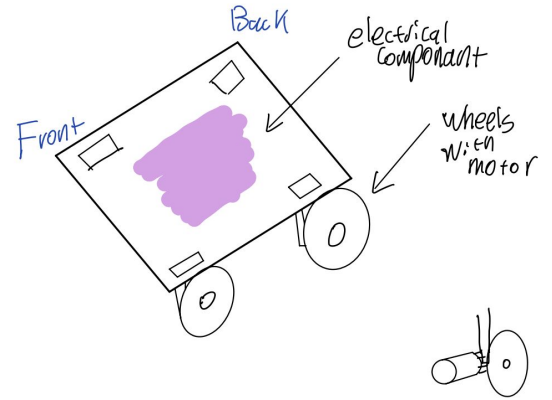
Load	1 - 4 Cups of Water
Slope	0° - 60°
Speed	1ft/s (on any slope)
No Spill	90% Filled
Response Time	500 ms

Minimum Viable Product (MVP): A 90% 1 Cup up 0° to 45° with spilling any water.

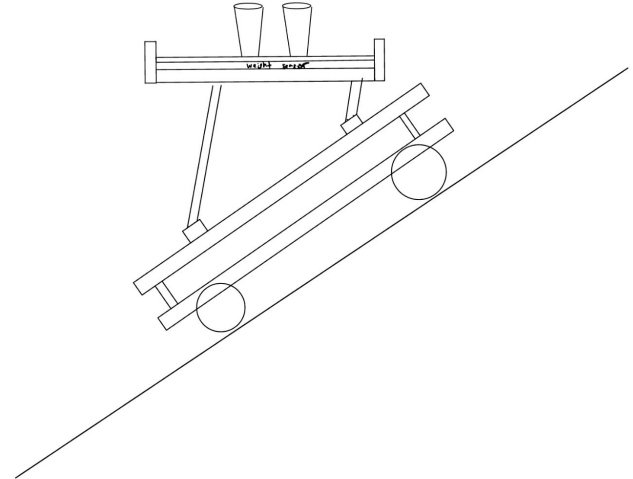
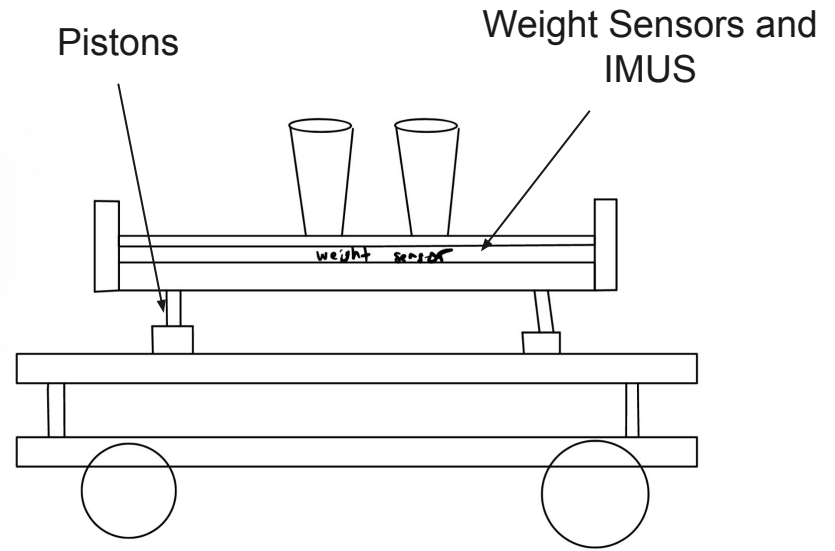
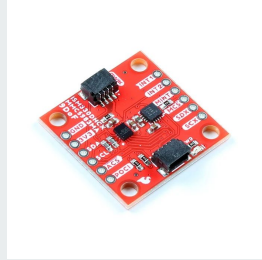
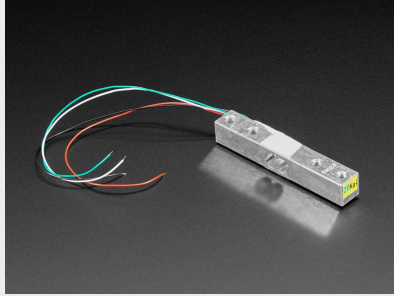
System Overview



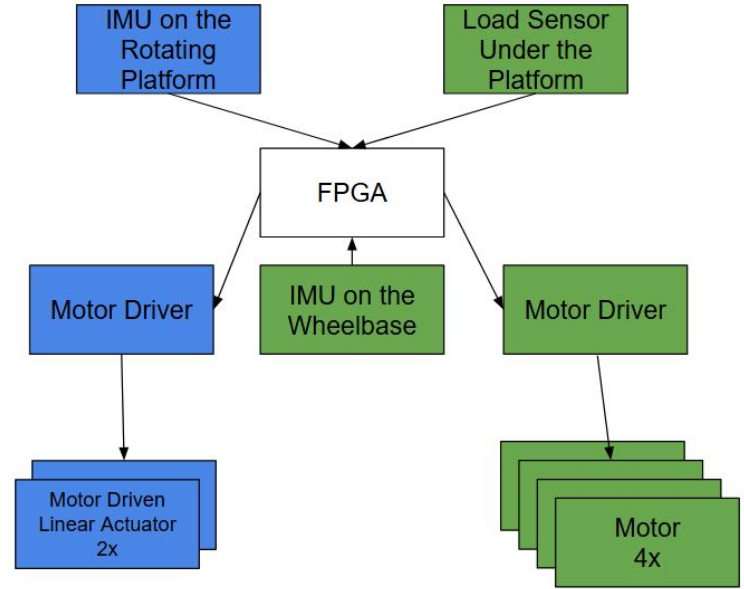
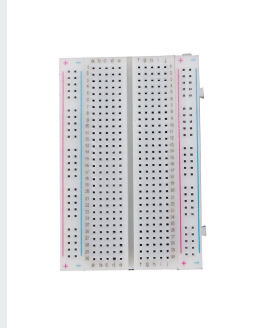
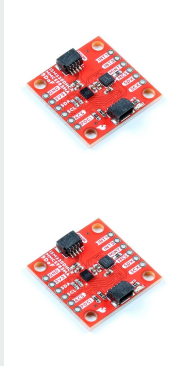
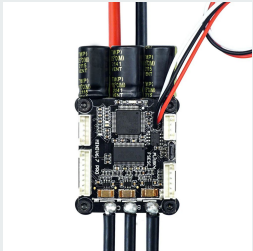
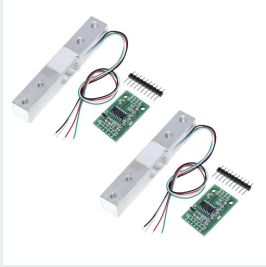
Base Design



Platform Design

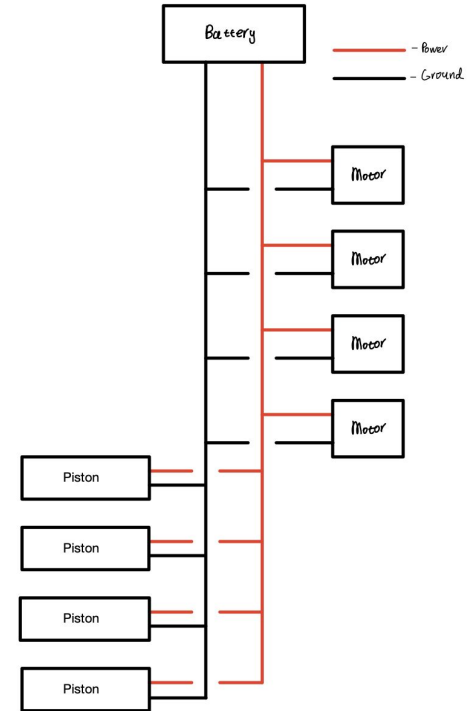
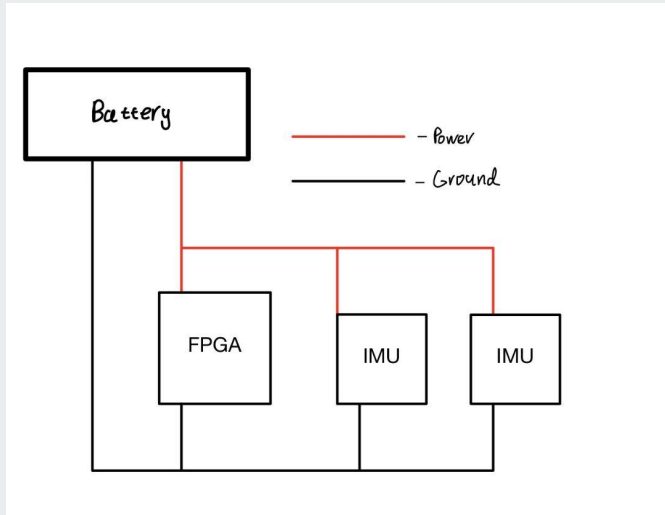


Electronics Design



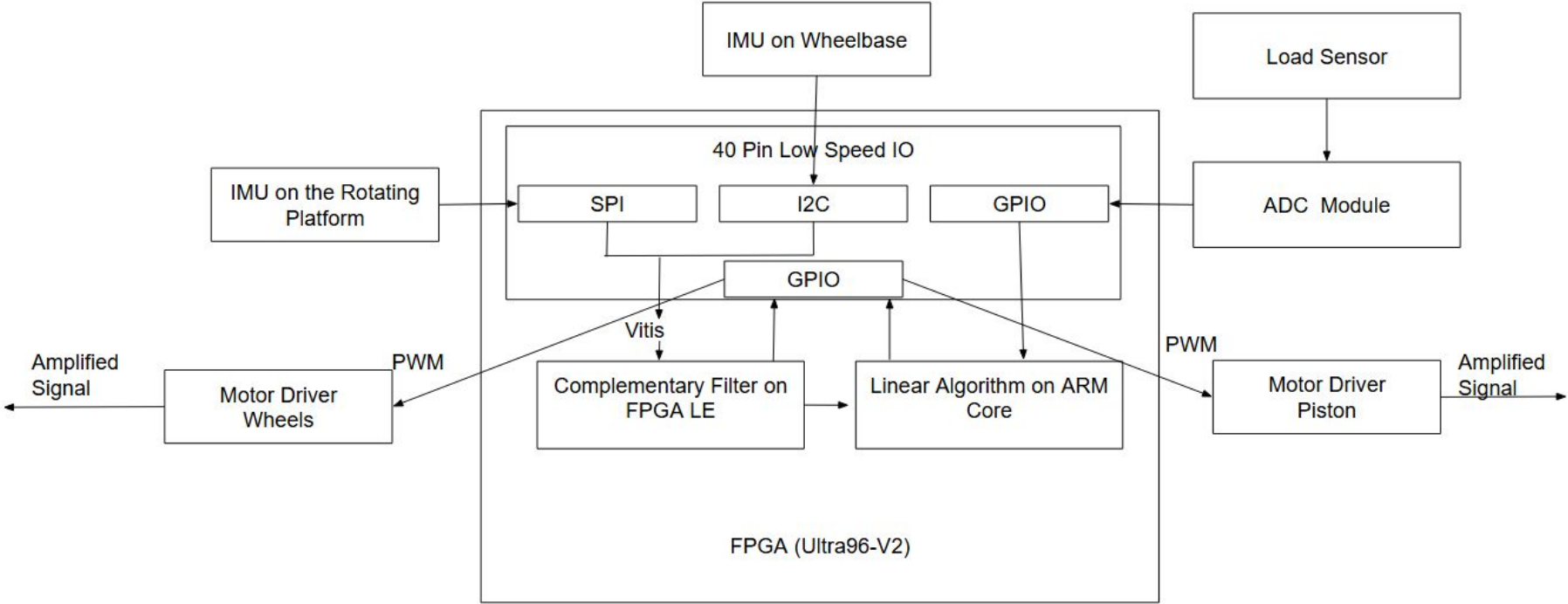
Power System

12V battery - All Motors & Pistons all run on 12V.



FPGA & IMUS

System Implementation Diagram





Testing

Build a Ramp:

- Adjustability from 0° to 60°
- Have the robot drive with certain amount of glasses of water

Make a bench of test cases for FPGA & IMU

- Feed test input (known slope and & acceleration) into the IMU & FPGA
- Read the results

Stability and Response Time Unit Testing

- Change and add glasses of water.
- Place the robot on slanted surfaces



Verification

Build a Ramp:

- The robot is able to travel from 0° to 60°
- Make sure the robot goes at a steady 1 ft/sec

Make a bench of test cases for FPGA & IMU

- The FPGA's and IMUs are receiving and outputting the desired data

Stability and Response Time Unit Testing

- Make sure the platform and pistons are working
- No drop of water is being spilled when the platform is moving and When the robot is moving

Schedule

