EE / CprE / SE 4920 - sdmay26-07
Salt Spreading Autonomous Mobile Robot
Status Report 5

03/27/2026 - 04/09/2026
Client: student-led
Faculty Advisor: Alexander Stoytchev

Team Members:

Isaac Blandin - Project Manager & Software Team Lead
Dylan Bunting - Electrical Team Lead
Hoyt Dzwoniarski - Electrical Team
Thomas Huedepohl - Electrical Team
Mikhail McDade - Software Team
Shobhit Singh - Scribe & Software Team

Work Period Summary

During this work period, the team was split among several high-priority tasks as we approach large-scale integration and testing.

On the software side, the team has developed a new iteration of our pathfinding model that is better at finding straight paths and handling diagonal paths. Additionally, we have implemented a better system for task scheduling and fault detection that our control system can use to schedule and prioritize tasks based on importance and polling rate needs.

On the main structure side, we have been able to design, 3D print, and assemble the entire main structure, including electronic enclosures, the last drivetrain components, and our sensor mounting structure.

For electrical, we have developed early prototypes for our transistor-based motor control and servo actuators for the salt subsystem, and our main board was submitted for review.

Past Work Period Accomplishments

- Isaac:
  - Final CAD modeling for switch & sensor mounting.
  - Magnetometer iron calibration code.
  - CAD modeling for a servo-controlled linear motion converter.
- Dylan:
  - 3D printed lids and other various parts for the project.
  - Worked on the electrical system design and implementation further. (see end of doc for current state of the diagram)

Past Work Period Accomplishments (cont.)

- Isaac & Dylan:
    - Assembled main structure of the robot
        - Power & Control Containment Boxes
        - Battery Containment Boxes
        - Main Structural Plate
        - Sensor Mounting Structure
    - Made all necessary holes and cuts for assembly
- Hoyt:
    - Worked on design of salt spreading mechanism. Pivoted work goals as a result of design considerations.
- Thomas:
    - Designed power circuit for salt spreader finished and ordered circuit board
- Mikhail:
    - Worked on a new pathfinding algorithm for better performance, handling diagonals, handling the size of the robot, and accommodating for battery life
- Shobhit:
    - Implemented a task scheduling and prioritization framework for our main contrl systems.
    - Made mock classes for each of our sensors for pre-integration testing purposes.
    - Debugged issues with data updates on the app.

Time Tracking

Name	Hours This Period	Cumulative Hours
Isaac Blandin	13	72.5
Dylan Bunting	10	47.5
Hoyt Dzwoniarski	8	47
Thomas Huedepohl	15	40
Mikhail McDade	6	55
Shobhit Singh	9	56

Plans for the Upcoming Week

- Isaac:
    - Integrate GPS and magnetometer code with drive control code for first GPS-based A to B drive testing
    - Perform early GPS-based drive control tests.
    - Work with Hoyt to get the first iteration of salt spreader gate control running.
- Dylan:
    - Implement electrical components and get the robot to a position where it can drive. Work on the poster and gathering documentation.
- Hoyt:
    - Work on implementing new design of salt spreading mechanism, including 3D printed hopper, and implementation and wiring of necessary electrical components required for the software team.
- Thomas:
    - Check on circuit board order, wire up robot
- Mikhail:
    - Finish up the new algorithm and have something presentable for a fully fledge pathfinding algorithm.
- Shobhit:
    - Refine distance calculations for the computer vision system to improve object size approximations.
    - Get the mobile companion app demo ready.
    - Add better documentation for the obstacle detection system implementation and iterations.

Summary of weekly advisor meeting

- 03/02/2026
    - Note: Had fewer members than usual due to a variety of time conflicts.
    - General work updates.
    - Showed off most recent 3D prints, discussed more clean lid fastening methods such as magnets.
    - Discussed additions to prior-art section of our documentation including robotic lawn mowers and how they do path finding.
    - Discussed the implementation of safety related features such as specific wire coloring and e-stop placements.
    - Further discussed locations and methods of doing final demos and presentations.

Summary of weekly advisor meeting (cont.)

- 04/09/2026
    - General work updates.
    - Presented the recently completed the main robot structure
        - 3D printed electronic enclosures, sensor mounting structure
        - Looked at the rigidity and discussed vibration concerns.
        - Discussed the next steps for it.
    - Lengthy discussion about how to move forward with the salt spreading system
        - 3D print a custom hopper or use the current one
        - Servo actuation of the salt gate
        - Showed an early prototype of the transistor circuit for spreader motor control.
        - Discussed timeline and plans for the next week for this

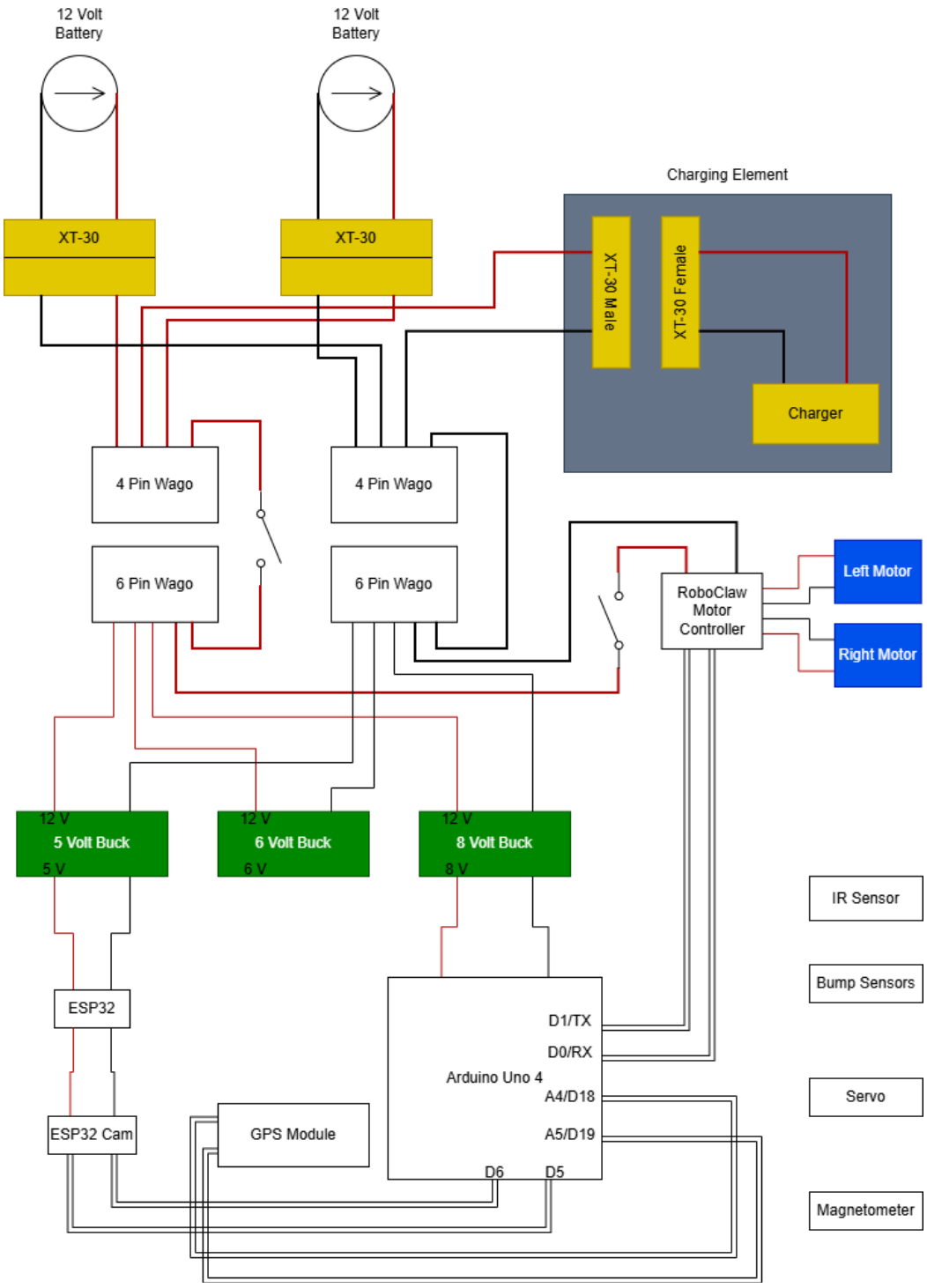


Figure: Near-complete wiring diagram.