EE / CprE / SE 4920 - sdmay26-07
Salt Spreading Autonomous Mobile Robot
Status Report 4

02/27/2026 - 03/12/2026
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

For most team members, this work period turned out to be a continuation of the last. On the software side, work continued on obstacle avoidance, client-server communication, and path-finding. Physical design has progressed from cardboard-aided to computer-aided design, with the entire robot now modeled, except for a few tweaks that need to be made.

However, some new developments have also occurred. Major progress is being made in our salt distribution system, with our actuators now being designed. Our electrical system has also begun to take physical form.

Past Work Period Accomplishments

- Isaac:
    - Team-level task planning
        - Planned out the next two sprints of individual & subteam tasks.
    - CAD Modeling
        - Drivetrain, Electronics Enclosures, Compliant Bumpers, Sensor mounting
        - Designed new drive modules using bevel gears to move motors to a protected location.
    - 3D printing support
    - Top-level electrical system design
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Past Work Period Accomplishments (cont.)

- Dylan:
    - Began design of final power distribution schematic.
    - Prototyped multiple iterations of bumbers and a new drivetrain system until our needs were met. Built the updated drive modules
- Isaac & Dylan:
    - Overall team-level planning
        - Electrical & Software Integration Scheduling
        - System interactions design
- Hoyt:
    - Tore down and analyzed commercial salt spreader module. Planned how to integrate existing manual, trigger activated, mechanism with software control. Tested motor functionality. Researched options for using servo motor for linear motion. Designed servo horn.
- Thomas:
    - Planned and soldered power wiring.
- Mikhail:
    - Made progress on pathfinding as it is now capable of generating a full path for the robot to follow, with variables such as the width of the salt spreader, but currently, it will not dynamically change its route if any of the initial parameters change. Updated the UI so it overlays the Google map screenshot with the path it's going to take and what it's already cleared, and wrote a Python program that converts the screenshot to a text file the path-finding algorithm can read.
- Shobhit:
    - Continued working on the control systems via the app, tested the subsystems communications and refactored code into libraries before the start of systems integration phase.
    - Changed the microswitches (bumper sensors) to normally closed.
    - Got the new camera working and communicating.

Time Tracking

Name	Hours This Period	Cumulative Hours
Isaac Blandin	20.5	49.5
Dylan Bunting	8.5	27.5
Hoyt Dzwoniarski	10	27
Thomas Huedepohl	6	20
Mikhail McDade	14	36
Shobhit Singh	10	32

Plans for the Upcoming Week

- Isaac:
    - Finalize CAD models, start final 3D prints
    - Write initial A to B GPS-based drive code.
    - Create an updated top-level control system diagram.
- Dylan:
    - Complete power distribution schematic
    - Continued 3D printing support
    - Assembly of drivetrain.
- Hoyt:
    - Finish designing controllable spreading mechanism and fully mount to existing hardware. Begin working with the CPRE team to make spreading controllable via MCU.
- Thomas:
    - Finish power distribution board
- Mikhail:
    - Improve the UI for better readability and accuracy of the PNG-to-TXT Python program, and fix bugs and improve the pathfinding program.
- Shobhit:
    - Bluetooth integration in the app for initial wifi connection and making the user controls and operations working.
    - Figuring out whether to create a hole in the grid for the detected obstacle or move around it.
    - Work out a way to handle moving objects and others. Accounting for all possible real time scenarios and having solutions ready.
    - Work towards IR integration.

Summary of weekly advisor meeting

- 03/05/2026
    - General work updates
    - Presented CAD model of proposal for the structural overhaul of the robot, including the cost of the overhaul
        - Received approval to make the purchase
    - Presented the current state of our path-finding algorithm
    - Dr. Stoytcheb encouraged us to make a major push going into Spring Break and immediately after.
- 03/12/2026
    - General work updates.
    - Dr. Stoytchev expressed concerns over subsystem integration.
    - Discussed the needs for salt measurement, battery monitoring, and fuses.
    - Presented new CAD models.
    - Discussion about the near-term work planning.
    - Presented test prints for 3D printed hinges and compliant bumpers