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

03/13/2026 - 03/26/2026
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

While this period saw reduced output from the team due to Spring Break, we still made key steps towards full bot integration.

The drivetrain of the second prototype is now complete, and other physical components have reached their final form, whether in CAD or fully printed, including updates to our compliant bumper mechanism.

On the control side, magnetometer code has begun, pathfinding has gained major performance and feature improvements, and the obstacle avoidance system has gained the process handling layer.

Electrically, the salt spreader control system has been sketched out, our electrical system diagram has been finalized, and the mainboard is nearing completion.

Past Work Period Accomplishments

- Isaac:
    - General team-level task planning
    - CAD Modeling
        - Updated bumpers for more compliance
        - Added switch mounting locations
        - Added final mounting hole locations on enclosures
        - Updated drivetrain model for final component & hardware selections
    - Magnetometer integration
        - Have begun working on integrating the magnetometer, and am current working on how to trigger and execute a calibration sequence from an external trigger.
- Dylan:
    - Created an electrical system level diagram of our project
    - Started circuit integration
- Isaac & Dylan:
    - 3D printed and assembled the drivetrain for prototype 2.0.
- Hoyt:
    - Worked on implementation, design, and planning of salt spreading subsystem
- Thomas:
    - Added salt spreader power circuit to mainboard design, as well as accessory headers.
- Mikhail:
    - Worked on improving UI by adding the quantity of salt available on the deployed robot and adding the ability to hide one or all of the different paths that the robot will take. Improved performance by changing how it plotted the path, and added resolution and the ability to change how much space a square takes up in the real world, i.e., 1 grid is 1 ft x 1 ft
- Shobhit:
    - Worked on the Bluetooth integration and initial user app setup.
    - Worked on listing the different environtment scenarios for sensors, their responses, system failure prevention and handling via a hybrid RTOS model for the whole system with fault tolerance.
    - Worked on the obstacle avoidance and handling system, combining the camera, bumper, and mmWave sensor, comparing their data for the final output.
    - Configuring the mmWave to work on a moving platform.
    - Started working on a layered RTOS architecture with fault tolerance for the whole system.

Time Tracking

Name	Hours This Period	Cumulative Hours
Isaac Blandin	10	59.5
Dylan Bunting	10	37.5
Hoyt Dzwoniarski	10	37
Thomas Huedepohl	5	25
Mikhail McDade	13	49
Shobhit Singh	15	47

Plans for the Upcoming Week

- Isaac:
    - Finalize hard-iron calibration code for magnetometer
        - Mock up how to integrate this with an external trigger and the needed motor controls
    - A to B GPS + Magnetometer-based robot motor control loop.
- Dylan:
    - Integrate the electrical system diagram into the bot
- Hoyt:
    - Finish implementation of the salt spreading subsystem and integrate with other existing systems
- Thomas:
    - Finish and order mainboard
- Mikhail:
    - Correct how pathfinding deals with diagonals and how it treats turns and the longest path and new obstacles, as well as improve how the grid is made.
- Shobhit:
    - Working on the ToF sensor for the salt level measurement.
    - Make a detailed sub-system integration architecture, data handling, speeds, task scheduling and priority.
    - Test dummy tasks on UNO R4 for results.
    - Fixing some bugs in communication between the app and R4.

Summary of weekly advisor meeting

- 03/26/2026
    - Presented our new drivetrain to Dr. Stoytchev
        - Had a discussion about next steps and how we plan to manufacture our top plate out of polycarbonate (hand tools vs. ETG CNC)
    - General task/work updates
        - Electrical system updates
        - Physical robot construction updates
        - Motor control/pathfinding/object avoidance integration
    - Dr. Stoytchev raised questions about the state of the salt spreading subsystem
    - Discussed the remaining time in the semester and whether we have enough time to complete our tasks
        - Documentation, general project scope.
    - Discussed the viability of outdoor demonstrations for poster sessions.