sddec18-22 Automower (Autonomous Lawn Mower)

Biweekly Report #2
Reporting Period: 9/25/18 - 10/8/18
Client: Micron Technologies/Ryan Marion
Advisor: Dr. Jones

Team Members

Sam Tinklenberg - Team Leader
Andi Li - Meeting Facilitator/Software Dev
Bryton Hayes - Test Engineer
Grant Duncan - Software Lead
Joel Seaser - Hardware Lead

Summary of Report

For the term of this report, our focus was on getting the chassis assembled to start doing the physical testing of our system. We have been working to order all necessary parts to continue progress. We have added Google Maps to the app and testing with simulated GPS data. We have also tested the initial motor control library with our motor and started working on libraries to parse and process GPS data and read the quadrature encoder that is on our motors. We have decided to switch over to all-wheel drive. This solves the problem of the wheels and provides more power for going uphill and solves our turning issue. One thing we might have to look at is the new weight distribution, but expect to have the chassis assembled within the term of the next report. We also worked on getting the raspberry pi to have a more streamlined setup. This includes being able to initiate a ssh connection over bluetooth so you can give it the local wireless network information. This will prevent us from having to use a monitor, mouse, and keyboard to set-up the raspberry pi every single time we use it on a different wireless network.

Tasks Completed:

General Tasks:
- Order all parts except wheels to assemble chassis
- Researched new drive method (all wheel drive)
- Determined which bump sensors we will be using

Specific Tasks:
- Mobile
  - Get Google Maps API key and add it to project
  - Create simulated GPS data
- Raspberry pi
  - Headless setup using bluetooth.
- Embedded
  - Created and tested basic custom C++ library for motor control

Tasks In Progress:

General Tasks:
- Research different wheel and drive options

Specific Tasks:
- Mobile
  - Make Google Maps polylines to show mowing history
- Raspberry Pi
  - HTTP Server
    - Handle HTTP post and get requests.
    - Get php scripts to work to add stuff to database
  - Networking
    - Work on getting the phone and raspberry pi to be able to connect together more automatically and less manually.
  - Database
    - Create other tables for more information from the arduino.
  - Firewall
    - Make a little bit more robust.
- Embedded
  - Test and validate WAAS data (need antenna)
  - Test motor feedback and GPS libraries
  - Create list of database information to communicate with Rpi
  - Add functionality to Arduino libraries
  - Decide on methods of object detection
- Hardware
  - Research wheel and drive placement

Upcoming Tasks:

General Tasks:
- Finish and test Perimeter Wire Circuit
- Meet with ETG to discuss drive and blade mounting

Specific Tasks:
- Raspberry pi
  - Authentication
    - Come up with a way to authenticate users when they try and send requests to the web server.
  - Connectivity
    - Connect the raspberry pi to the local network automatically.
    - Come up with a solution for the raspberry pi to still be functional when it loses connection while it mows.
- Embedded
  - Plumb GPS and motor data to Raspberry Pi database

- ○ Incorporate library functionality into a main Arduino program
- ● Mobile
  - ○ Get location data and diagnostics from mower
  - ○ Use real location data to make a map of where the mower has been
  - ○ Update weather to use mower's location instead of phone's
- ● Hardware
  - ○ Start assembling drivetrain/chassis
  - ○ Compare motor feedback to GPS data

Name	Individual Contributions	Hours this report	Cumulative hours
Sam Tinklenberg	Pi headless setup, webserver.	12	32
Andi Li	Researched the new drivetrain method and bump sensors to detect objects	12	32
Bryton Hayes	Create and test custom Arduino library for motor control, start libraries for encoder feedback and GPS	21	52
Grant Duncan	Worked on the mobile app	15	35
Joel Seaser	Worked on parts lists and perimeter wire ardiono	12	3232