**Intelligent Mobile Systems – Project Logbook**

Team 6: Eddie Lindgren

**Week 13:**

* This was the starting week and as such the focus was on the lectures, meeting the team members and getting to grasp the task given to us.

I attended both lectures which were about the project and how Husqvarna handles larger projects.

We met up as a team and decided how we were going to designate ourselves to smaller groups. I joined the mower group alongside Anton and Kero. Additionally it was decided that the team will use Agile methods for the project. Since we’re just starting there wasn’t a lot done on the mover but we’ve planned to start working on it next week.

I want to give a shout out to Dejan who showed impressive effort in coordinating our large team when we where making decisions.

**Approx. time spent this week:** 6 hours

**Week 14:**

Monday:

* Today we in the Mower group met up and discussed the project. Anton had during the weekend setup the robot and managed to make it move and follow some requirements. He explained to us how it worked and I downloaded some necessary programs such as Arduino and mBlock. After this we discussed our goals and what requirements we where going to need from the other teams. Lastly I set up a Github repository.

Tuesday:

* Two things happened today. Firstly I attended the online lecture about wireless communication. Then we in the mower group held more discussion on our requirements and dependencies. I changed the repository on Github to better follow what the rest of the groups in our team were doing. Then the whole team held an online meeting where we discussed what dependencies we had and everyone's interpretation of the requirements. We also made rough outlines for our planned sprints and how we were going to implement version control.

Wednesday:

* I watched the recorded lecture on Bluetooth and began looking up how Bluetooth was going to work on the robot.

Thursday:

* Anton called in sick and as we currently have the time we decided in the group to take the rest of the week doing individual research. I read up on the robot specifications and familiarized with how coding works on it.

Friday:

* Further familiarized myself with the robot. I looked up libraries the robot used and found documents on the libraries the robot and other Arduino boards use in regards to Bluetooth. Concentrated on reading those documents. Additionally the team had a stand-up meeting where we discussed on how far we were in the project.

**Approx. time spent this week:** 17 hours

**Week 15:**

Monday:

* The day started with a meeting with us from the Mower group. We took our epics and divided them up into user stories. Afterwards we discussed how we were going to implement Bluetooth to the robot. I managed to find the name of the Bluetooth module the Arduino board used. Together with Anton we tried to implement Bluetooth with a test function with example code that we found online. The day ended with a sprint planning session with the entire team.

Tuesday:

* Today I continued reading up on the Bluetooth module. Anton managed to find out that the Arduino board uses the same serial output for the Bluetooth and USB port. Meaning that it would be necessary to use Bluetooth on the raspberry pi instead. We ended the meeting by deciding how the state-machine for the robot would be structured.

Wednesday:

* Attended the lecture on LiDAR. Me and Anton met up after the lecture and attempted to setup Bluetooth on the raspberry pi. We succeeded in establishing a connection with the test app “Serial Bluetooth Terminal” and creating a test function that could send strings between the and the raspberry pi.

Thursday:

* Attended the lecture on internet structure. Afterwards the team took a vacation for Easter between Friday and Monday.

Friday:

* Easter break.

**Approx. time spent this week:** 16 hours.

**Week 16:**

Monday:

* Easter break.

Tuesday:

* I attended the lecture on localization and positioning. The day started with a meeting with the mower group where we worked out how we wanted the state-machines for the mower to be. Then we assigned tasks to each other. My task will be to create a random turn function.

Wednesday:

* I focused on getting to know how to work with the robot hands-on. I looked over the ultrasonic sensor and how that works. Finally I created a test-function to be able to more easily test how the mower should turn. The last task of the day was a sprint planning meeting with the entire team.

Thursday:

* Continued programming on the mower and finished the random turn function.

Friday:

* Attended Linus Rudbeck’s second lecture. We in the mower group had a meeting where we checked our progress, had a small discussion on how some functions and enum variables should be handled and then a small tutorial of how we were going to handle Github merges. The last thing I did for the day was to update my turn function based on feedback I got from the meeting.

**Approx. time spent this week:** 15 hours

**Week 17:**

Monday:

* I attended the lecture on computer vision. After the lecture the team had a sprint planning where we planned what we were going to do this week.

Tuesday:

* I spent a session roughly measuring the speed of the mower when going in a straight line. During the tests I discovered that the internal Arduino “delay()” function would not work for our robot due to it forcing the rest of the robot to stop.

Wednesday:

* We in the mower team had a meeting where we tried to connect to the app via Bluetooth. We also had Mikael who is in the frontend group also work with us. The connection sadly didn’t work due to a miscommunication that started with a misunderstanding from me. When I was asked which type of Bluetooth connection we where going to use I answered with Bluetooth Low Energy. While the raspberry pi board we use can use BLE it can also use Bluetooth Classic, which is the one we where gonna use.

Thursday:

* Me, Anton and Mikael worked on the Bluetooth connection. After a bit of fiddling the app and raspberry pi managed to bot pair and connect with each other.

Friday:

* I learnt of the LED’s on the robot worked and I adding the LED lights to the mower code. Additionally looked into how the line sensor operated and started working on improving the turn function of the mower. Lastly I attended the sprint retrospective.

**Approx. time spent this week:** 20 hours

**Week 18:**

Monday:

* First I attended the teams sprint planning. Then I continued using the line sensor and learned what values it sought for each specific sensor on the module. With that I updated my random turn function so that it would turn in a specific direction based on what sensor on the line sensor module would detect darkness first.

Tuesday:

* I added the LED’s to the main code and then tested the new turn function I made yesterday. It didn’t work at first though because I forgot to add a certain function in my test code. The rest of the testing I had to wait for Thursday.

Wednesday:

* Was unable to work on the project today.

Thursday:

* This day we had a large amount of tests with the entire hardware group that took a couple hours. We tested positioning, the gyro module and the Bluetooth driving functionality. We managed to get the hardware positioning data working correctly but we encountered trouble with the Bluetooth connection again sadly. I managed to test with my Android phone and Android studio but we sadly didn’t manage to connect the app with the raspberry pi.

Friday:

* The team had a sprint retrospective and I spent a while looking through and cleaning my code to make the merge in Git easier.

**Approx. time spent this week:** 18 hours

**Week 19:**

Monday:

* I attended the sprint planning meeting with the rest of the team and began planning what was needed for the last bit of the project.

Tuesday:

* Me and Anton went through a couple of tests this day. We again tried to find out if we could connect the app with our raspberry pi. With the help of Mikael we managed to figure out what the issue has been. The problem was that my Android phone is an older variant and therefore used a slightly older SDK which the was not taken into account when developing the app. With some slight adjustments we managed to make the connection work. After this was done we started testing the communication with backend together with Dejan. This went successfully without hitch. We lastly tried to test the main functionally of the mower that we ourself developed but we encountered some issues. The program did not work as intended. More testing will be needed.

Wednesday:

* Me and Anton continued tackling the issue we found for a couple of hours. With some specific tests we managed to pinpoint the issue to probably being some issue with the serial communication between the mBot robot and the raspberry pi. We didn’t manage to figure out a solution yet.

Thursday:

* Looked through the code and read online to see if I could find a solution to the serial communication issue. Also spent some time reading through the lecture notes.

Friday:

* Me, Anton and Kiro did some more tests and finally managed to resolve the serial communication issue. We did some tests to find and fix some more bugs. When merging this my updated turn function was reverted which I began fix later during the day. This will be merged next week. We had our sprint retrospective with the entire team where went through what more we had to do since the deadline was coming up. Lastly I created a simplified template for the software design description.

**Approx. time spent this week:** 20 hours

**Week 20:**

Monday:

* Today we had our last sprint planning meeting and therefore we went through what was left to do. The hardware and backend was mostly done but still needed testing. The app still had a few things to do so the plan for the week is to test the backend and the mower tomorrow and then on Thursday we would do a final integration test where everything would be tested to see if it would work. We also began planning out how we were going to do the documentation and the presentation.

Tuesday:

* Three main things were done today. First we in the mower group tested the communication between the mower and backend. There were a few issues that occurred but they were solved by the end of the day. Secondly we began setting up a power bank and the Raspberry Pi on the mower so that the mower could run without being plugged into a power plug. Lastly I read up on how a system design description is typically written and created a simplified template we in the mower gang could write in.

Wednesday:

* Since it’s the last week it felt necessary to have an additional meeting in the middle of the week to check everyone’s progress. We also spent some time planning out what we were going to do for the upcoming presentation. Lastly I continued with the documentation and made a sketch for the state-machines for the automatic driving and manual driving for the mower.

Thursday:

* We did our final integration test to see if everything worked. While some bugs were found, they were promptly fixed and everything was working. I personally continued with the documentation and began writing the system architecture of the software the hardware group had done. Lastly I prepared for the upcoming examination of the course.

Friday:

* The whole team sat down for a long meeting where we wrote the “Lessons learned” document. We reflected the project as a whole. Such as what went good and what could have been done better. Lastly I finished the documentation for the system architecture.

**Approx. time spent this week:** 21 hours.