ENSC 440/305 Capstone Engineering Project

Progress Report

Group 16

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For the past three months, Freedom Innovation is actively working on the development of Robotic Item Retrieval System, a household robot that could self-navigate in a room and retrieve items for the user. The following list illustrated the completed and ongoing tasks for the project.

1. Documentation
    a. Functional specification — completed
    b. Design specification — completed
    c. User manual — 0%
2. Hardware implementation
    a. Robot base and steering system — completed
    b. Navigation module — completed
    c. Robotic arm platform — 5%
    d. Central control module — completed
3. Software implementation
    a. Operating system — completed
    b. Wireless connectivity — completed
    c. Drivers - processor I/O ports — completed
    d. Drivers – sensor and actuators — 60%
    e. Robot application — 5%
    f. Camera streaming server — completed
    g. Client GUI — 20%
4. Testing and Integration
    a. Hardware module testing — 75%
    b. Hardware integration — 60%
    c. Software Unit testing — 30%
    d. Software integration — 0%
    e. System integration and testing — 15%

Project Status

As progress has been made, the development focus of the team is gradually shifting from hardware to software. The hardware implementation is almost complete except for the robotic arm elevator platform. Each hardware module we built is tested separately before all modules are put altogether. However, most of hardware system tests cannot continue before the corresponding software driver is ready. As for the software development, we have finished the drivers for processor I/O ports such as ADC, GPIO, PWM and I2C interfaces. We are currently working on higher level drivers for reading sensors and controlling motors. At the same time, we have developed a preliminary version of client GUI software that could communicate wirelessly with the robot.

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Schedule

The original scheduled date for finishing the project is March 30th. We are not going to meet this deadline for three reasons: first, the Robotic Item Retrieval System is a comprehensive project which by its nature requires more time and resource. Second, the scheduled project demo date for our group is April 30th, so it's only wise to use the extra one month to improve the quality of our project. Lastly, one of our team members is troubled by the health issue of his mother, so he could not make full commitment to the project as he wanted. This will be explained in the Issues and Concerns section.

Action Items

The following task, listed in order of importance, will be accomplished before the project demo date.

1. Order the last batch of parts for building the robotic arm
2. Build and test the robotic arm platform.
3. Finish the robot software implementation.
4. Complete client graphical interface software.
5. Finish system integration and field test.
6. Write user manual and other required documents

Budget

At the time this report is written, the project spending of Robotic Item Retrieval System is still well under the proposed budget of **$1693.35**. We have minimized the cost for the project by purchasing parts from selected stores. For example, we have ordered most of the sensors, servos motors from China. The current project spending is a bit under **$1400**. Out of this total, **$800** was funded by ESSEF and we expect to get the rest of the money from the Wighton Fund.

Group Dynamic

The team is still strongly tightened and most group members are still in very positive work atmosphere. The group dynamic is healthy and the team members are constantly exchanging technical ideas and share fun topics. Most of the team members have a high commitment for the project and put this project as the highest priority among their course works.

Issues and Concerns

The mother of John Ogawa, one of our team members, has been lately diagnosed with cancer. John is current under a great deal of emotional stress thus he was unable to make full commitment to the project. The other team members understand his difficulties and each is willing to off-load some of the project work from his shoulder. We as a team are working harder to make sure the project will be ready for demo by April 30th.

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