RAFS - Robot Aided Feng Shui

Customer Feedback Document

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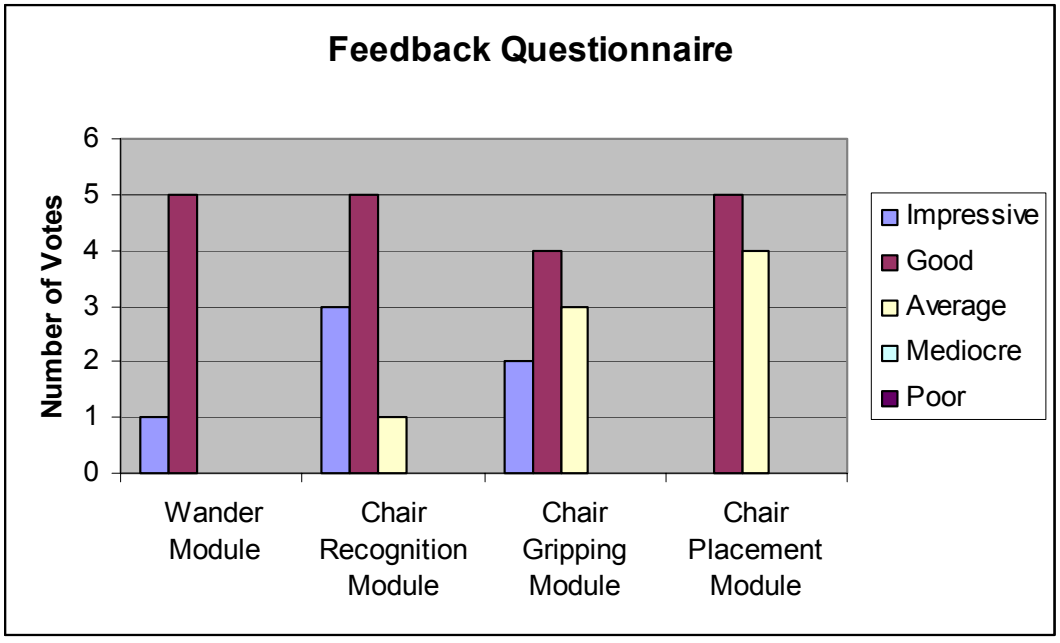
Introduction

Customer feedback is very important in the software development life cycle. It is used to analyze how the customer feels about a product. This can in-turn be used to improve a product before it's final release on to the market, to a customer, or for a senior project faculty presentation.

We, the RAFS team, have written a questionnaire and have presented our product to the CS 490 – Mobile Robotics class in order to get some knowledgeable feedback on our project in preparation for our faculty presentation. Our questionnaire asks questions pertaining to each of the four main modules developed for our project along with if the person feels there might have been a better method of implementation. Another question has been added to get a feel for what people think has been implemented well. The final question tells us whether or if any of our modules need significant improvement.

The questionnaire has been structured to get feedback on how we did and if there is a better way any module could be implemented. In doing this, someone may give us a fresh idea that we could implement by the faculty presentation time. Not only will it give us fresh ideas, but also it will give us an idea of how we would have faired presenting our project to the faculty as it was.

Feedback Results



Comments:

- To recognize a chair, it can use some other distinguishable properties, instead of color.
- Didn't see wandering. However, the idea behind random "goals" seemed very functional.
- Use of ACTS to detect the difference in chair/obstacle worked efficiently.
- Chair didn't seem to end up where it should at the desk. Some improvement seems needed to place the chair somehow and not the robot.
- Watch out for the laser's status lights or change your color to something not normally visible.

Which aspects of the RAFS project particularly impressed you? Please explain.

- Smooth navigation – It's fast to detect obstacles in the closed world.
- Grabbing a chair – It has a pretty strong grabber and performed well.
- Path planning and movement of chair to the desk. To see it when fully functional would be quite interesting.
- Path finding, chair recognition – [fair].
- Chair gripping seems like one of the hardest modules to implement. The robot's reorientation was impressive.
- The complex control of the robot from a PC.
- I saw you are using color recognition to detect chair, don't you think coupling that with edge detection would help to find a chair or desk.
- ACTS recognition seemed to work well.

Which aspects of the RAFS project did you feel needed significant improvement? Please explain.

- Objects Orientation Recognition – It should figure out the shape of an object.
- Localization Precision – It should place a chair in the right direction.
- Again, just the movement of the chair. Also the integration of movement with the chair and forward sensing, seems objects dead on could be easily hit instead of avoided.
- It had some problems (getting stuck) before reaching the chair. This could be improved, though it was working previously.
- Code just needs a little more work.
- You might want to rethink the Placement Algorithm.

Analysis

The results from the Robotics class were not what we expected. A fair amount of good feedback was received, but a lot of extraneous information was put in the survey as well. A lot of the information received did not apply to our project. For instance, we had a

comment that said, “It has to have the chair in certain position. It’s better to find a chair leg autonomously.” First of all, it does work autonomously; we have no interference with it once the program is running. We had to test the chair in the direct approach position because, for some reason, it did not work when the chair was positioned to where the robot has to maneuver around it. It worked the day before, but not while we demoed it. We got a few comments that were of this caliber, which could be ignored (useless feedback). Another comment of this type dealt with a problem with the camera. For some reason, the camera did not want to tilt when we told it to, so we had to manually tilt it. We tilted it a little farther than it was in our code, so it saw part of the laser range finder. The problem with this is that the laser has little arrows on the top of it that just so happen to be the same color as the leg of our chair (a manila color). We got a comment about this, because the robot recognized those colors on itself as a leg of the chair.

Another type of comment that was received dealt with a different way to recognize a chair. We had some people say we should have used “other distinguishable properties instead of color,” along with using edge detection. We considered these “other distinguishable properties,” but with time constraints, color was the best choice for us. Using edge detection or some sort of algorithm such as this would be a much more complicated project.

We did get some positive feedback as well. Someone expressed their opinion about how they thought the chair gripping module seemed like one of the hardest to implement. This individual thought we did a good job with this aspect. Another comment dealt with the ACTS system, saying that it seemed to work well with our program. One person even understood the concept of our project a little better than most. This individual said something to the effect of wanting to see our project once we got the bugs out, because it would be interesting.

Overall, our group thinks we got some decent feedback. We got some useless information, but we got some good feedback to make up for that. We will discuss some of our afterthoughts in more detail in the Post-Mortem document after our final release.

Conclusion

Overall, the CS 490 – Mobile Robotics class gave us pretty good reviews. No module was rated mediocre or poor (even though the wander module was not demonstrated). A few people did realize this and put NA for a rating which is why wander doesn’t have all nine evaluation values. We got some fresh ideas that we would like to try to get working. One such example is placing a chair rather than worrying about the robots location. This we found to be one of the more valuable comments. It is a valid point and is fixable in what little time we have left. Many of the comments we had thought of prior to getting feedback and thrown away because of time constraints.

From the feedback we got, we would have done fairly well in a presentation to the faculty. Knowing the inconsistencies that come with robots, they may have been a bit more lenient than a faculty member whom has never done robot programming.

Questionnaire

In an effort to improve the RAFS project, we've developed the following questionnaire. Please take a moment to respond to these questions and help us determine what we did right and wrong.

Rank the following RAFS modules, commenting on any suggestions you have for improvement.					
1. Wandering Module	Impressive ○	Good ○	Average ○	Mediocre ○	Poor ○
This module enables the robot to randomly wander around EB 2029 while the chair recognition module executes in the background. When a chair is found, movement halts and the chair recognition takes control. Please comment on this module's implementation, suggesting any improvements that you might recommend.					
2. Chair Recognition Module	Impressive ○	Good ○	Average ○	Mediocre ○	Poor ○
This module uses image processing techniques to permit the robot to locate a chair by recognizing a unique color associated with it, adjusting the robot's heading as needed to approach the chair. Please comment on this module's implementation, suggesting any improvements that you might recommend.					
3. Object Avoidance Module	Impressive ○	Good ○	Average ○	Mediocre ○	Poor ○
This module uses the robot's sonar and laser capabilities to enable it to detect potential obstructions in front of the robot and its gripped chair, as well as to the sides of the robot. Please comment on this module's implementation, suggesting any improvements that you might recommend.					

4. Chair Gripping Module	Impressive ◯	Good ◯	Average ◯	Mediocre ◯	Poor ◯

This module enables the robot to reorient itself in order to be able to approach a chair from an angle from which it can get a sturdy grip on the chair, in preparation for transporting the chair to its desired destination.

Please comment on this module's implementation, suggesting any improvements that you might recommend.

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1. Which aspects of the RAFS project particularly impressed you? Please explain.

2. Which aspects of the RAFS project did you feel needed significant improvement? Please explain.

Thanks for your assistance!