Wild Cards | FRC Team 3407
FEI FI FO FUM: $1500 Grant, dated 1 Sep 2023
Summary Report, dated 31 May 2024

Goal Of The Project

Our goal was to create a smaller, lighter, dedicated outreach robot that will allow us to present STEM and robotics to more prospective students, more easily. We experimented with several new (to us) features for this robot, to make it as engaging to a wide range of audiences as possible. Because we generally have team members with ASD, we also wanted to design this robot with the specific needs of recruits with ASD in mind, and learn more about how to use this robot and our presentations to retain and work more effectively with students who have ASD who are already on the team.

How FEI FI FO FUM Funding Was Used

We constructed a basic FRC-type robot to use for outreach activities. We were unable to identify or implement an alternate Controls system, which we had hoped would really reduce our costs, so we re-purposed a standard kit-bot frame and plan to share a modular Controls cube between this robot and others for now.

Features we added to this robot include:
Drive base: wheels, motors, controllers, fuses, radio & power module, RSL & main circuit breaker
Wacky wavy inflatable tube people: tube people, solid state relay & buck converter
Lights: LED strips and panel, mounting channel, power converter, control board
Sounds: raspberryPi with SD card and case, audio hat, speakers
AprilTag Programming: (same rPi as above), camera
Misc: cables, connectors, matte lamination for AprilTags, robot stickers for audience, paint, …

Please see the SlideShow or YouTube video from our MN FRC Roundtable presentation on Outreach Robots for details.
SlideShow (presented in YouTube video below):
https://docs.google.com/presentation/d/1eTOlrCqU_Q8Po0_QGI7y9I0Sy7OKsU23aBObLOL171o/edit?usp=sharing
YouTube video:
https://youtu.be/qL48dI5o95g?si=KbThz-yS53EUOny7
Description: FRC 3407 | Wild Cards: Outreach Robot Development
[hosted by the KnightKrawlers]
How do we create the most accessible and engaging bot for all audiences, including those with special educational needs? We've been experimenting with AprilTags to execute a "program" among other things. Feedback and ideas welcome!

Outcome and impact of the project on team/school/community

In preparation for this project, we've spoken with a lot of people about how to use this robot in ways that will improve our recruitment and retention of team members who have unique learning strategies and needs. They include team members with ASD, Special Ed teachers in our high school and a feeder middle and elementary school, our "How to Make Almost Anything" teacher who has experience making accommodations for students in special ed and with special needs, and a northern MN team that is participating in Unified Robotics (https://unifiedrobotics.org/). We also promoted this project and invited feedback and ideas during our MN FRC Roundtable presentation on Outreach Robots (links are above). This has created a new sense of community, and we hope to keep these lines of communication open in the future.

Our team has definitely benefitted from working on this project. We have at least two members/mentors with moderate/significant ASD. We have at least two members/mentors with significant physical limitations. We have several members/mentors with sensory impairments. Opening up a dialog about how we can and should work within our team to best meet everyone's needs has been a revelation for some of us. And, we have an additional platform to work on, that's teaching us new skills that will be generalizable to our competition robots, in bite-sized assignments for small, specific interactions they can focus on that are FUN!

We've brought this robot to ReFLECT and invited the Special Ed teachers & classes to come by (ReFLECT is a weekly "catch-up" time at the high school, which is also available for "down-time" or limited activities). They had a blast seeing some of the features, and driving!! We've talked about it with various groups, but haven't had wheels on the ground for long. As we reach out more to our high school, and the elementary and middle schools that feed into it, we hope we'll be instrumental in helping kids who want to try out STEM feel comfortable and actually try out STEM! We think this robot may also help us recruit & educate sponsors and donors, and we can't wait to see if that's true.

[Feedback and ideas we've gathered from sources who are listed above, and debriefing of our own team after outreach activities, are summarized after the attached Feedback Form at the end of this report.]

Future Plans

We will continue to refine our robot by:

- Adding a "ball" handling mechanism
- Adding to our lights and sounds library
- Adding "autonomous" routines to our AprilTag programming library
- Considering alternate Controls systems, as new possibilities arise
- and/or dedicating standard Controls components, as funding improves
- Dedicating a wireless or other driver station controller(s) or button box
- The Balance Board is definitely fun, but may not be very accessible
- Possibly narrowing the frame
- Possibly replacing the wheels with omni or mecanum wheels

And pursuing additional funding to accomplish any or all-of-the-above!

We will continue to refine our outreaches by:

- Practicing, practicing, practicing
- Considering ways to increase interactivity with the audience
- Create narrative stories for our presentations to younger audiences,
  Especially if we introduce “programming”

We will explore more outreach opportunities, for example

- Scouting (merit badges)
- 5th graders
- Middle School science/tech classes
- ReFLECT time at High School: open outreach, or “by invitation only”
- How to Make Almost Anything classes
- ASL classes (which may also help us recruit interpreters, if needed)

We will try to keep an open dialog on Special Ed & Special Needs issues, like

- Learning more about needs at our high school and its feeder schools
- Learning more about how to address specific challenges to inclusion
- Working with parents/teachers to have Robotics support included in students’ Educational Plans, as necessary

We will continue to gather - and act on - ideas, feedback and data to improve our outreach and evaluate whether this project met our goals of increasing the number of outreaches over the next year, and improving the comfort level of our current and future team members with special educational needs.

Short Videos of Outreach Robot Development

are included in the MN FRC Roundtable links above. We hope you enjoy!

Thank you again for this opportunity - It’s been a great learning experience for us!

Lisa Vervena
Wild Cards | FRC Team 3407

Attachments:
Outreach Feedback Form
Summarized Feedback & Ideas

FEI FI FO FUM - Outreach Robot

Ideas and Feedback

Our robotics team at Mounds View High School is working on a new robot that we can bring with us to teach our audiences more about the FIRST Robotics Competition (FRC) and other programs. We plan to use it for show & tell, and for recruiting new members to our team.

We're trying to make our presentations interesting, engaging, educational, and accessible to as many people as possible. We especially want to make sure that anyone who gets special education services, and/or has physical / sensory disabilities or limitations, feels welcome.

So, would you please help us out by giving us feedback on our robot and presentation?

Thank you!!

—oo0oo—

Do you have a physical disability or limitation? Yes _____ No _____

Do you have a sensory disability or limitation? Yes _____ No _____

Do you participate in any special education services? Yes _____ No _____

Are you interested in learning more about Robotics? Yes _____ No _____

What could we change about our robot or our presentation to make it more:

Interesting? Educational? Accessible for you? Fun?

What features do you like about our robot and our presentation?

[Please put extra comments on the back, or contact info if interested!!]

Summary of Feedback & Ideas (from linked Slide Show)

Practice and Prepare FIRST

Present the driving controls to new drivers, one at a time, in order of complexity
- Practice with the simplest; consider when/if to add more

The “younger” or “less focused” the audience - change up the presentation!
- Smaller rooms
- Smaller groups
- Let the audience drive!
- More story-telling: create a narrative they can relate to

Definitely need a portable microphone/speaker

Consider if we’ll need any assistance engaging our audience, for example:
- (Spec Ed) teachers / parents
- ASL interpreter
- Physical/wheelchair accessibility

These new robot features seem to engage both team & audience members, including a few with ASD!

Be proactive
- Give the audience specific, acceptable interactions as much as possible, so we all understand the behavior we want to see, in advance
- Give the programmers specific guidance for programming for outreach

Be ready to E-STOP!!

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