Robotics Outreach Project

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Goal

- The goal of this project is to successfully design and build a robot to introduce underrepresented students in STEM to engineering.
- Students will construct a robotics kit that incorporates introductory level features and an evidence-based curriculum for middle/high schoolers to safely construct with assistance.
- Students will research materials to minimize cost of the outreach project, without compromising the safety of students

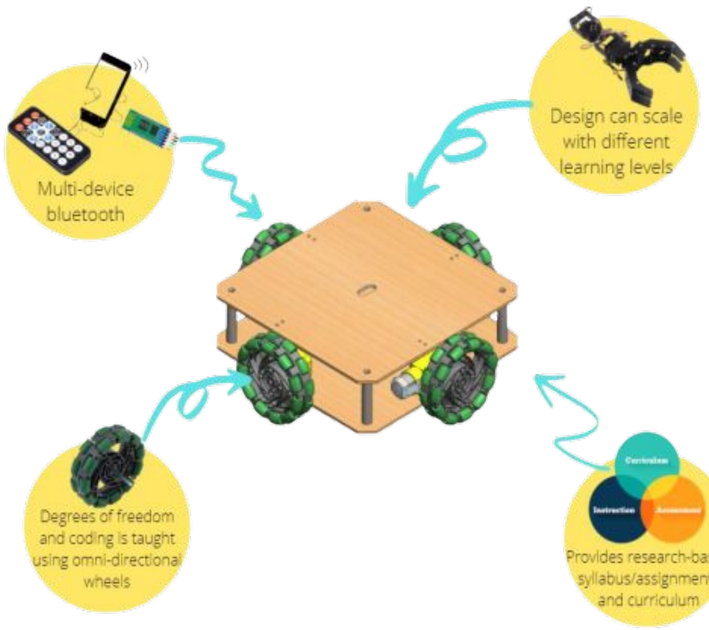
Background

- 1 in 3 U.S. adults would like to see a greater emphasis on K-12 STEM education (Pew Research Center)
- The education system neglect students' needs due to poor administration of resources (Darling-Hammond, L.)
- Current educational coding and robotics kits range from: $150-$600+
- Students develop stereotype threat as early as the 2nd grade, which creates under-performance in certain contexts, and grows into adolescence (How People Learn II)

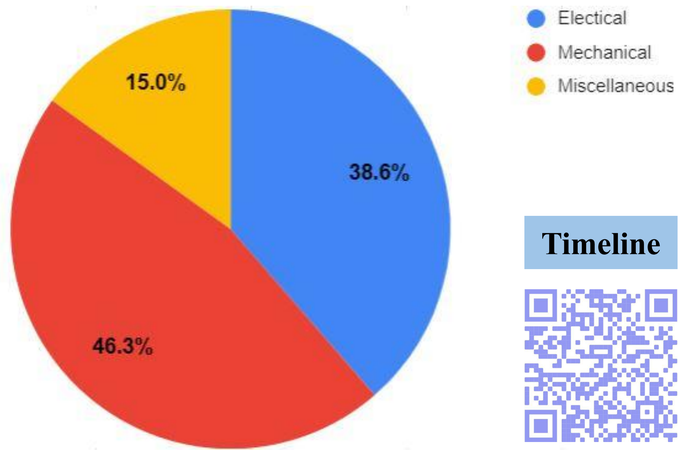
Quarter Goals

- Design robot and develop basic curriculum
- Develop trade study, purchase parts, & 3D print components
- Develop Arduino code and install electrical components
- Manufacture and assemble a working prototype

Meet Our Robot



Budget & Costs



- Current Cost: $170.50
- Target Cost: $150.00

Timeline

Design Requirements

- Components fall under 8mA of current (FS = 1.25)
- Create a syllabus, teaching curriculum, safety manual, and instructional manual
- Use non-carcinogenic fuse
- ±0.15 mm tolerance for 3D printing
- 8” x 8” omni-directional cart
- 6” x 6” area for hardware
- Use PETG thermoplastic polyester material
- Electrical component max height: 1.2”, 2” spacing between two boards
- 0.5 kg max weight of hardware

Refinements

- Reduced weight and cost by using 2 motor drivers instead of 4 H-bridges
- Adjusted and designed the layout and placement of the omni-directional wheels to meet the electrical teams’ coding needs

Team Structure

Electrical:
Francisco Mayorga
Carrie Lamb

Mechanical:
Breanna Najera
Brian Mejia

Project Lead:
Dr. Edgar D. Ramos Muñoz

Faculty Advisor:
Dr. Faryar Jabbari

Current Status & Next Steps

Current Status:
- Chassis is completed.
- Motors and holders are mounted.
- Rough code for moevement is completed.
- Teaching curriculum and syllabus draft has been completed.

Next Steps:
- Finalize code and add a realignment feature.
- Incorporate claw to capture student’s interest and to add learning objectives for students.

References

Darling-Hammond, L. (2010). The flat world and education: how America’s commitment to equity will determine our future. New York: Teachers College Press.
Felder, R. M., & Brent, R. (2016). Teaching and learning Stem: a practical guide. San Francisco, CA: Jossey-Bass, a Wiley brand.
The National Academies Press. (2018). How people learn II: learners, contexts, and cultures.Washington, DC.

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