College of Engineering
College of Education

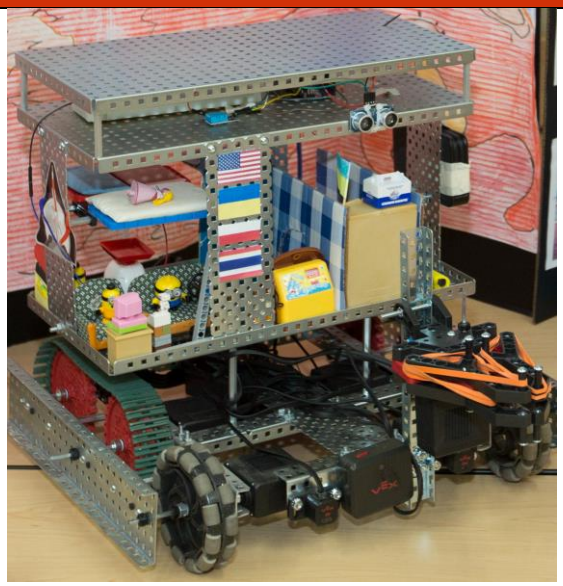
Vex V5 Mobile Living Quarters

Project Overview
This Vex V5-based project will be focused on designing a Mobile Fortress.

Course Connections	21st Century Skills	CTE Alignment
Middle School Science High School Physics High School Engineering	Communication, Critical Thinking, Collaboration	Energy, Environment, and Development Pathway

Objective
Build an energy independence multi-terrain life support unit that can travel on both the surface of the Moon and Mars. The system needs to be able to travel across varied terrain and support up to 4 humans for a period of 2 to 4 weeks.

Materials
1. VEX kits

Block Diagram


Application

At the moment NASA is actively preparing to send astronauts back to the moon with the eventual goal of creating a moon base to act as a way station. Furthermore, NASA among other agencies across the world are looking for ways to actively colonize Mars. Due to these current trends, NASA will need to build an energy independent multi-terrain life support unit that can travel on both the surface of the Moon and Mars. The system needs to be able to travel across varied terrain and support up to 4 humans for a period of 2 to 4 week

Outline/Schedule

Part 1: Design Process and Analysis

Understand the project requirements and constraints, and develop an initial design concept.

1. Study the Design Process Steps to gain a clear understanding of the project requirements and constraints.
2. Fill out the Design Brief, documenting the key specifications, such as energy independence, multi-terrain capability, and support for 4 humans for 2 to 4 weeks.
3. Sketch the initial solution based on the given information, labeling the input and output components.
4. Present the sketch to the instructor for feedback and approval

Part 2: Drive Train and Habitat Design

Design the robots' drive train and incorporate a habitat for human support

1. Design the robot's drive train, considering the ability to transverse varied terrains on both the Moon and Mars.
2. Incorporate a mechanism to change the direction of output and possibly the input/output speed relationship.
3. Ensure the structure is stable, rigid, and capable of holding the gears in proper relationship to each other.
4. Include a minimum of 4 separate sensors for data collection

Part 3: Comparison of Designs and Ideas

Evaluate and compare different design concepts to determine the most feasible and efficient solution

1. Compare the initial design concept with alternative ideas and
2. Analyze the pros and cons of each design option based on factors such as stability, reliability, energy efficiency, and ease of implementation.
3. Select the most suitable design concept based on the evaluation.

Part 4: Build and Test Design

Construct the chosen design and conduct testing to validate its functionality and performance

1. Build the robot according to the selected design, utilizing VEX kits and adhering to the given constraints.
2. Test the robot's performance on different terrains and in various scenarios to ensure it meets the project's requirements.
3. Make necessary modifications to the design to address any identified issues or improve performance.

Part 5: Programming and Final Presentation

Develop programming solutions for the robot and present the final design.

1. Design a test field to stimulate different scenarios and challenges for the robot.
2. Develop programming solutions to control the robot's movement, direction change and sensor integration.
3. Test the programming solutions in the simulated test field and refine as necessary.
4. Prepare a final presentation showcasing the design functionality and performance of the Mobile Fortress.
5. Present the final solutions to the instructor providing an overview of the design process, challenges faced, and the successful outcomes.

Note: throughout the project, it is essential to consider the given constraints, such as time limitations, limited materials, and the use of VEX V5 Pro or VEX V5 code only. Additionally, ensure that the final bot design fits within the 12x18x18 area specified.

Reflection