FAMU-FSU College of Engineering

Virtual Design Review 1

Team 515 – Controllable CVT Device

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Aliya Hutley, and Cade Watson

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Sponsor & Advisor

Florida Agriculture & Mechanical University and Florida State University

Dr. Carl Moore Jr.
Associate Professor

Meet Team 515

Kemani Harris
Dynamics Engineer

Aaron Havener
Controls Engineer

Jacob Hernandez
Design Engineer

Aliya Hutley
Test Engineer & POC

Cade Watson
Materials Engineer

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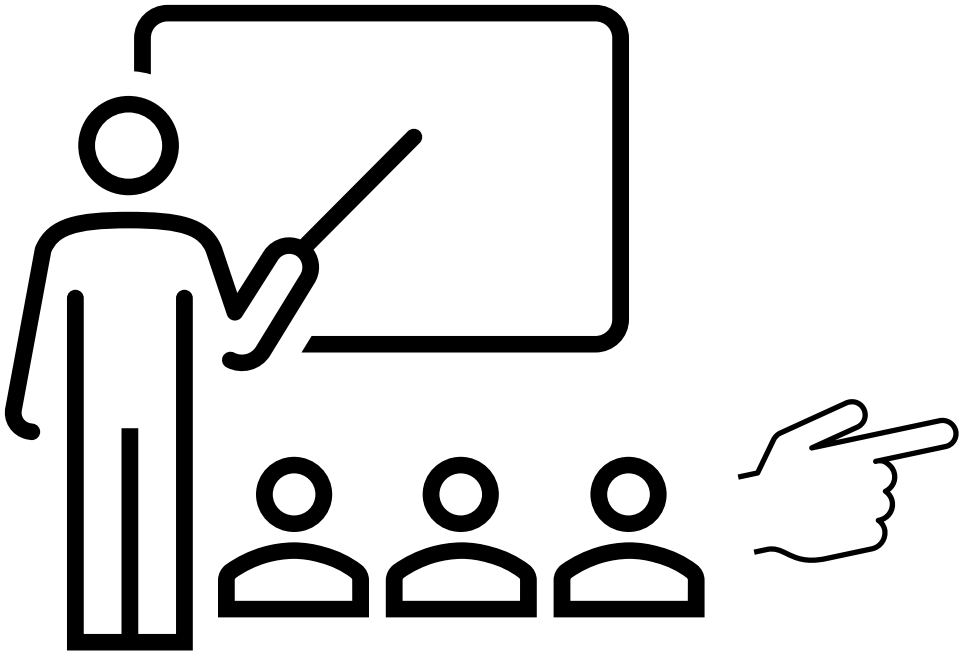
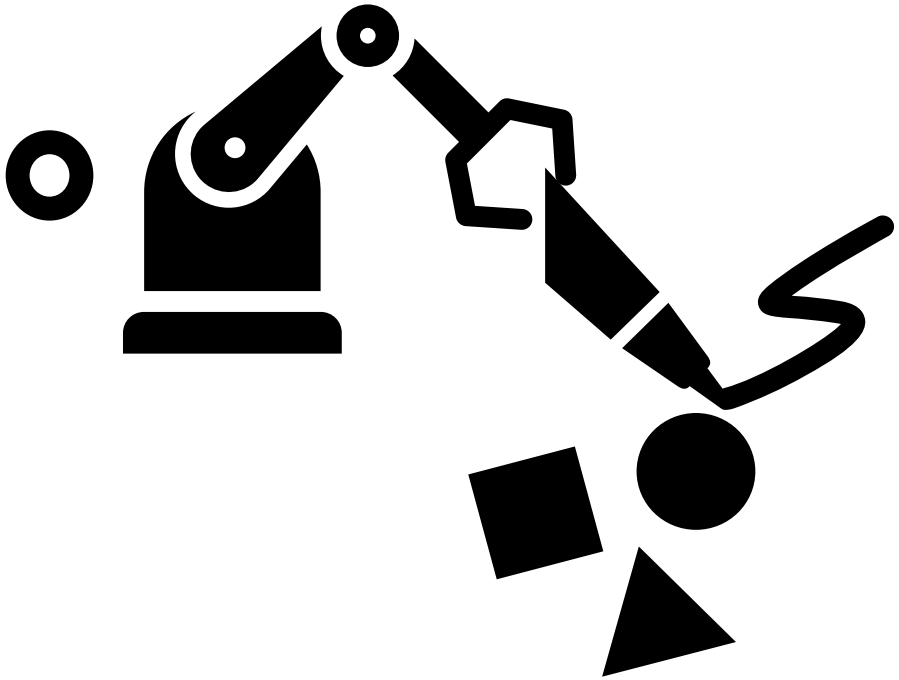
Project Objective

The objective of this project is to enhance the education of haptic robotics by creating a device using continuously variable transmissions (CVTs). The device is intended to utilize computer control and move through various positions to produce accurate output motion.

Project Brief





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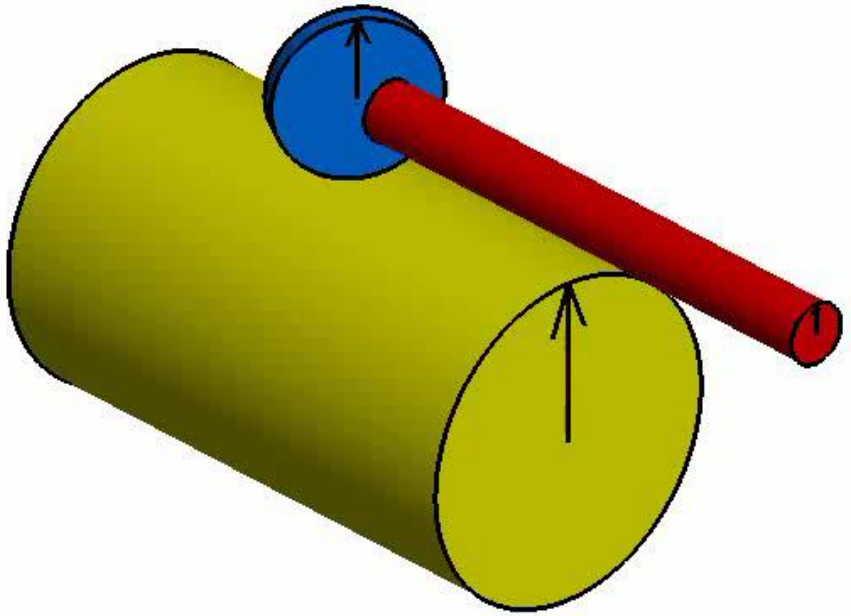
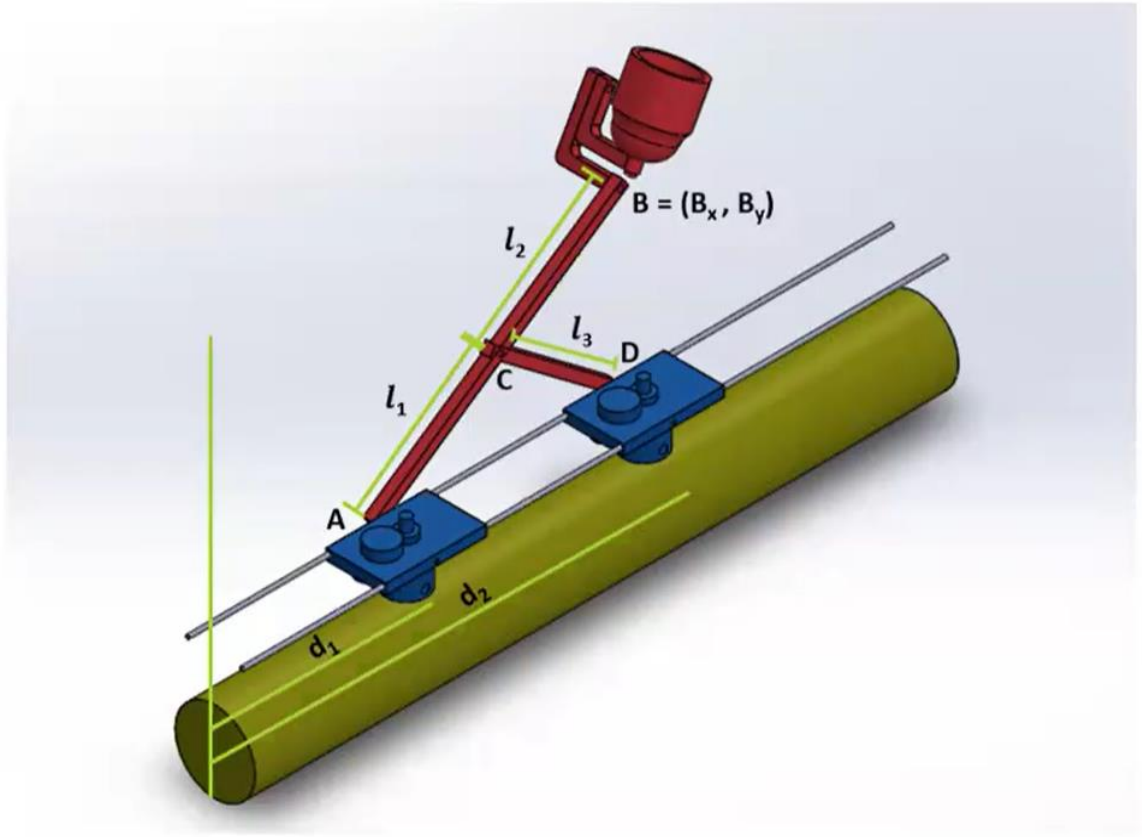


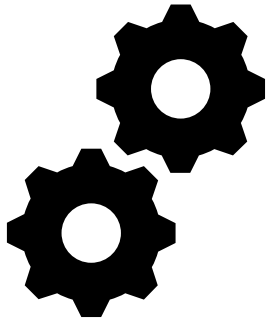
- The **Rotating cylinder** (yellow) powers the movement. The **wheels are steered** (blue) to adjust their contact point on the cylinder, using a **linkage** (red) that moves the endpoint.

Background

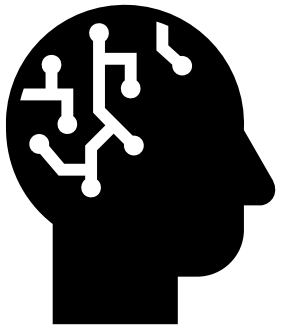


Key Goals

The primary goal of this project is to educate an audience on:

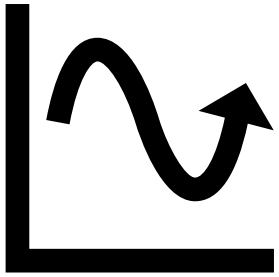


Continuously variable transmissions (CVT's)

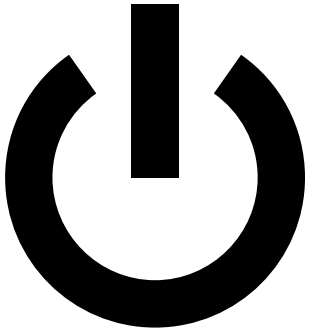


Autonomous characteristics of robots

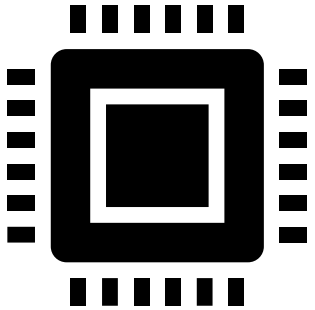
Assumptions



Three-dimensional motion is not required.



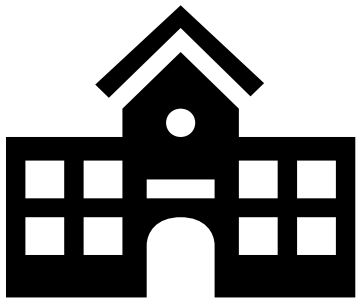
Common sources of power are accessible.



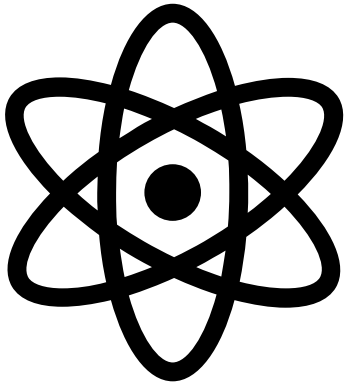
Existing motor and control hardware is allowed.

Who can benefit?

The primary intended markets of this project are STEM educational institutions. This includes:



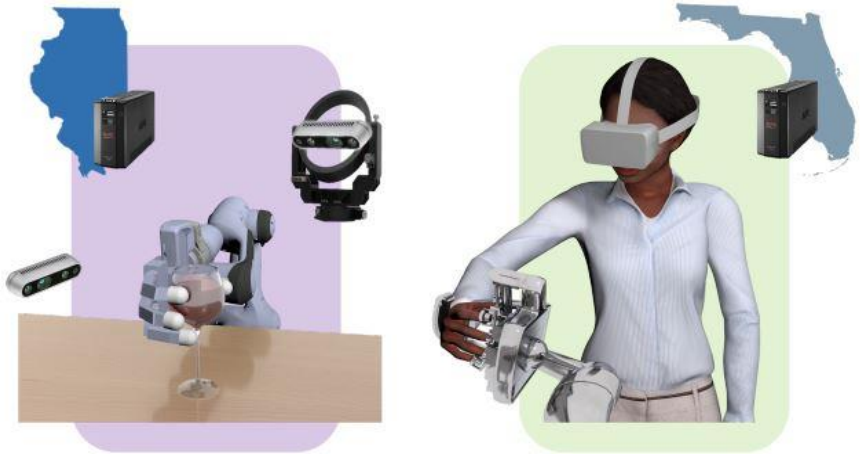
Local public and private schools



- Science museums
- STEM outreach programs

Adaptations

This could be adapted to serve industries where haptic robots could be implemented. This includes hazardous environments (e.g., space, nuclear, or underwater environments), remote surgery, and VR gaming.

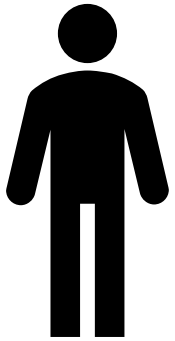


Stakeholders

- Dr. Shayne McConomy
- Dr. Carl Moore Jr.
- The National Science Foundation (NSF)
- The National Research Institute (NRI)
- Shape-Based Remote Manipulation (SBRM), consisting of Northwestern University and the FAMU-FSU College of Engineering
- Prairie View A&M University, a host of a similar capstone project

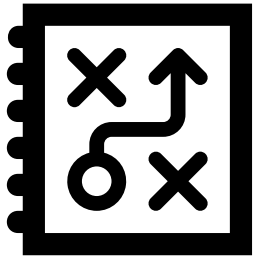
Understanding Functionality

Questions were formed to understand the educational environment the design will be implemented in as well as the typical use case:



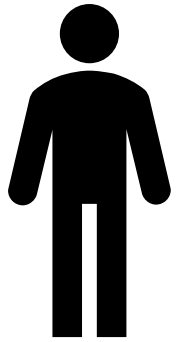
Who is the audience?

Where is the audience?



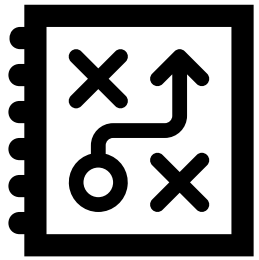
How will interaction occur?

Understanding Functionality



A target high school audience

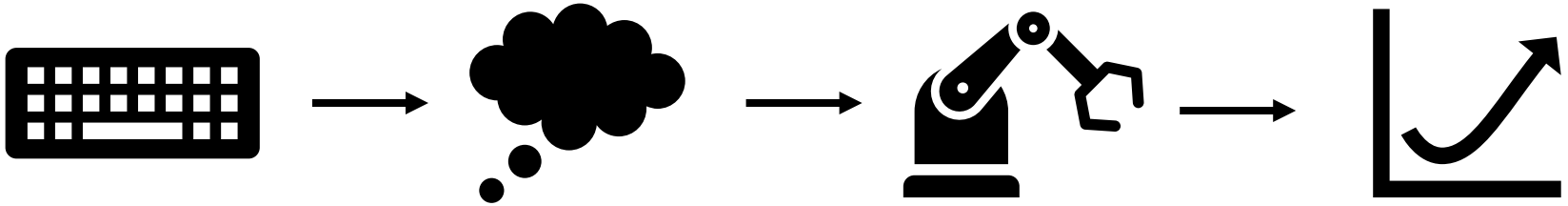
Use in multiple locations



Customizable, well-displayed output that transitions continuously from an input to an output

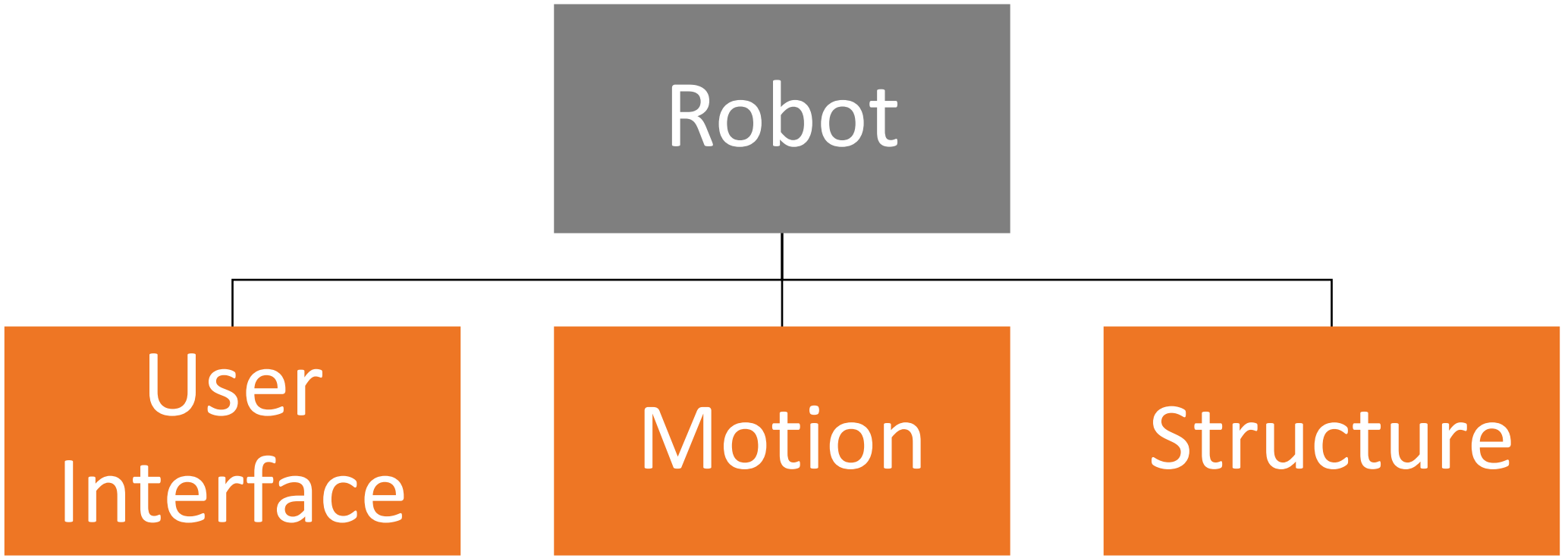
Flow of Information

From customer statements about autonomous functionality, the basic flow of information can be realized:



Desired path parameters → Nominal control data → Actuation data → Outputted path

Characterizing Functionality



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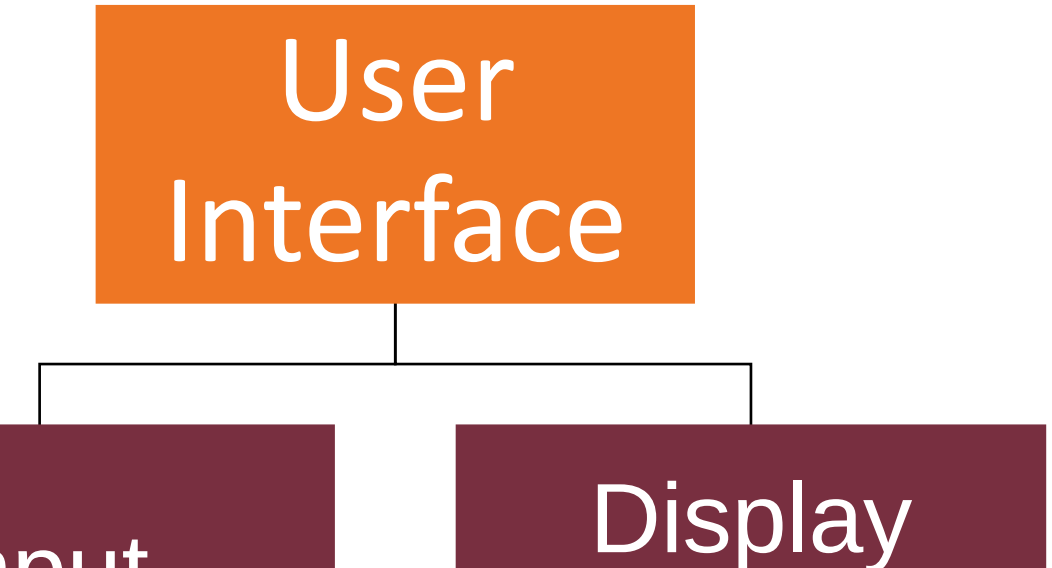

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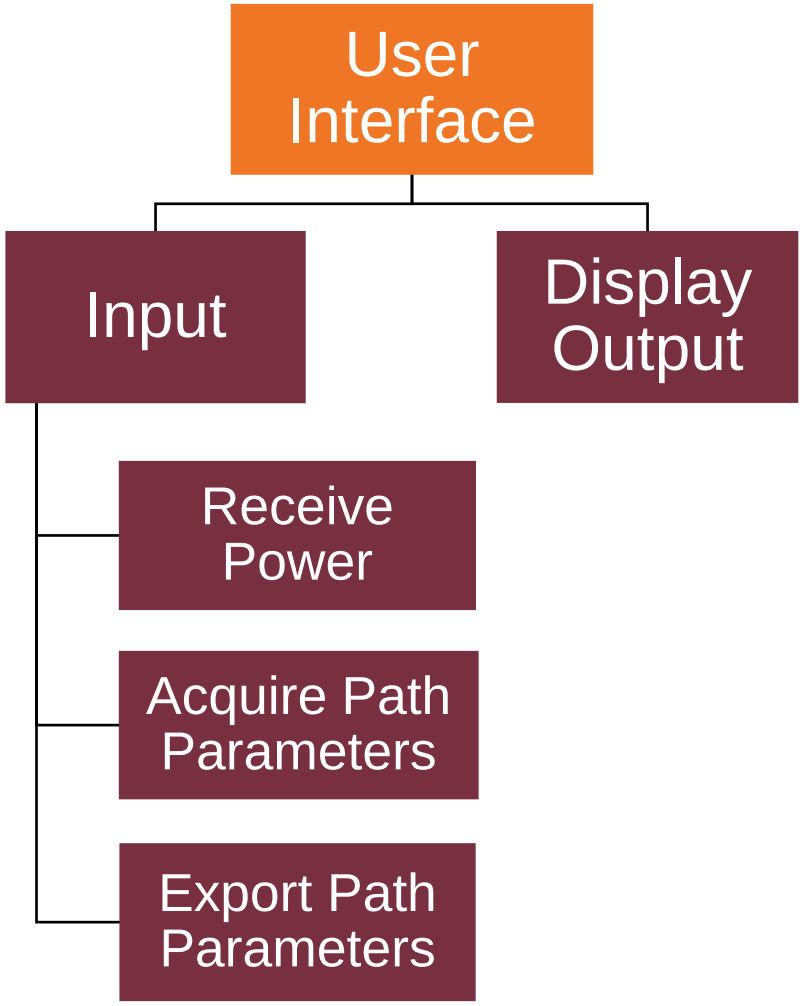

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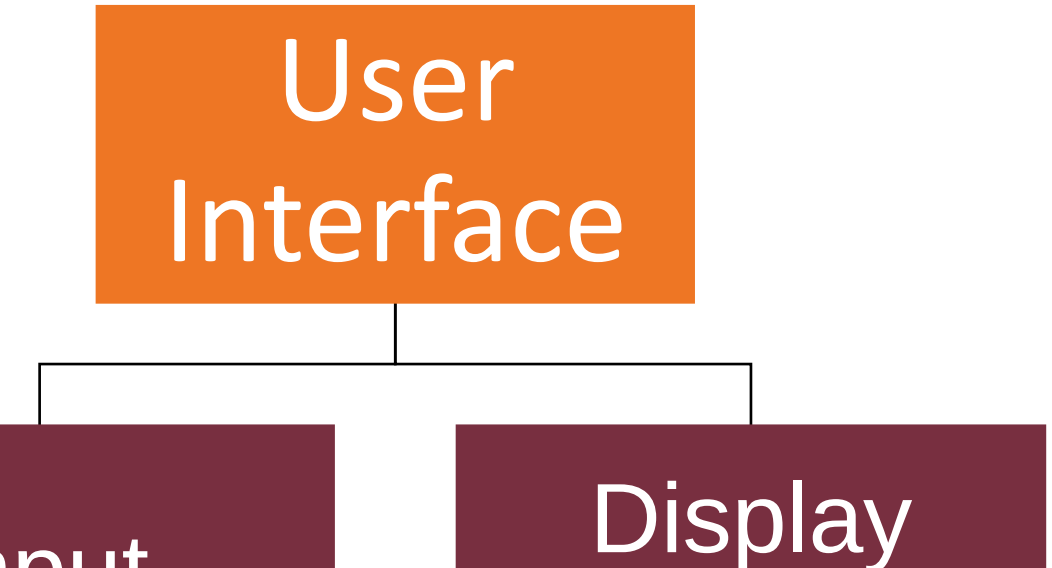
Characterizing Functionality



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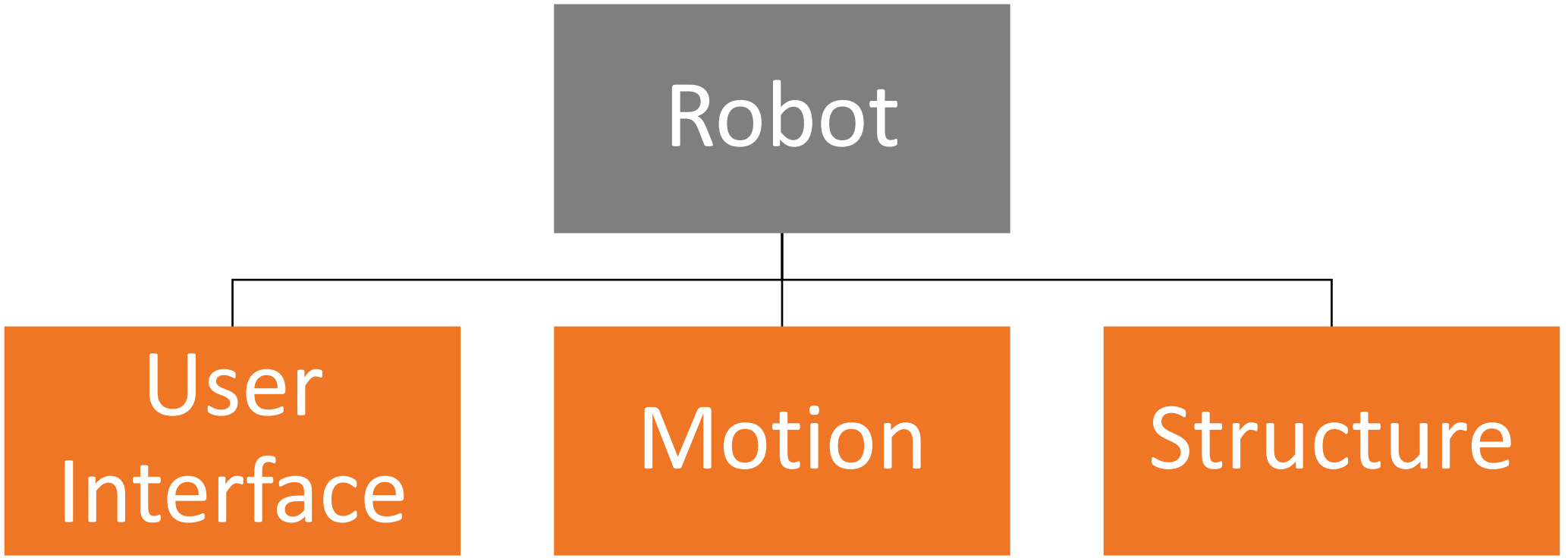

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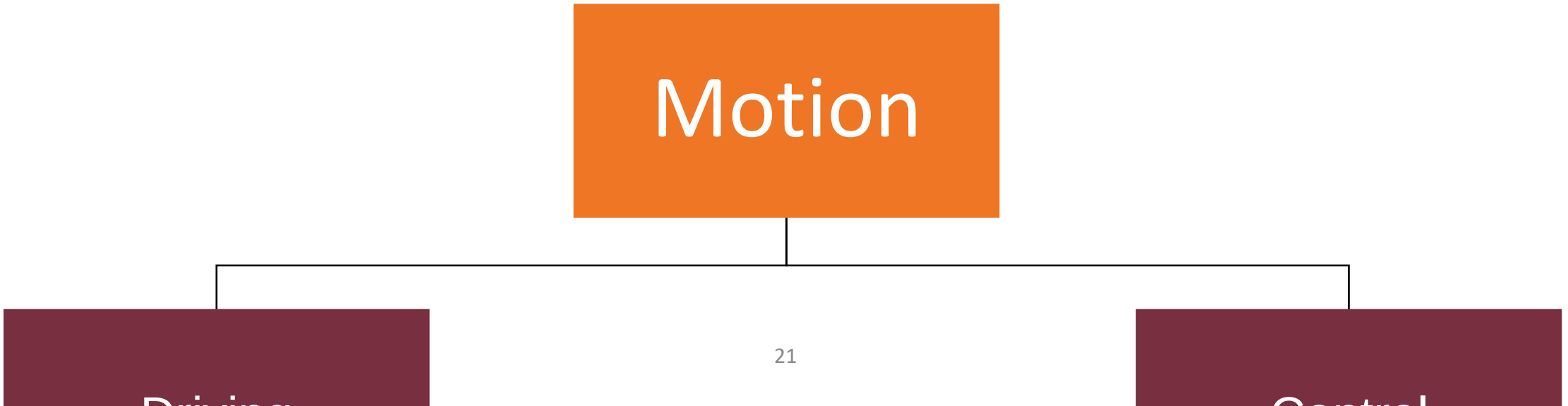

Characterizing Functionality

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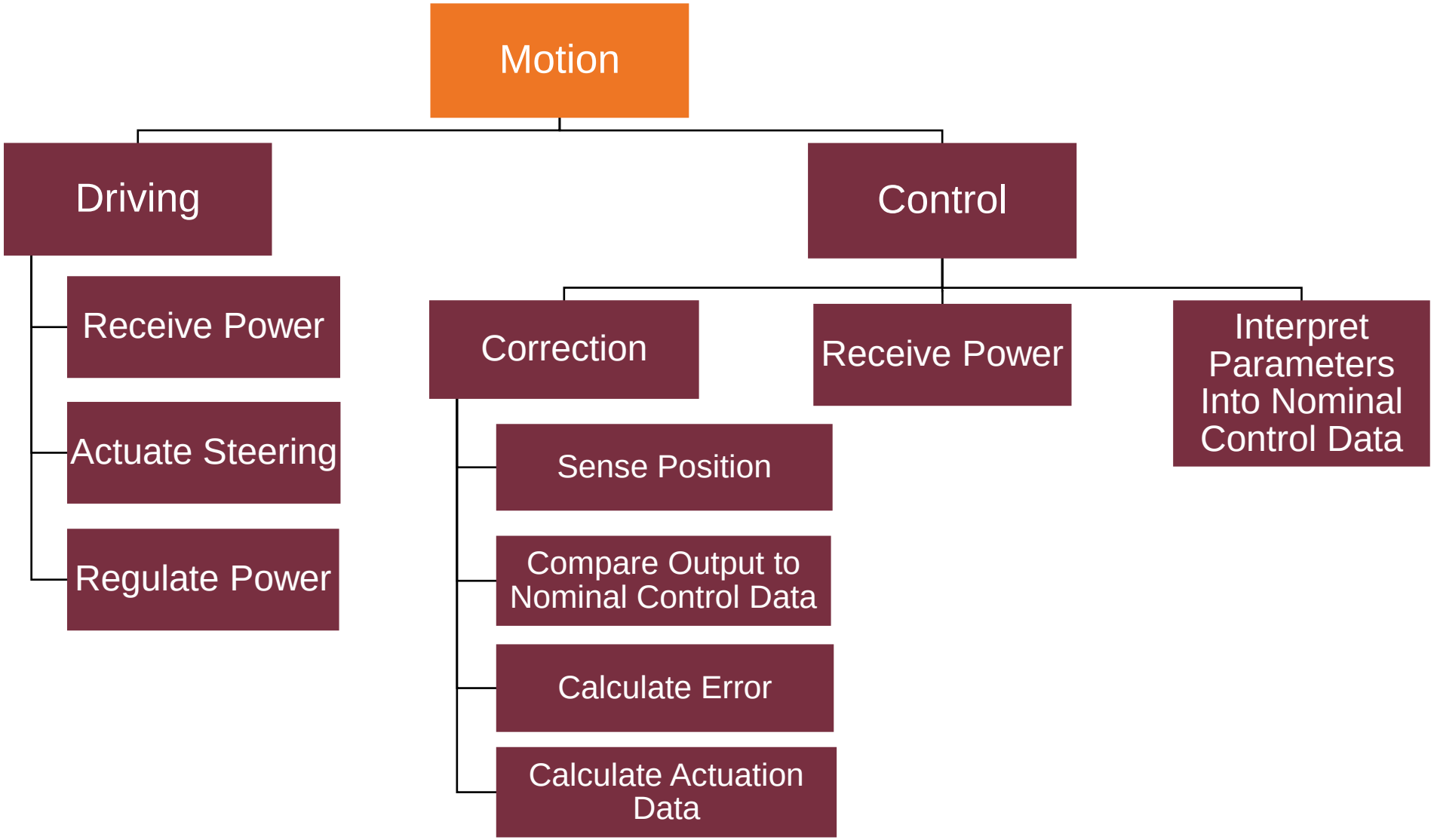

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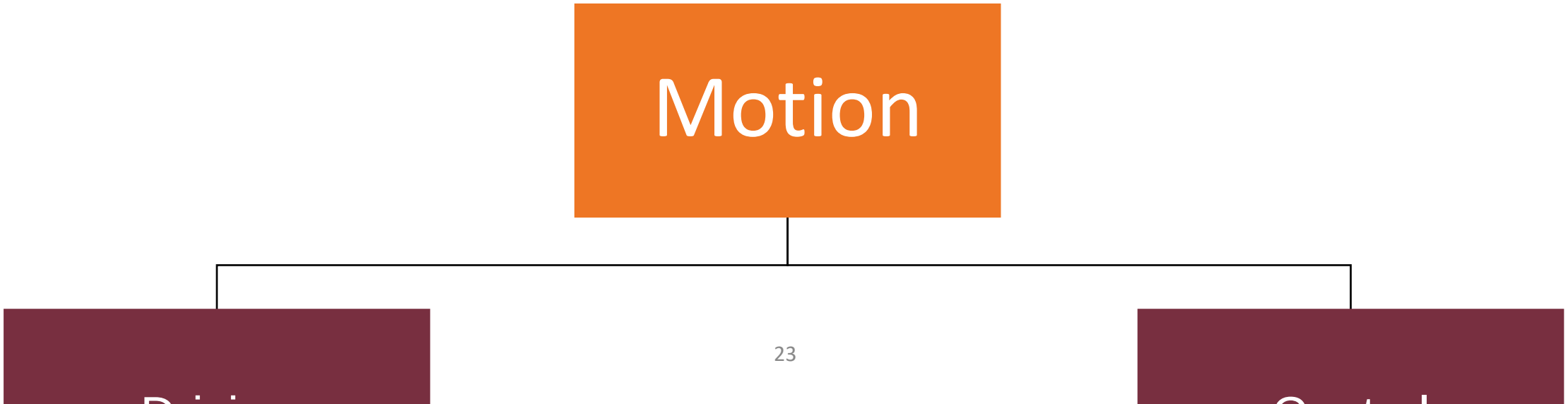

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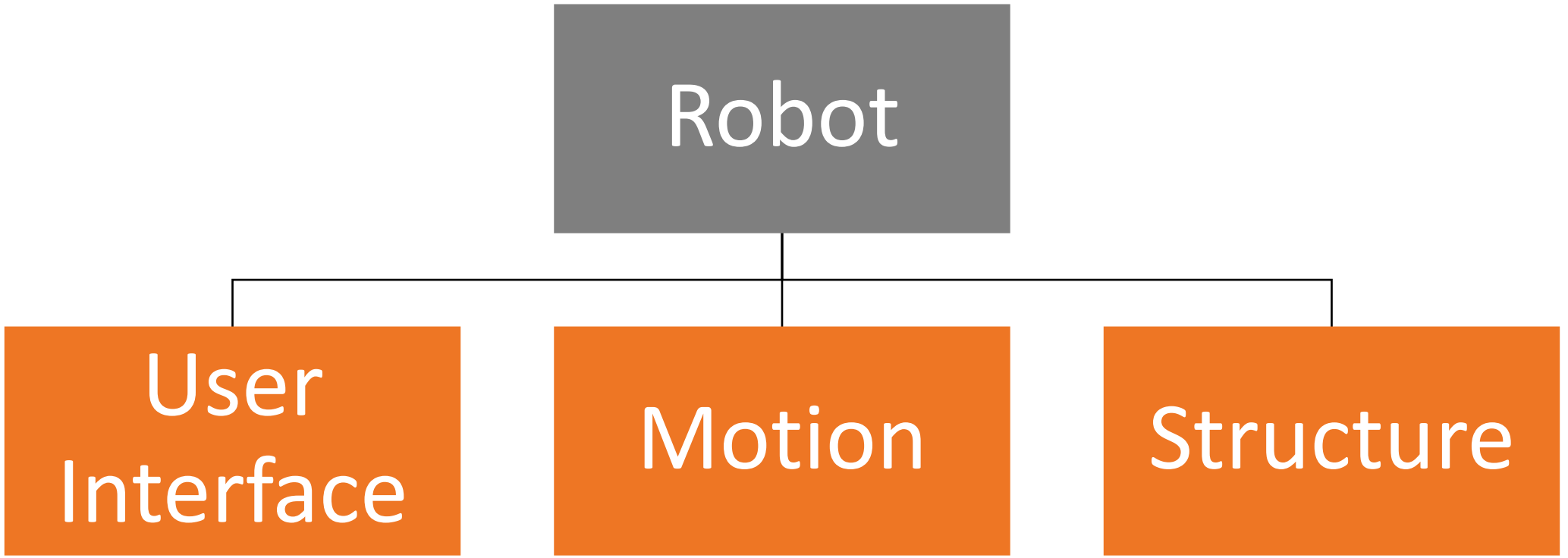

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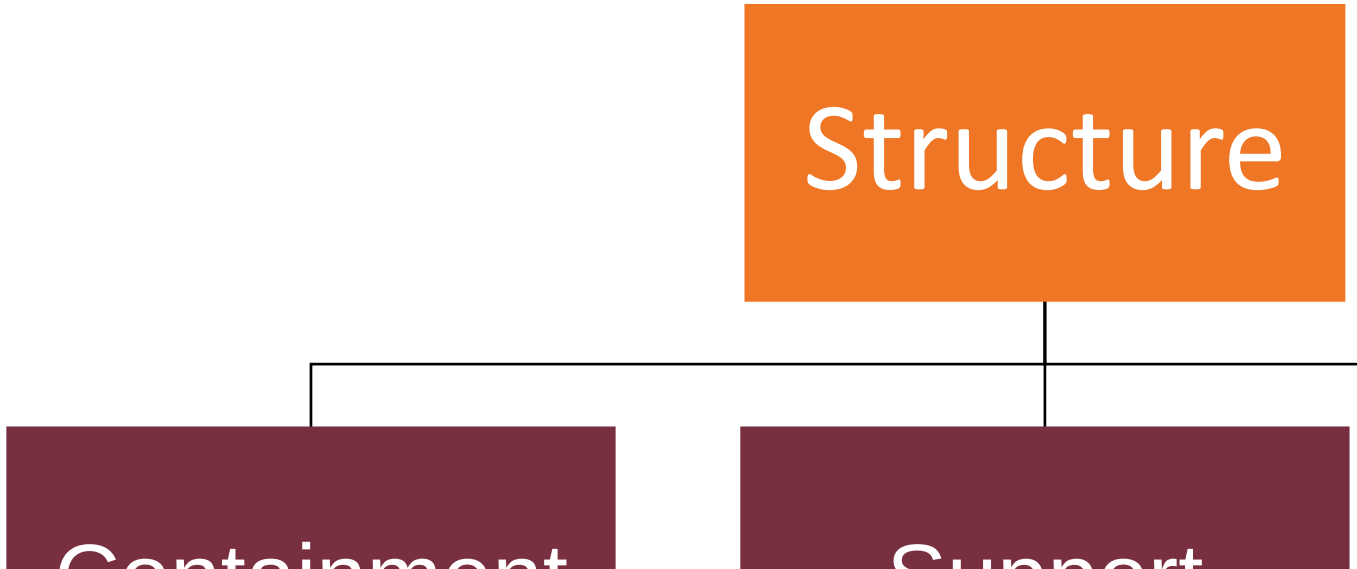

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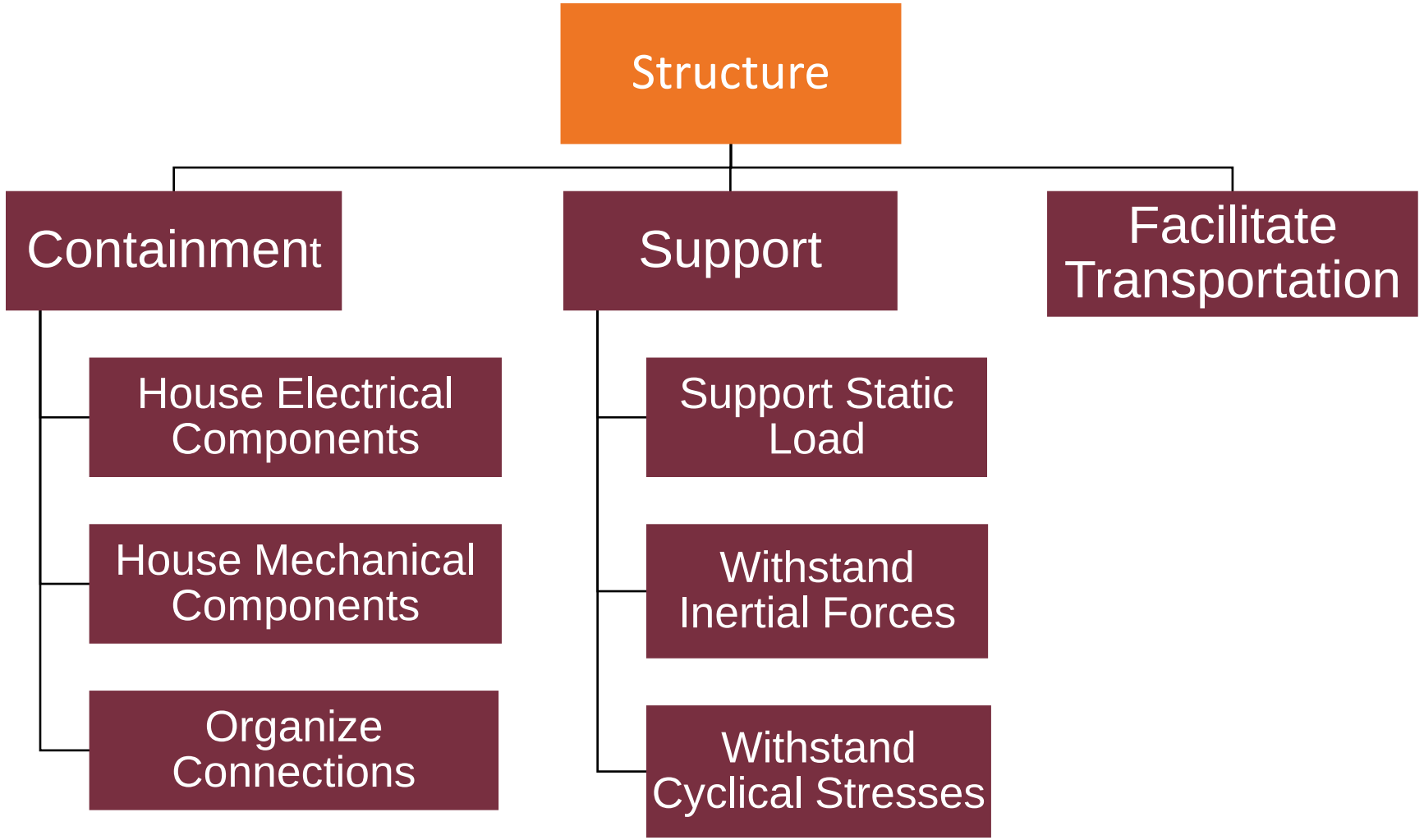

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In Summary

The end solution currently will:

1. Aid in educating high schoolers.
2. Provide customizable and continuous two-dimensional motion.
3. Utilize three main systems to function.

What's next?

Creating benchmarking criteria

Further research on educational tools

Generating solutions and determining a prototype design

Questions?

Back Up Slides

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