# FRC 7407
Pre-Season Project Descriptions

CS560HO - Competition Robotics
Winter Term 2021-2022

Parametric Elevator CAD

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- Design a parametric elevator system in Onshape that utilizes variables for customizability on key parameters
  - Step 1: Understand the basics of elevators and how they are designed
    - NASA RAP Guide (Chapter 5.2 pg 122-129)
  - Step 2: Begin as a 2D sketch on the right plane that includes main elevator components from a side view
    - Dimension key sizes as variables (see diagram below and Onshape file in 7407 team)
  - Step 3: Once 2D sketch is fully defined, 2D sketches will be extruded to create 3D components. Additional finishing work on the design will be completed at this stage as well.
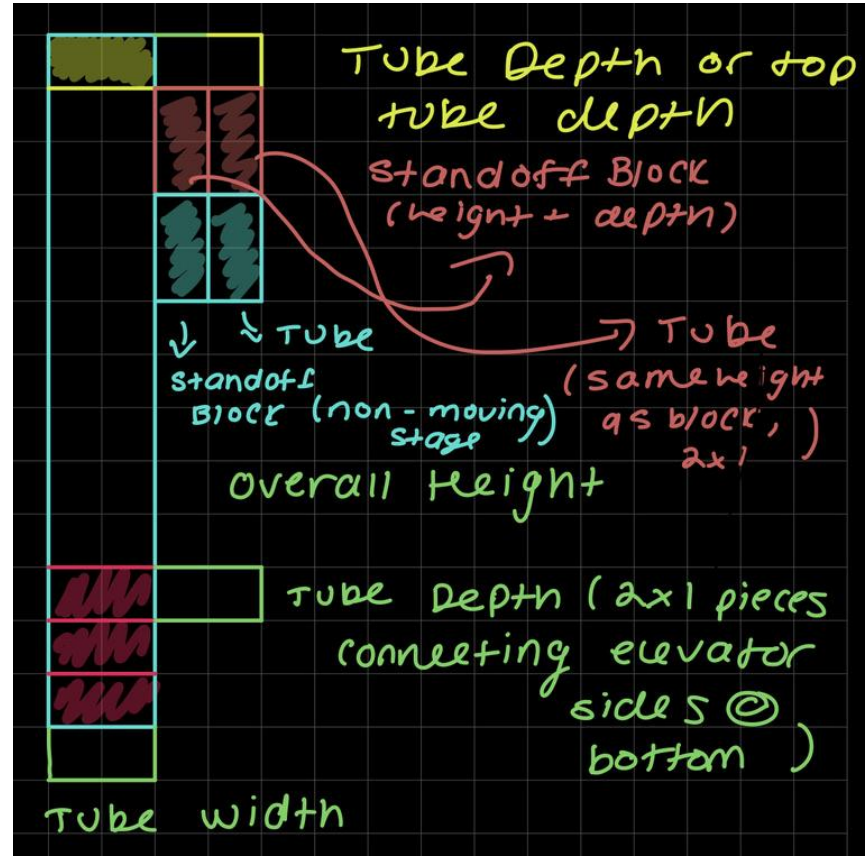
2018 Cube Intake Linkage CAD Project

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- Design an attachment linkage that will mount the existing 2018 Power Cube intake onto the existing swerve drive chassis.
  - The linkage must have 2 positions:
    - 1: Intake vertically upwards and be contained within frame perimeter
    - 2: Intake parallel to the ground and at correct height to intake a Power Cube off the ground
  - The linkage needs to be pneumatically controlled
- Once the linkage is designed, manufacture assemble and test the mechanism

Prototyping - 2019 Destination Deep Space
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- Create prototypes for the 2019 FRC Game, Destination Deep Space to intake/score the Cargo (orange balls) and the Hatch Panels
- One group should focus on Cargo and the other on Hatch Panels
- Use the following prototyping methods
  - Start with a rough physical prototype → proof of concept
  - Create simple CAD model with parts that can manufactured quickly in the following ways: laser cutter, CNC router and/or jigsaw
  - Assemble and test prototypes

Fabrication - Swervey B

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- Fabricate parts to assemble a swerve drive using aluminum tubes, aluminum gussets and swerve drive modules
  - Look at existing swerve drive model for parts to manufacture, quantities and their dimensions → create part drawings
  - Utilize shop tools to manufacture parts
  - Assemble swerve drive modules
  - Assemble drivetrain
  - Add control system components to drivetrain and wire robot

Fabrication - Elevator

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- Fabricate parts from existing elevator CAD model
  - Look at existing model for parts to manufacture, quantities and their dimensions → create part drawings
  - Utilize shop tools to manufacture parts
  - Assemble elevator components
  - Design components to mount elevator to existing swerve drive frame
    - Will need to think about additional framing elevator will need

Programming Projects

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- Teach new programming students basics of FRC programming
- Work on swerve code
  - Get new students up to speed on existing code
  - Delegate tasks among team to finish, debug and test swerve code
- Can work on additional programming projects as needed

Scouting Systems

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- Research existing scouting systems used by other teams
- Develop tentative plan for type of scouting system we want to use in 2022 (app, spreadsheet, paper, etc.)
- Work with Sunday club members on scouting system development
- During build season develop scouting system based on game

CNC Managers

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- Responsible for managing the operation of the CNC equipment in the shop
- Train new students on how to safely use equipment
- Report broken bits or other parts to Mr. Murgio for replacement
- Maintain CNC equipment during December and build season
- Develop operation and safety procedures for the machines
    - Turn into manual or poster?

Videos & Media

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- Create videos and social media content
  - Instagram, start Tik Tok account
- Weekly vlogs of progress during class and after school meetings

Technical Mentorship

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- Work with other teams on various robotics projects
    - FRC Team 8604
    - New England Innovation Academy
    - Rookie Kits