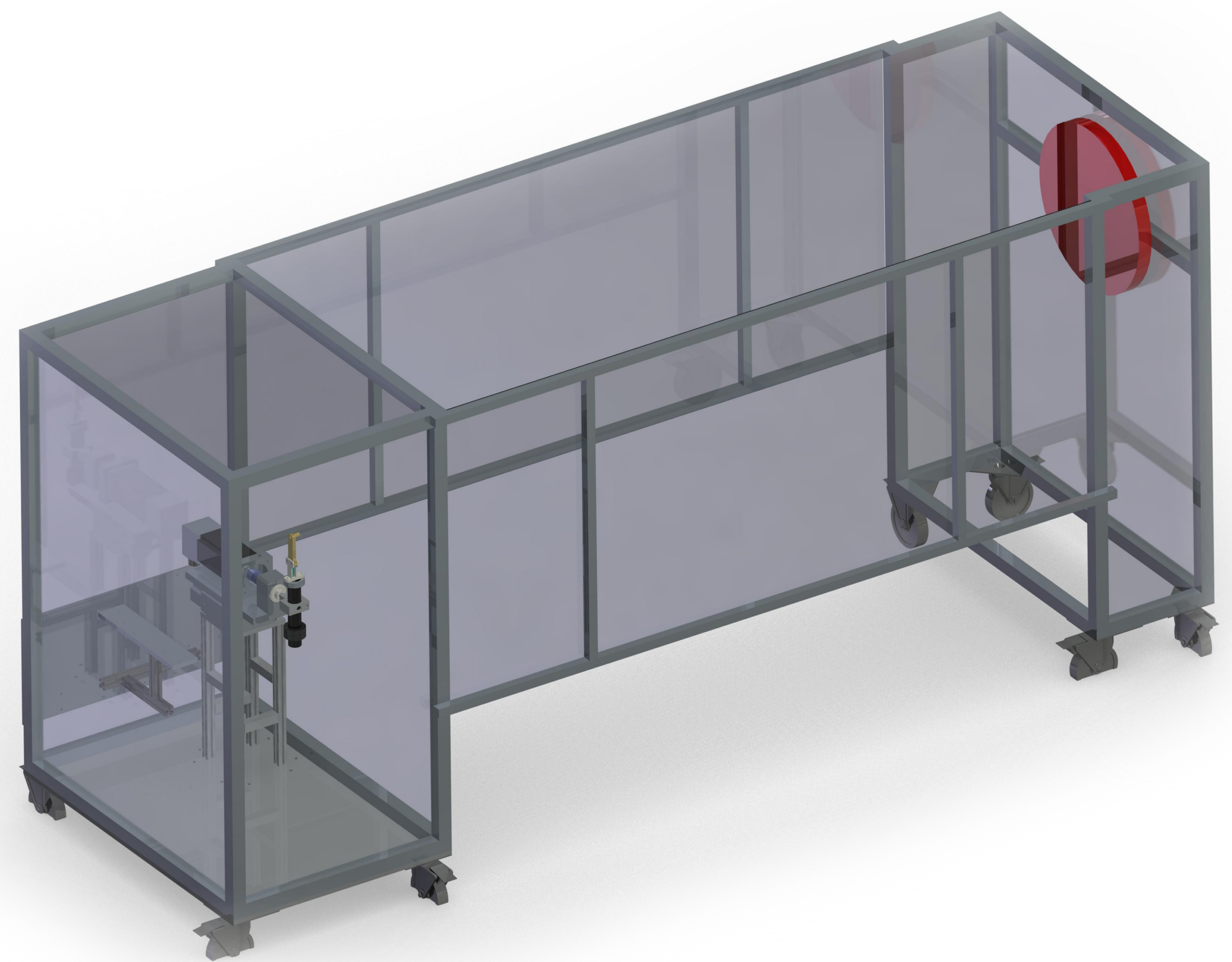
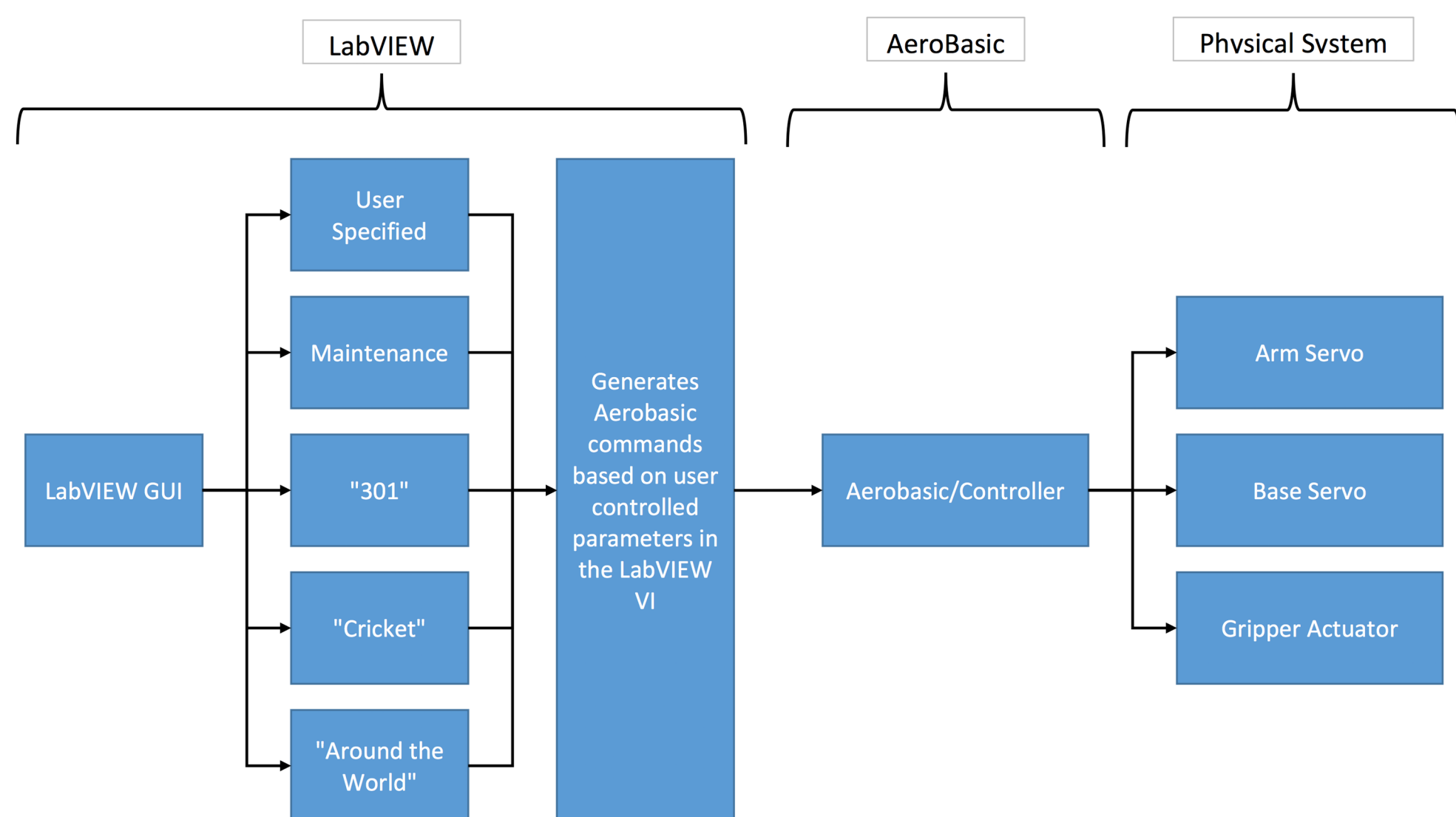


AOLR

AUTOMATIC DART LAUNCHING ROBOT

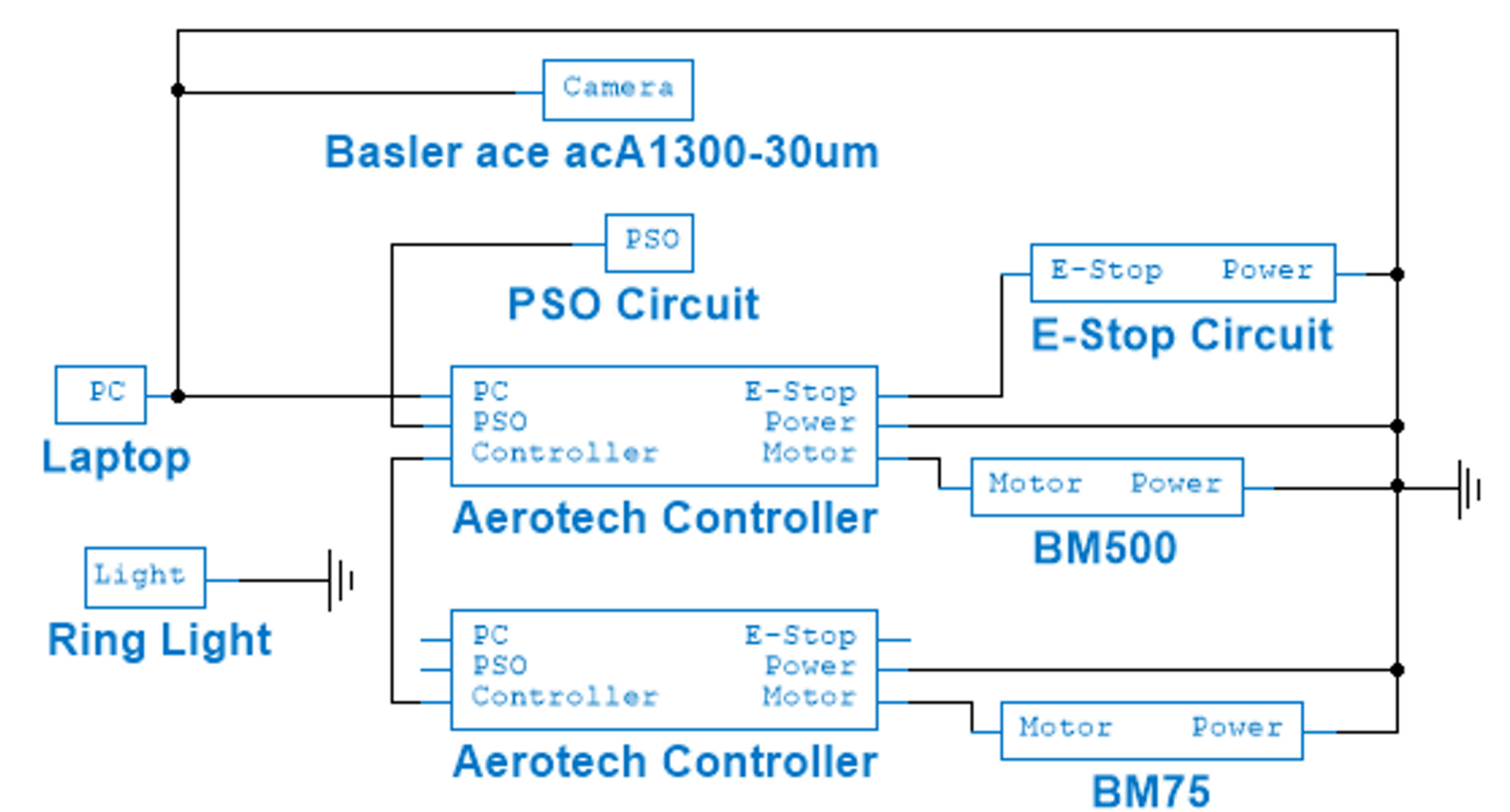
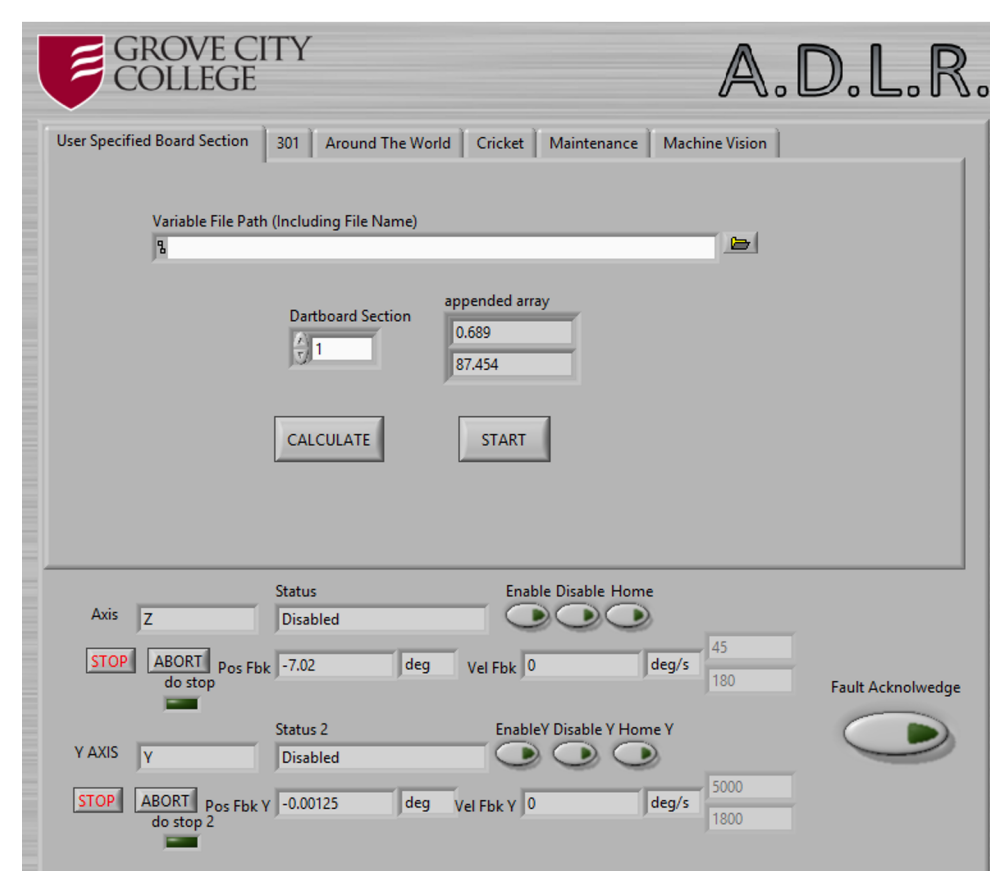
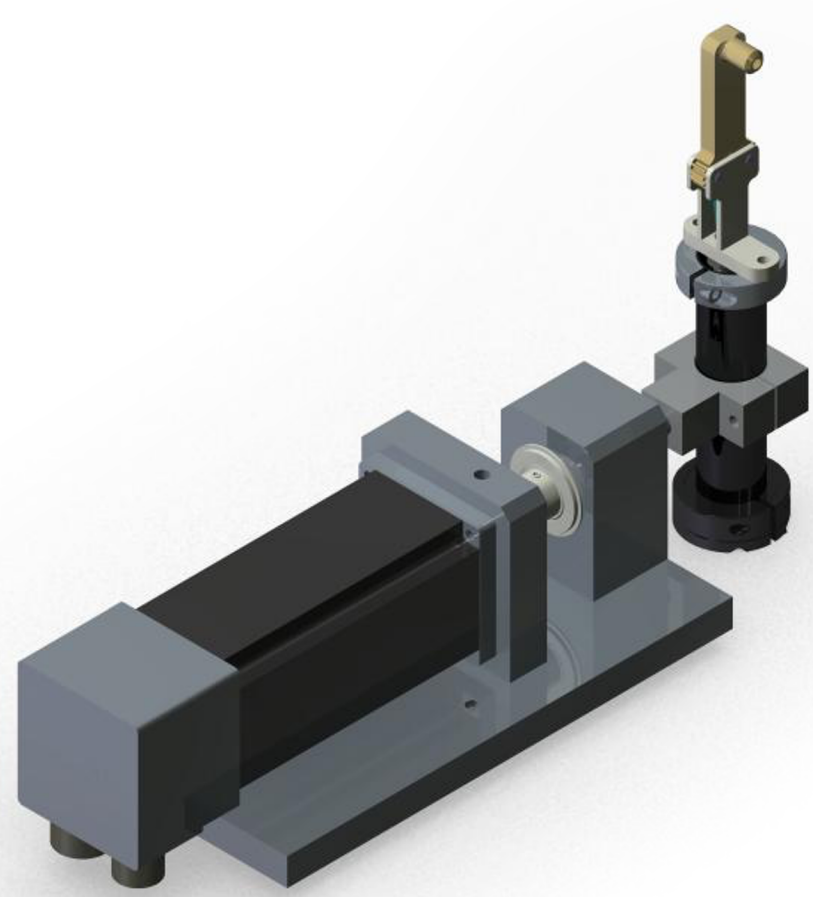


THE OVERVIEW

The MECE senior design project involved creating a robotic system for the students in ROBO 301 to experiment and practice with. The design team chose to work on a dart throwing robot, so a user could tell the robot to hit any specific section on a dartboard. The program used for controlling the dart throwing robot was LabVIEW, pictured in the center below. Here, the user specifies what the robot should do using the control panel, or Graphical User Interface (GUI) in LabVIEW. The program calculates the correct robot movements and uses the Aerobasic program that controls the Aerotech motors in the correct way. Through these steps, the servo that rotates the arm, the servo that rotates the base, and the actuator that opens and close the dart gripper can be controlled robotically.

MACHINE VISION

The robot has the option of using machine vision, which involves using a camera to process images, collect quantitative data from the images, and make autonomous decisions based on the extracted data. Using machine vision, the robot has the capability to use the center of the dartboard as a coordinate system in order to calibrate the robot, find where the previous dart was thrown and make a correction to the next throw if necessary, and find an item on the dart board and hit it.



THE ROBOT

- Aerotech BM500 for arm rotation
- Aerotech BM75 and Newmark Turntable for base rotation

These motors work to control left and right movement of the robot arm and circular motion to throw the dart. The pneumatically controlled dart gripper at the end of the carbon fiber tube makes up the hand of the robot arm and releases a dart at the precise time while the arm swings to hit the correct location on the dart board.

THE GUI

The Graphical User Interface serves as the front panel of the robot. From here, the robot can be commanded to hit a specific section on the dart board, play dart games automatically, perform specific motions of the motors for robot maintenance, and use machine vision.

THE WIRING

The wiring for the robot is set up to be very simple, so the robot can be set up and taken apart quickly. The wiring for the robot has one ground, and the wiring for the ring light has a separate ground. An emergency stop wiring system is also installed so when any door on the cart is opened, the system shuts off.

THE TEAM



SAM
McMANUS

ERIK
AZEVEDO

DOUG
DONATELLI

DAVE
SPINDER

DR. BLAIR
ALLISON

ELLEN
TURNER

JOSH
RUHL

STEVEN
DECKER

CALEB
SUNDHOLM

BEN
FOSTER

