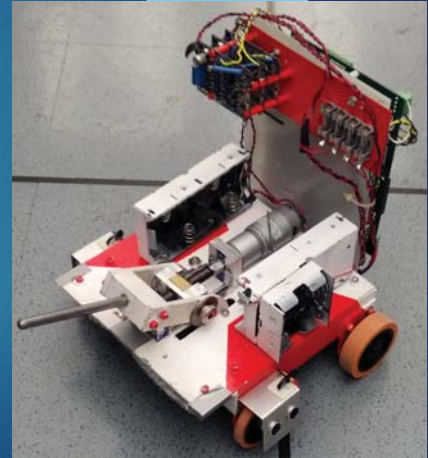


Panthra Project

UCLA, MAE 162E: MECHANICAL ENGINEERING DESIGN II
TEAM 3

ASHER KATZ – SYSTEMS ENGINEER
WILSON LAM – COGNIZANT ENGINEER
ALEXANDRA NOE – PROJECT MANAGER
CHRIS UNDERHILL – COGNIZANT ENGINEER
DAVID WALTER – MECHATRONICS ENGINEER



Outline

- ▶ Design Requirements
- ▶ Design Overview
- ▶ FEM Analysis
- ▶ Mechatronics
- ▶ Programming
- ▶ Manufacturing
- ▶ Lessons Learned

High Level Design Requirements

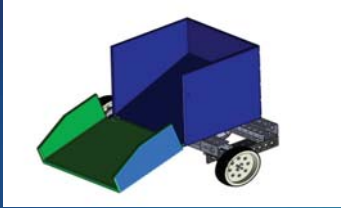
- ▶ Objective: Construct a robot to navigate a course autonomously
- ▶ 12"x12"x16" max dimensions
- ▶ Must carry at least 3 lead discs, ~6lb each
- ▶ 10x disposable 1.5V batteries, 3x 9V batteries
- ▶ Emergency kill switch
- ▶ 10 minute demonstration, 5 minute competition
- ▶ \$350 budget

Low Level Design Requirements

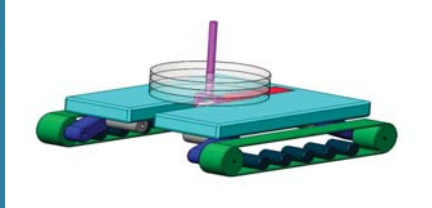
- ▶ Deliver 3 discs per run
- ▶ 60 sec complete runs
- ▶ Simple design
- ▶ Aesthetically appealing

Design Overview

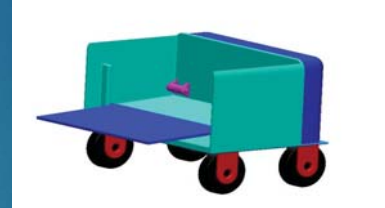
- Started with 3 different designs



Cheetara

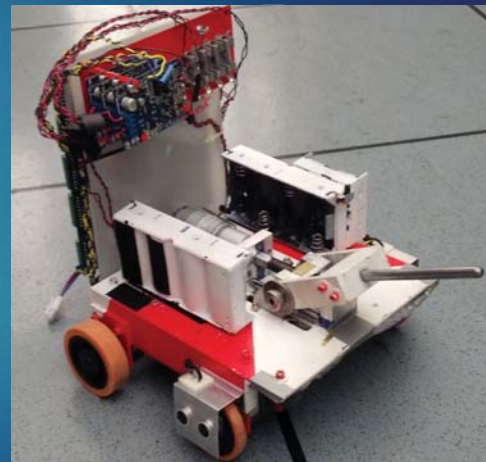
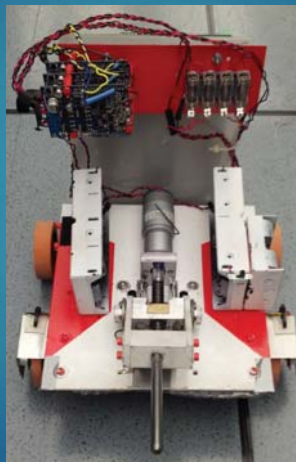
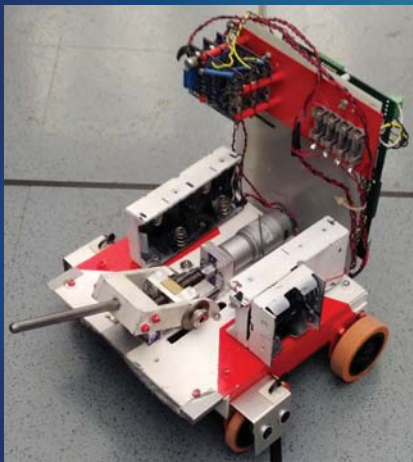


Panthro



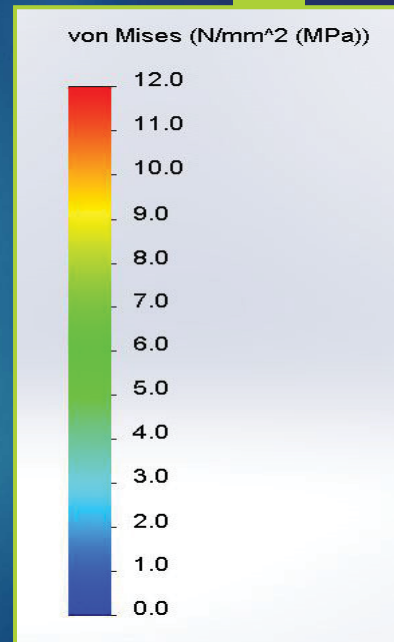
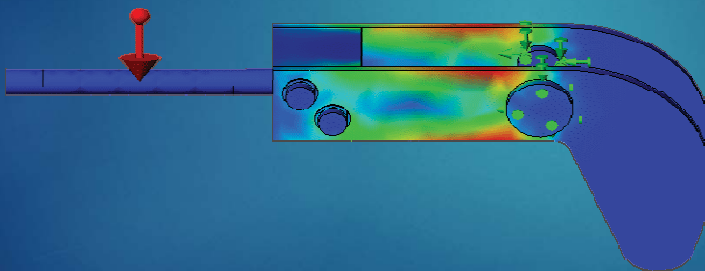
Tygra

Panthra Design



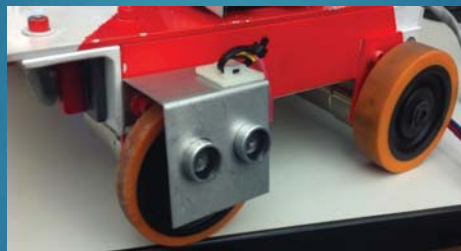
Horizontal Stress

- ▶ AL 6061-T6 yield stress: 275 MPa
- ▶ Also performing a FOS test yields a sufficient FOS

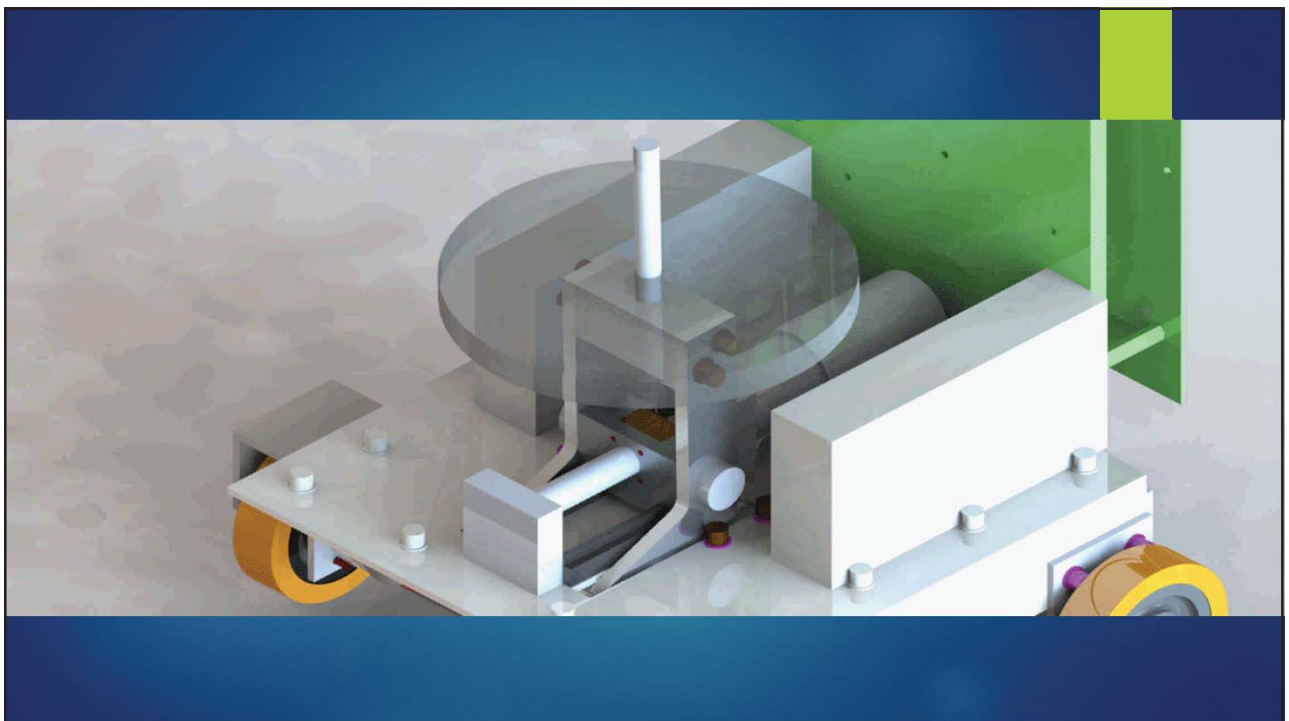


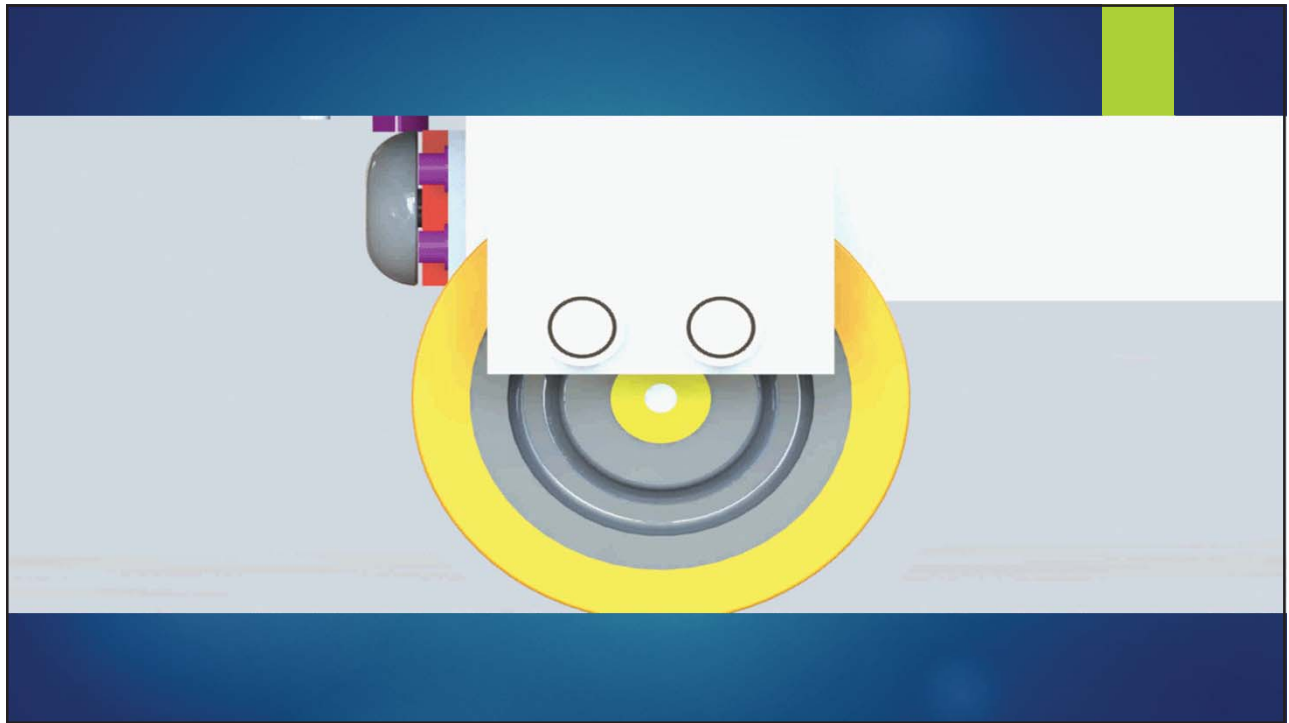
Mechatronics

- ▶ 2 Ultrasonic sensors – located on the front left and front right sides



- ▶ 2 push buttons – located on the front





Mechatronics

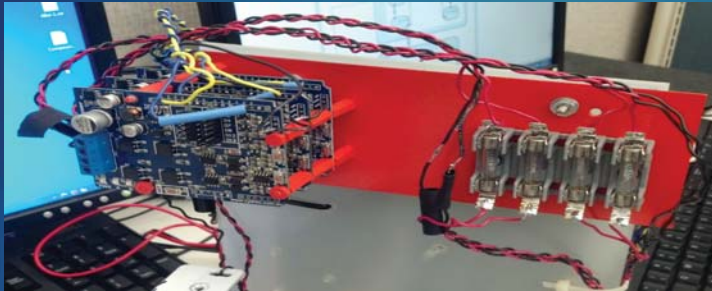
- ▶ Lead screw circuit



- ▶ Batteries

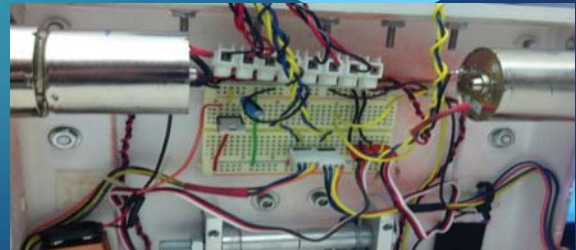


Mechatronics

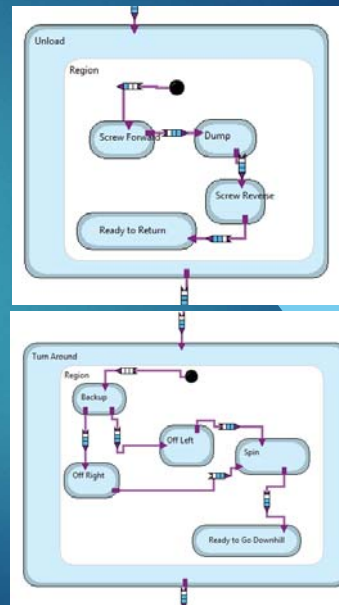
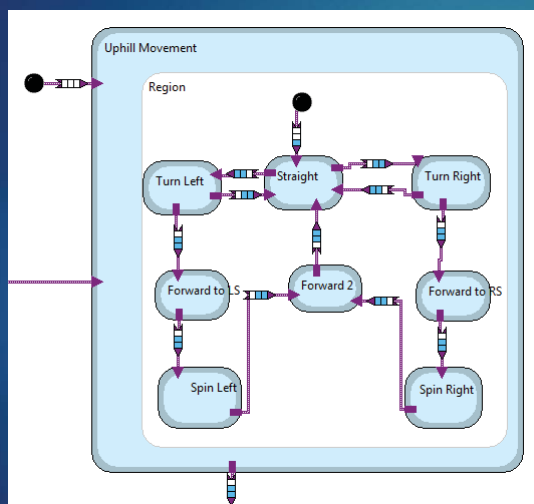


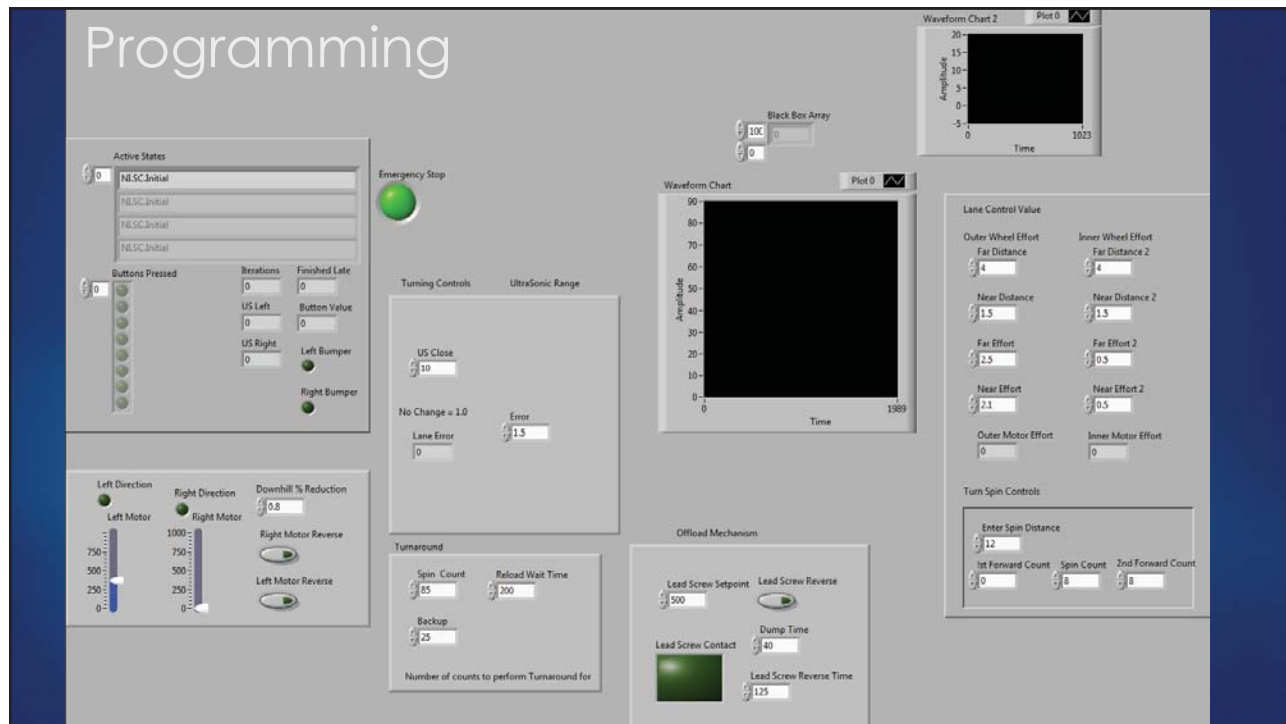
- Motor drivers mounted to back of SB Rio

- Breadboard mounted underneath baseplate



Programming





DFMA

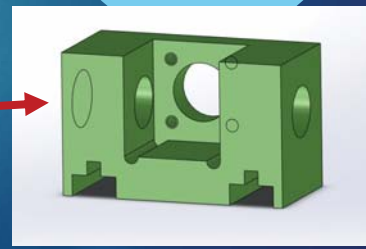
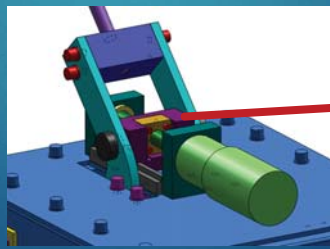
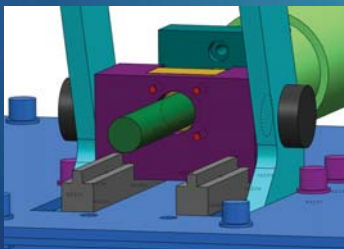
DESIGN FOR MANUFACTURABILITY AND ASSEMBLY

- ▶ Parts designed for manufacture with traditional machines
- ▶ 6061 T6 Aluminum – excellent strength to weight ratio and machinability
- ▶ Fastener Continuity



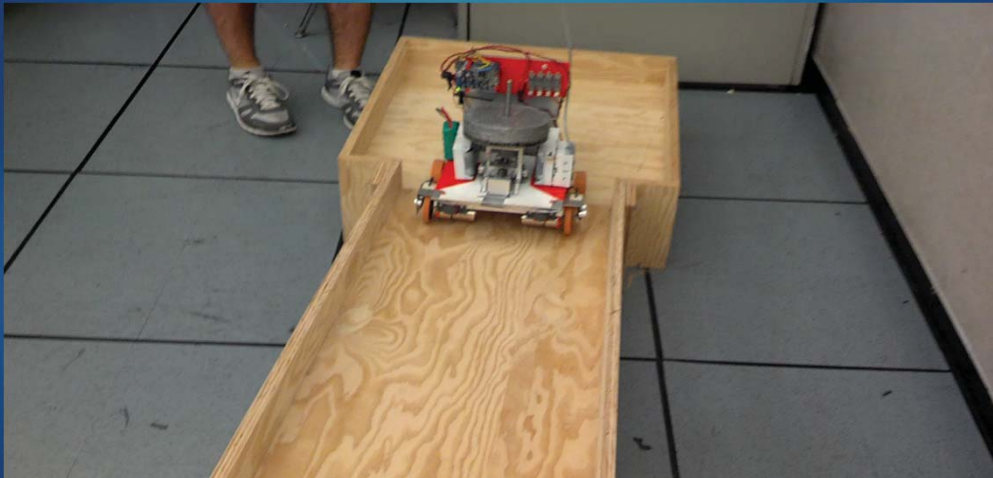
Manufacturing Difficulties

- ▶ Highly discouraged from using waterjet cutter
- ▶ Linear actuator – low tolerances



Lessons Learned

- ▶ Where to mount our ultrasonic sensors
- ▶ Skid steering – overpowered motors
- ▶ How much space the electrical components take up
- ▶ Length of unloading spindle arm
- ▶ Testing and refining statechart diagrams is time consuming, but very important



Next Steps

- ▶ Speed up the times of our runs
 - ▶ Currently at about 75 seconds, want to be at 60 seconds
- ▶ Test if we can take 4 discs

