SumoBot Capstone

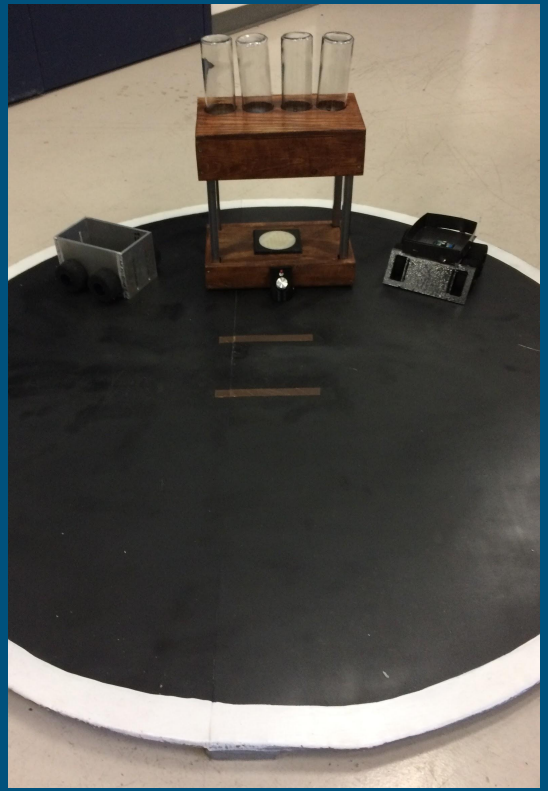
8:30 A.M. April 28, 2017 , Havasupai C Room

Department of Mechanical Engineering
Team 21

Rene Diyarza - Project Manager
David Feetterer - Budget Liaison
Jose Villegas - Website Developer
Yousef Alghareeb - Client Contact

Outline

- Introduction
- Requirements and Specifications
- Design Selection
- Manufacturing
- Final Design
- Problems/Difficulties



Rene Diyarza

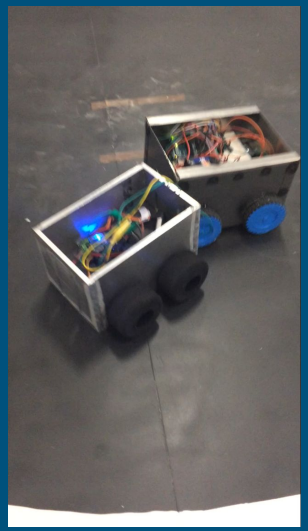
What is a the Competition?

Based on the RoboGames events

Two robots compete in head-to-head match following sumo matches.

Solely meant to push the opponent off of the arena

Multiple classes



Rene Diyarza

NAU Competition Layout

•Each match consists of 3 rounds, within a 3 minute time period
•A team wins a match when they obtain a total of two points
•An extended match maybe be placed by judge's decision if neither team has won a point within the time frame.

Requirements and Specifications (Sumo)

Length and width of bot must not exceed 20 cm but height is unlimited.

Total weight of bot must be less than 3000 grams.

Autonomous bot must not start moving before 5 seconds after match starts.

The controller frequency for R/C bot must not have a frequency of 75Mhz.

Edges must not be sharp and have radius greater than 0.005 inches.

Engineering Requirements	restrictions
Length	< 20 cm
Width	< 20 cm
Height	Unlimited
Total weight	< 3 Kg
Start Up	After 5 s
Controller Frequency	≠ 75 Mhz
Edges	> 0.005 in

Yousef Alghareeb

Requirements and Specifications (Serving)

Does it look good?

Does it prepare the drink with style or dramatic flare?

Can it deliver the drink after it is made?

Can it prepare more that one drink?

Rene Diyarza

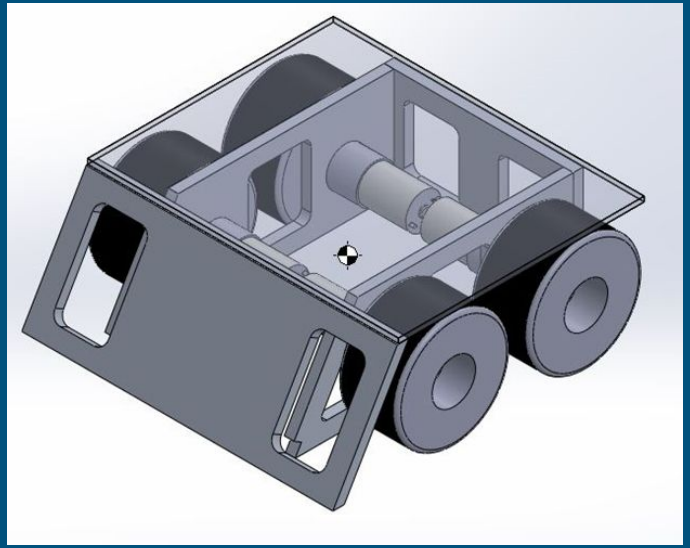
Design Selection (Autonomous)

The bot was coded to act independently using Arduino language.

five motion sensors and two line sensors are placed at the front and side to assist reading situation.

Connecting two batteries to get more torque and velocity by delivering more current.

Aluminum with a thickness of 0.25 inches was selected to make the frame.



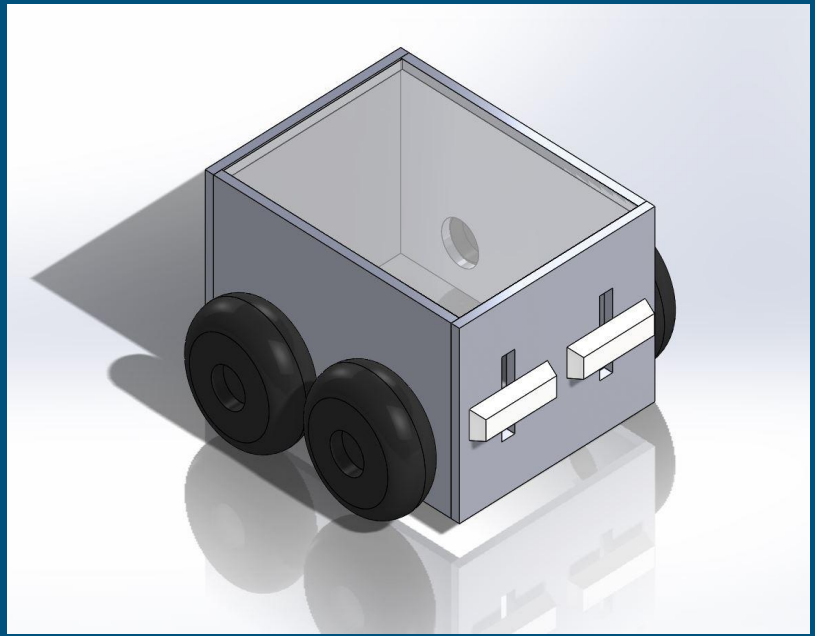
Design Selection (Remote Controlled)

Controlled by an R/C remote by a user

Speed controller used to control the four motors

Team member controls the bot

Plexi glass for showable electronics



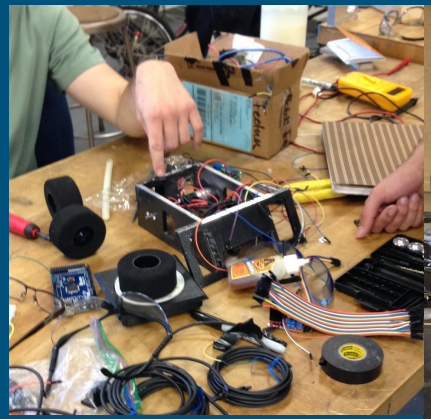
Design Selection (Serving)

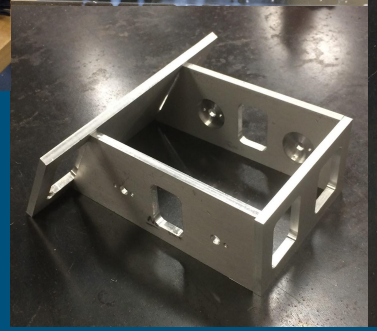
- Most compact design
- Minimal exposed hardware
- Clean lines
- Inverted liquid container

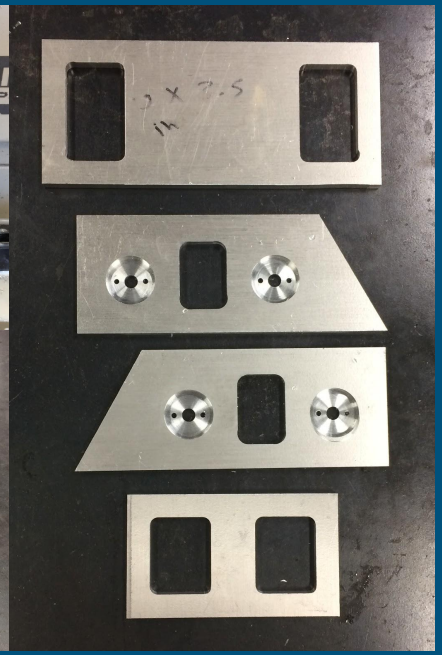
Manufacturing (Autonomous)

Equipment Utilized

- Tormach CNC
- Vertical Mill
- Tig Welder







David Feetterer

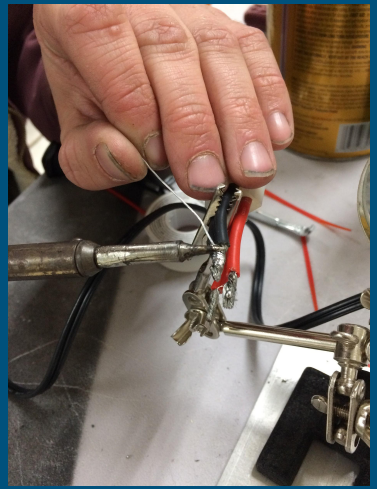
Manufacturing (R/C)

Welded Frame

Soldered wires for added strength

Vertical mill used to slot design

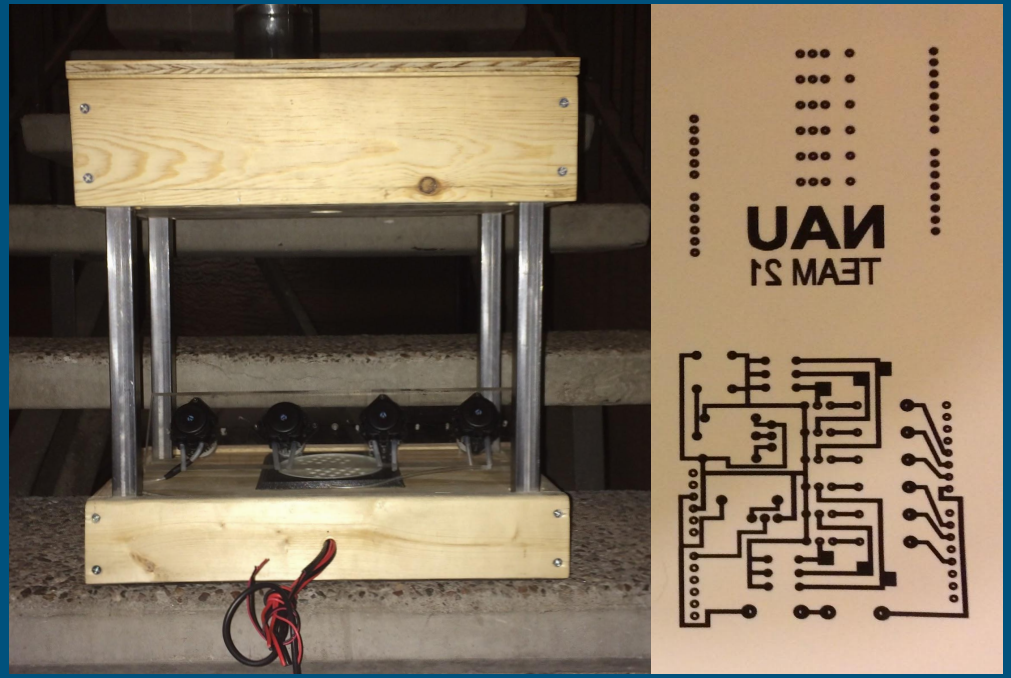
Sandpaper to smooth edges and frame



Jose Villegas

Manufacturing (Serving)

- Materials
- Construction
- Electronics



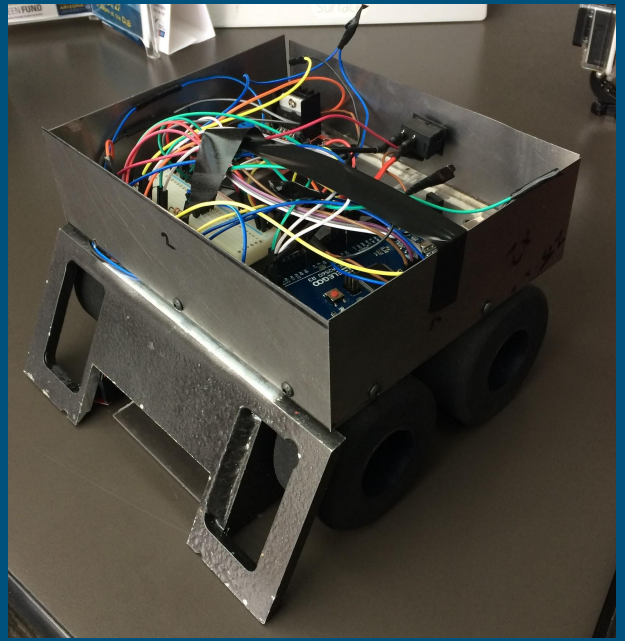
David Feetterer

Final Design (Autonomous)

Four aluminum sheets were added at the top to secure the components.

One battery was used only because of changing the selected motor driver.

Two motion sensors one the side were dropped because one the sensors was damaged.



Final Design (R/C)

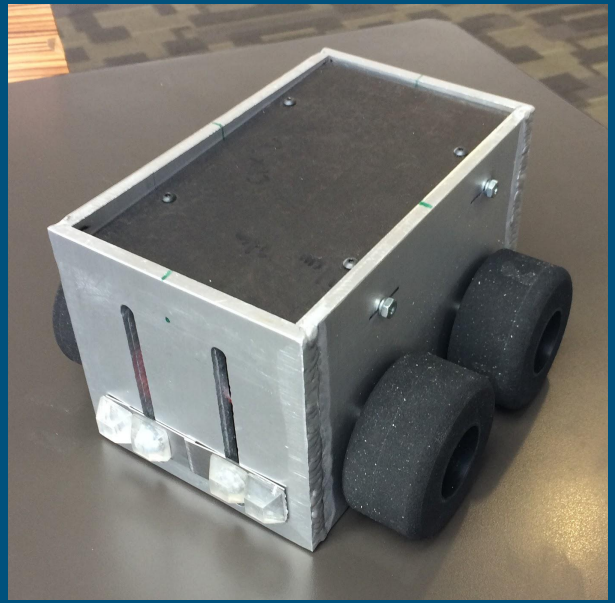
Bumpers distinguishing the front of the R/C

Guided slots for adjusting bumper's height

GreenDot compound wheels for maximum traction

Angled frame to add stability

Four wheel drive system for maximum torque



Final Design (Serving)

Capable of making 5 drinks

LEDs indicate liquids being dispensed

Flow rate 200 ml per minute (4 pumps)

Knob helps the user select a drink

Top features the tubing and peristaltic pumps

Bottom features Arduino and electronics

Problems/Difficulties

First R/C remote was defective

One of the speed controllers stopped working two days prior to competition

Anonymous coding was beyond the team's ME knowledge

Trial and error for configuring sensors

Maximizing serving bot's flow rate

Arena's surface

Questions/ Answers

Luncheon & Keynote Address – 11:30am-1:30pm, du Bois Ballroom

Please join us for lunch if you are a poster or oral presenter, family member, judge, sponsor, alumni, mentor, faculty, staff or advisory council member.

"Creating a Tech Startup, What I Wish They Would have Told Me"

Martin Casado, PhD, **General Partner, Andreessen Horowitz**

Presenting the first annual Sumo Robotics competition! - during Luncheon

Enjoy the first joint Mechanical and Electrical Engineering Sumo robotics competition to take place this year after the keynote address during the luncheon in the du Bois Ballroom. For more information regarding the rules of the sumo competition, please visit: http://robogames.net/rules/all-sumo.php