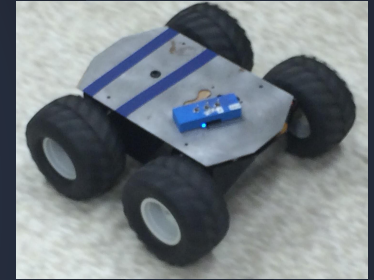
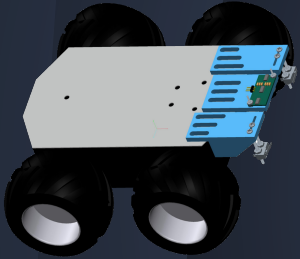


Beacon and Obstacle Navigation for an Autonomous Rover



By: Richard Ortecho and Tim Helmer
Collaborators: Cassandra Spath and Josh Beaty
Mentors : Maurice Woods III and Tim O'Neill

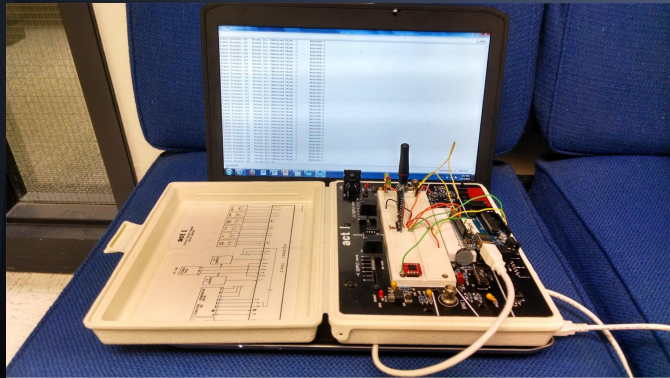


Equipped with his five senses, man explores the
universe around him and calls the adventure
Science.

(Edwin Powell Hubble)

Overview of Challenge

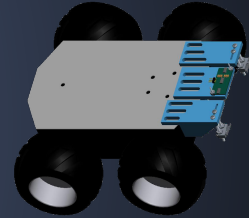
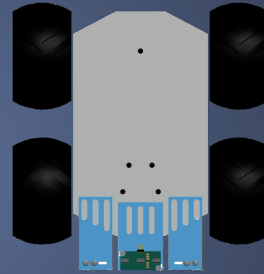
- Navigate an arena
 - Moving around walls
 - Moving around holes
 - End point is beacon
- Requirements
 - Under 4 kg
 - \$500 budget
 - Autonomous



COLORADO SPACE GRANT CONSORTIUM

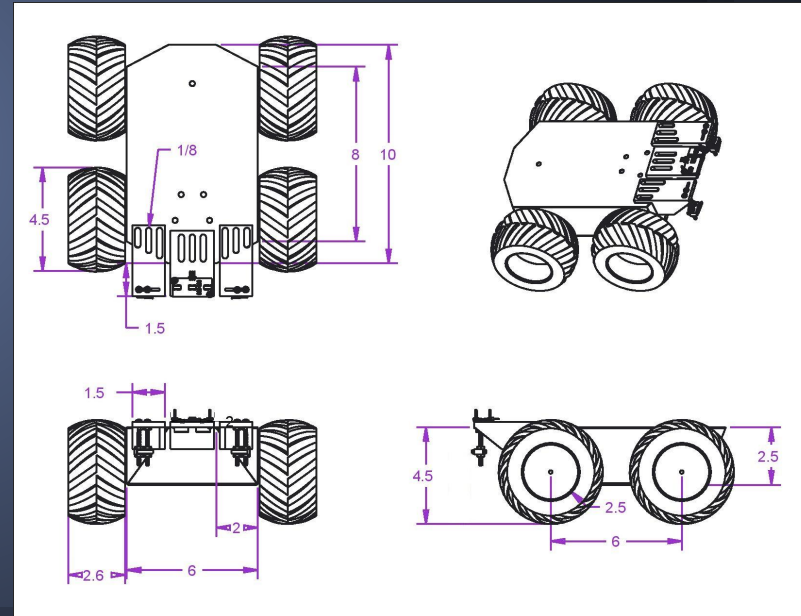
About our project:

- Had to build a robot
 - Mechanics
 - Documentations
 - Software
- Used to Navigate
 - A chassis
 - And sensors



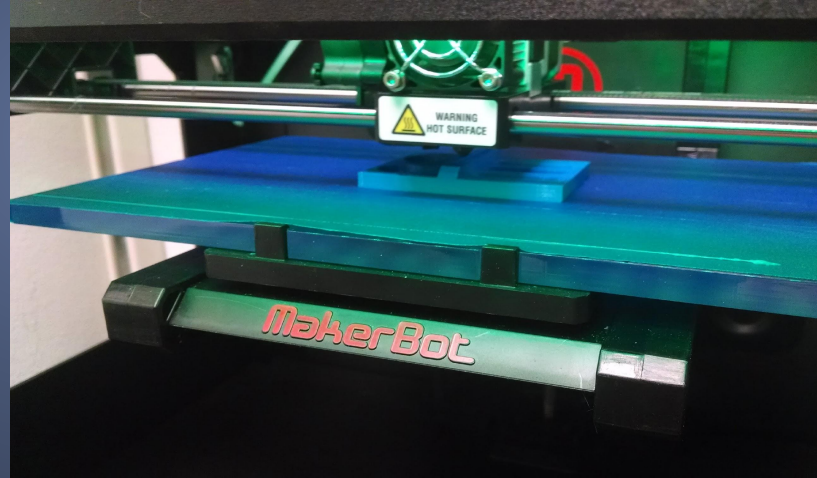
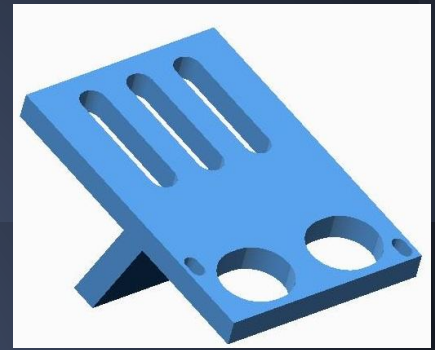
Chassis

- From LAZARUS PROJECT (Sheily)
- Built for future projects
- Modifications had to be made



Construction

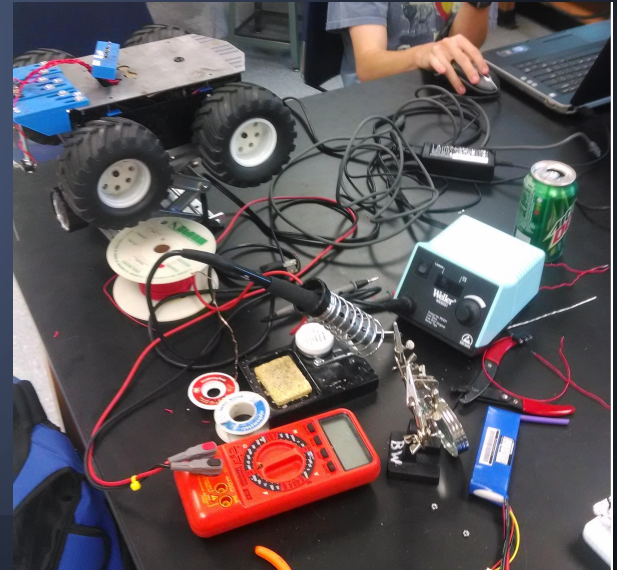
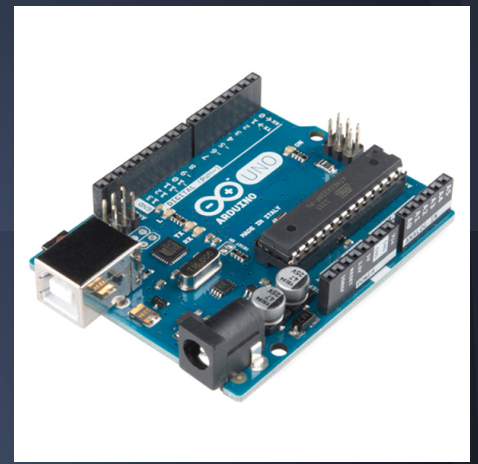
- Modifying the chassis
 - Holes
 - Wires



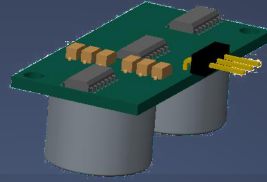
- Printing the mounts

Electronics

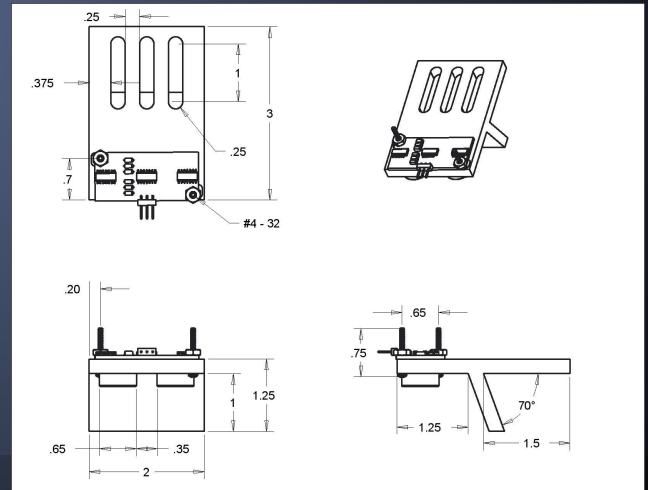
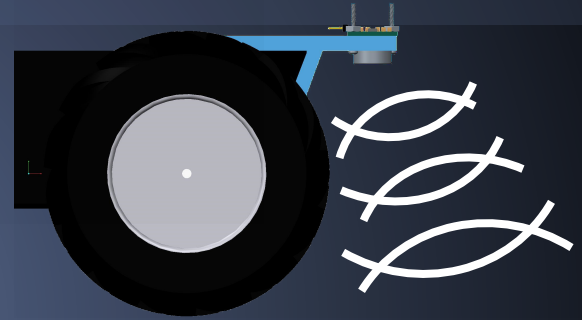
- Had to plan out everything
 - Motor Controller
 - Soldering
- Digital input and output
- Arduino Version of C++



Ultrasonic Sensor

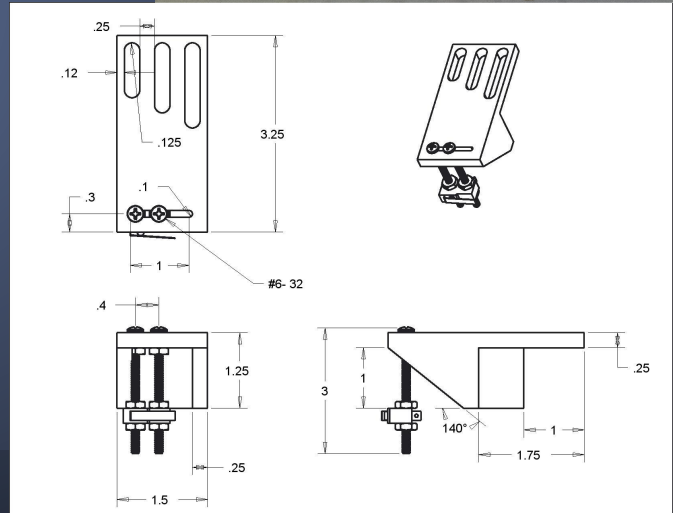
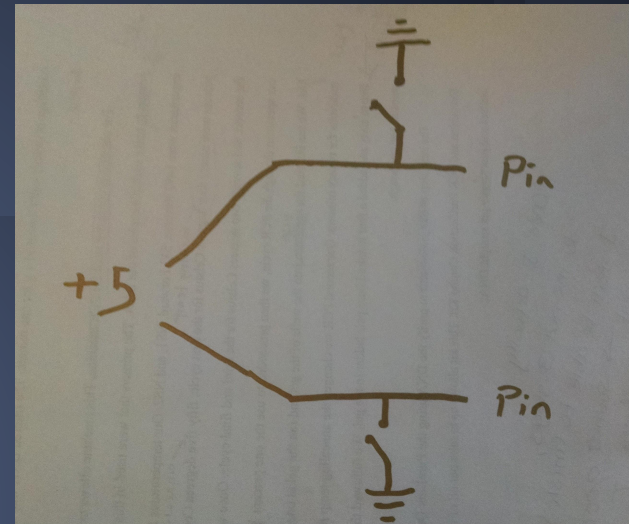
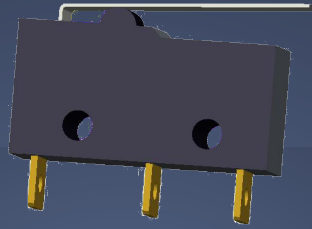


- Parallax Ping Sensor
- Uses 40 kHz waves
Humans hear up to 20 kHz
- Used to measure height
 - No turtling
 - No falling
 - High centering



Limit Switches

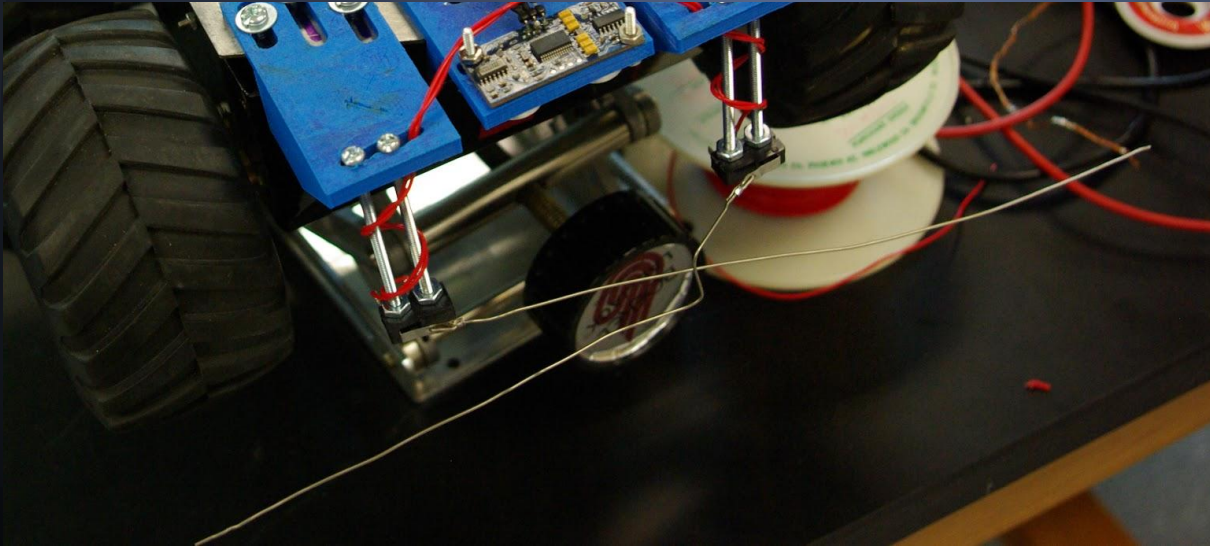
- Makes a circuit
- Used as stop
 - Digital
 - Mechanical
- Two angled mounts on front



Logic Behind the Bump Sensors

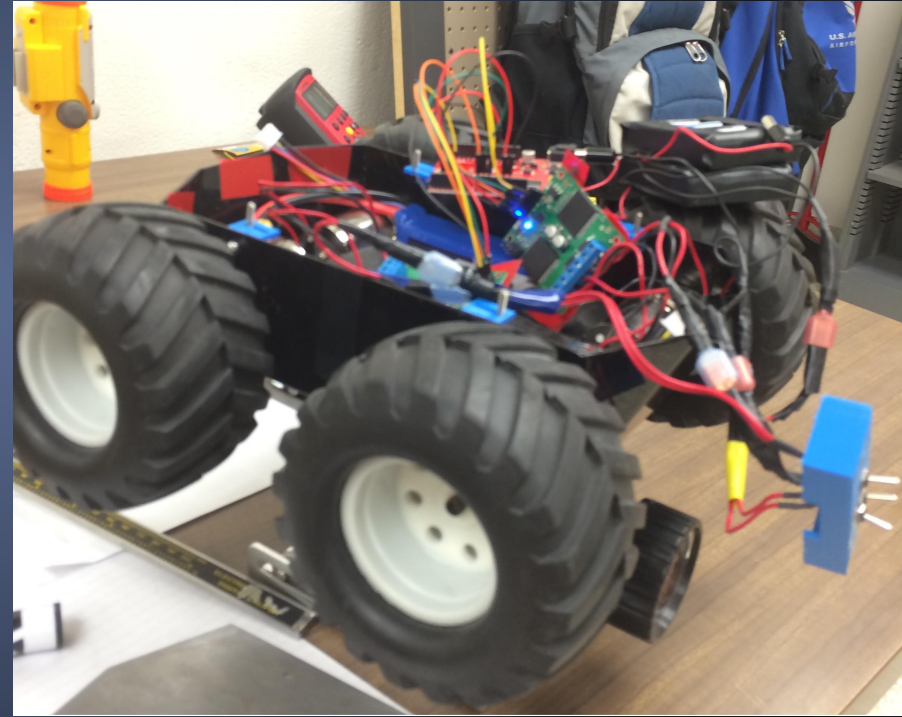
Left hit = Right Turn

Right hit = Left Turn



Results

- Currently running
- Some technical issues
 - Working to get fixed
- Only bump sensors are operational
 - Working to integrate all aspects



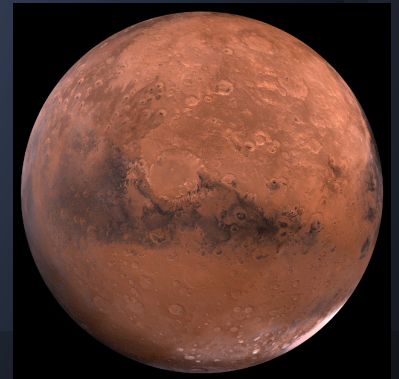
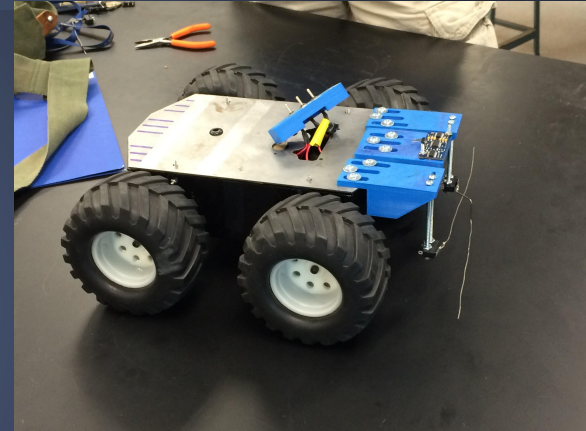


<http://youtu.be/PXfdWKdTvhk>

Demo of Robot (Live)

Conclusion

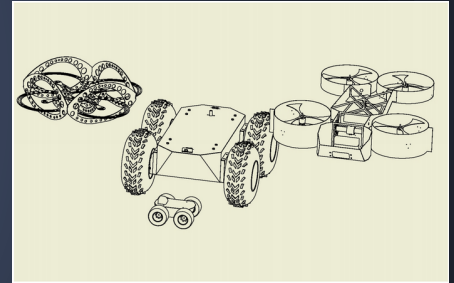
- Helped the robotics platform at UNC by building off of the LAZARUS Project
- Applications
 - Space Exploration
 - Demolished building Rescue



References

Floreano, D. & Nolfi, S.(2000). Evolutionary robotics: the biology, intelligence, and technology of self-organizing machines. Cambridge, Mass: MIT Press.

Sheily, R. The Lazarus Project: Developing a robust framework for future robotics research. Greeley, Colorado: UNC. (Sheily)



Volpe, R. Rover Functional Autonomy Development for the Mars Mobile Science Laboratory. Retrieved from https://www-robotics.jpl.nasa.gov/publications/Richard_Volpe/aerospace03.pdf

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FSI Alumni
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Xcel EnergySM

BACON FAMILY
foundation

**KINDER  MORGAN
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