

All-terrain Robotic Excavation System (A.R.E.S.)

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Introduction

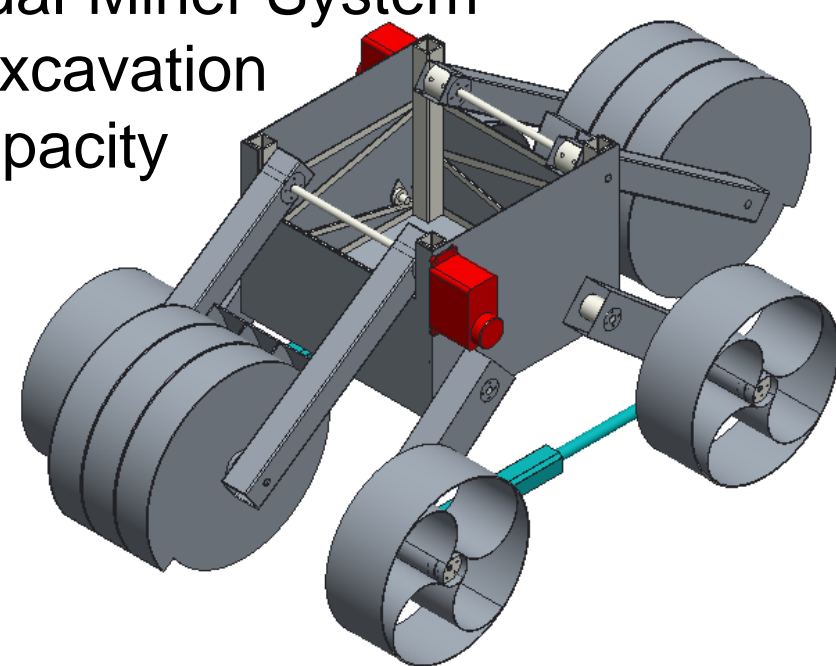
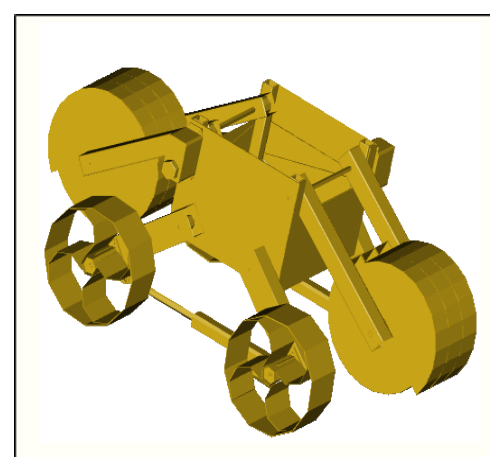
A.R.E.S. is a multidisciplinary team that is designing and building a robot to compete in the 2016 NASA Robotic Mining Competition at Kennedy Space Center, Florida.

Objectives

- To compete and place first in the 2016 NASA Robotic Mining Competition
- Design and build a robot that
 - weighs under 80 kg and contained with a starting configuration of 1.5m x 0.75m x 0.75m
 - is remotely operated
 - is able to mine and deposit at least 10 kg of regolith in the allotted 10 minute competition run

Design

- Carbon Fiber
 - Excavation Drums
 - Efficient mining ratio
 - Lightweight
 - Durable
- Adjustable Locomotion System
 - Extended depositing height
 - Increased weight distribution
 - Controlled center of gravity
- Adjustable Dual-Miner System
 - Modular excavation
 - Double capacity



Software and Communications

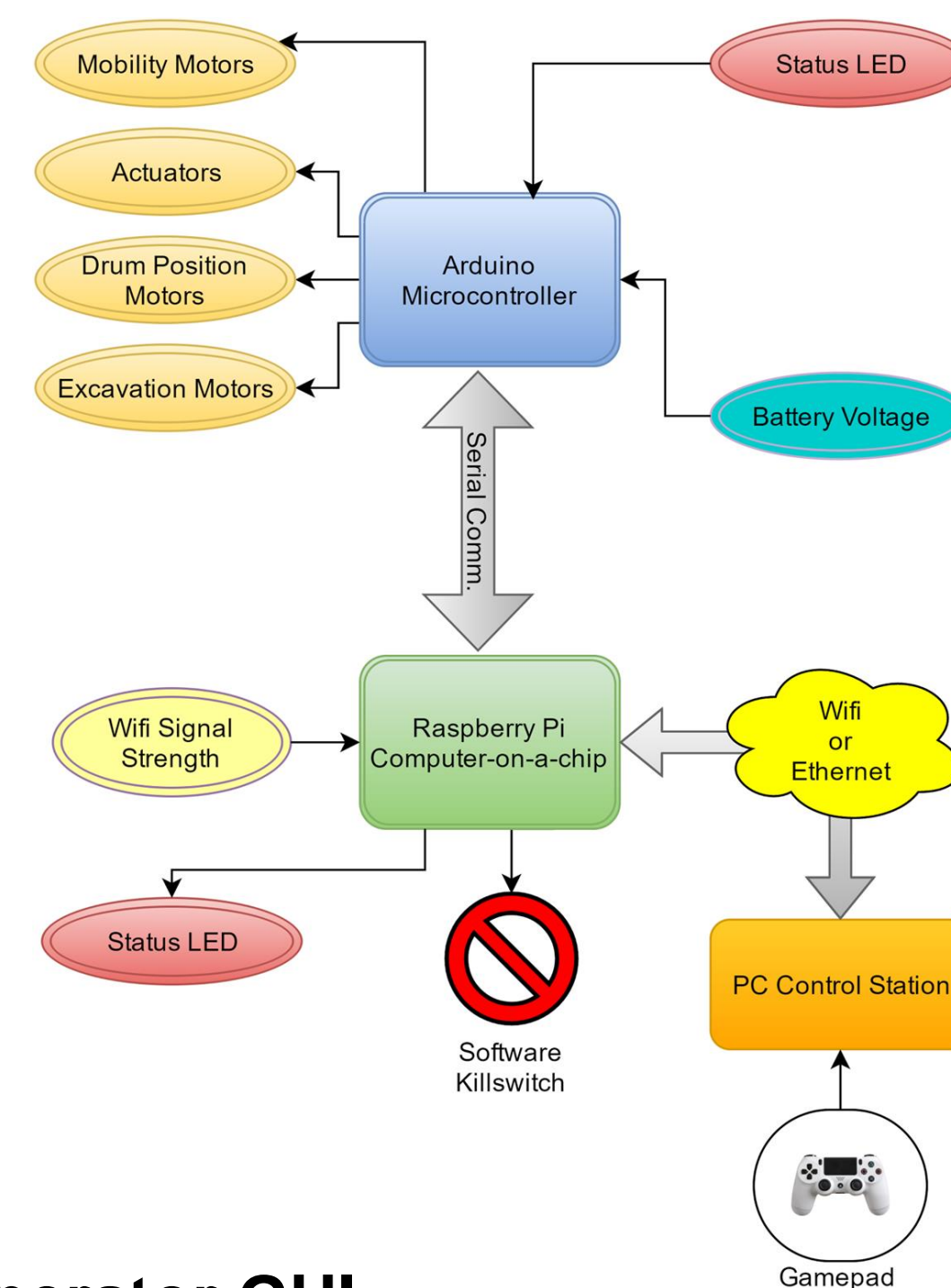
- On-board computers include an Arduino and a Raspberry Pi.
- Arduino drives motors and collects data.
- Raspberry Pi does networking and system monitoring.
- The on-board network is UART Serial.
- Remote command is done with a TCP Client-Server design pattern.
- Tele-operation is done via Playstation 4 controller or Laptop User Interface.
- Remote communication happens through an ethernet or wifi link on an isolated network.

Carbon Fiber Manufacturing

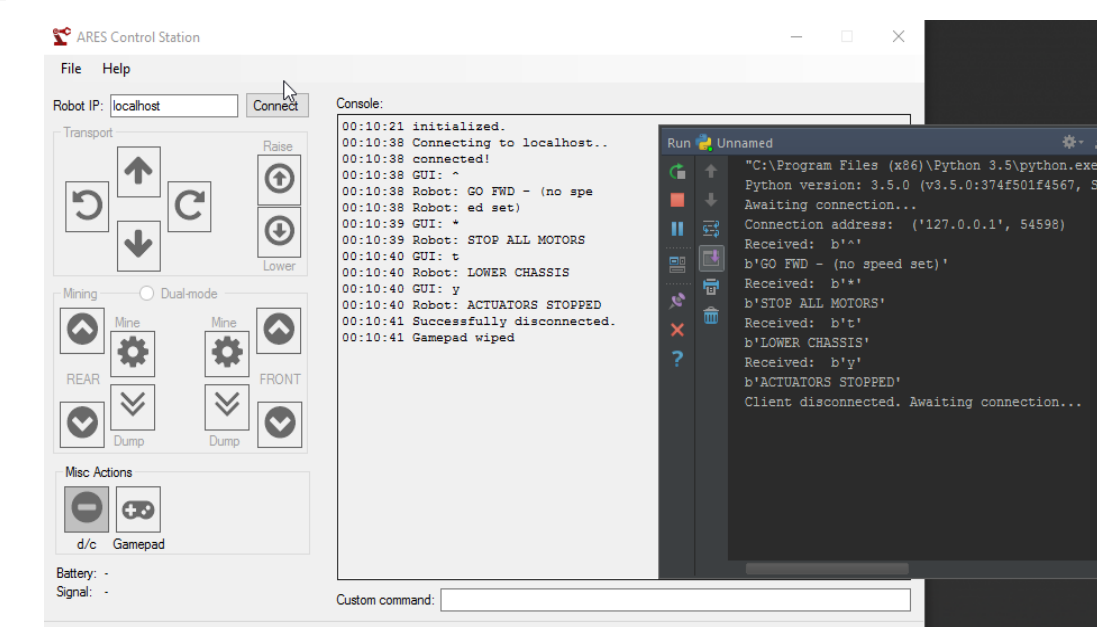
- 0/90 stitch carbon fiber
- Polyester Peel Ply
- 4 oz Breather / Bleeder Cloth
- Vacuum bagging method



Control System Diagram



Operator GUI



Sponsors

Thank you to our sponsors: Florida Space Grant Consortium, Northrop Grumman and SolidWORKS

Fellow Students

Ronald-Dean Allado and John Breen

NORTHROP GRUMMAN



Engineering & Science
Student Design Showcase
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