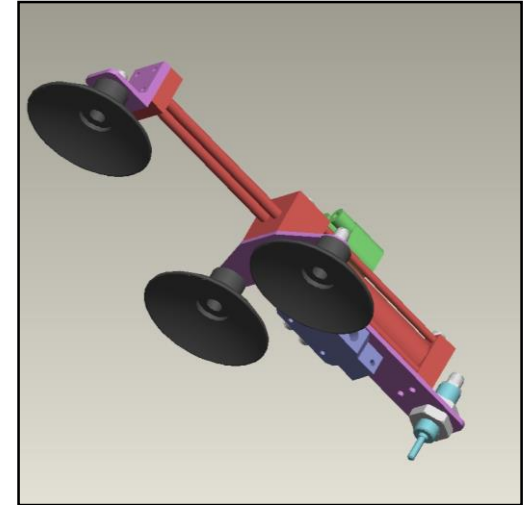
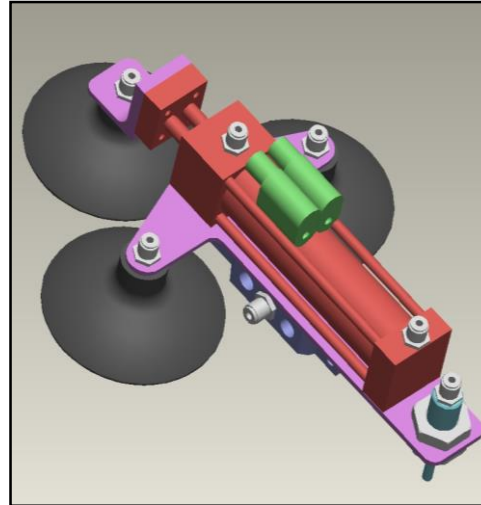


# Intelligent Wall Climbing Robot

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## Problem Statement

- Design a remote-controlled robot that can crawl up a vertical wall with no cable or wire support, and carry a five pound load in addition to its own weight.
- Important design parameters include reliable adhesion to the wall during transit, speed, tolerance to both smooth and rough surfaces, lift capability, and efficient use of any onboard battery power.

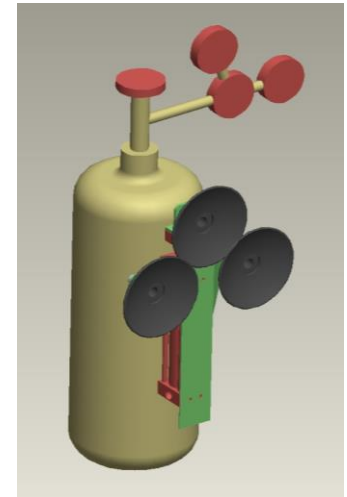
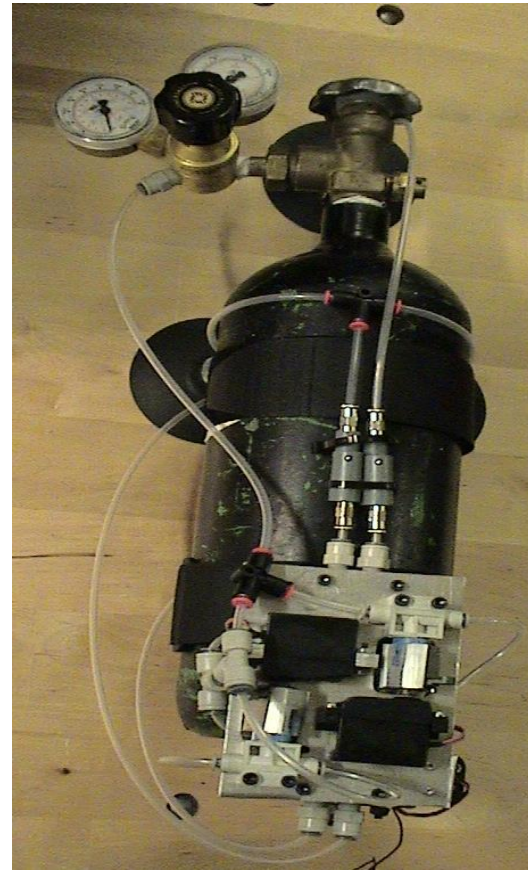


## Initial Design Concept:

- Use actual components during development phase
- Use ground source for compressed air and venturi style vacuum pumps
- Employ dual rods of cylinder to eliminate need for linkage
- Design later modified to incorporate air cylinder into the climbing robot

# Final Prototype

- ◆ Operation
  - ◆ Relies on sequenced translational motion and vacuum cups
- ◆ Employs nitrogen tank
  - ◆ Source of compressed air for vacuum pumps
  - ◆ Weighs 12 lbs
- ◆ Overall weight
  - ◆ 17 lbs (before loading)
  - ◆ Capable of carrying additional 10 lbs load up smooth vertical wall with a factor of safety of 2
- ◆ Valving
  - ◆ Total of 2 valves needed for crawler
  - ◆ Valve #1 controls suction cups
  - ◆ Valve #2 controls air cylinder
- ◆ Controls
  - ◆ Incorporates servos and controller/receiver to automate on/off valves



## Many questions answered by design:

- Suction cups hold over 50 lbs each
- Two cup design unable to cope with moment created during extension
- Valving offers instantaneous switch between cups
- Cylinder capable of lifting 60+ lbs, but movement is too quick

