

Autonomous Robotic Balloon (Capstone Design Project)



Capabilities

- Autonomous navigation and flight within a local outdoor area (such as the campus or city)
- Performing pre-defined robotic tasks such as pick-and-place.
- Autonomously avoiding collisions with buildings, trees, towers, etc.
- Remote supervision and emergency handling.

Potential applications

- Flying around for advertisement
- Taking images of public events or a designated area
- Delivering payloads from one spot to another
- Surveying, monitoring, or surveillance
- Planetary exploration (e.g. flying on the Mars although no GPS there)

Current Sponsor: Boeing.

Schedule

ME Only— Spring 2005: design, analysis, simulation, components acquisition and development.
EE and ME— Fall 2005: system integration, indoor test completion, starting outdoor testing (maybe tethered)
Spring 2006: completing optional features and completing autonomous flight test.

Mentors

Mr. George Conrad (PSL retiree) – balloon technology, geocon@ZiaNet.com

Dr. O. Ma (ME Dept.) – robotics and mechanical, 505-646-6534, oma@nmsu.edu

Dr. S. Stochaj (EE Dept.) – sensing, balloon, and electrical, 505-646-4828, stochaj@nmsu.edu

Prof. Earl Burkholder (Surveying Dept.) – GPS technology, eburkhol@nmsu.edu

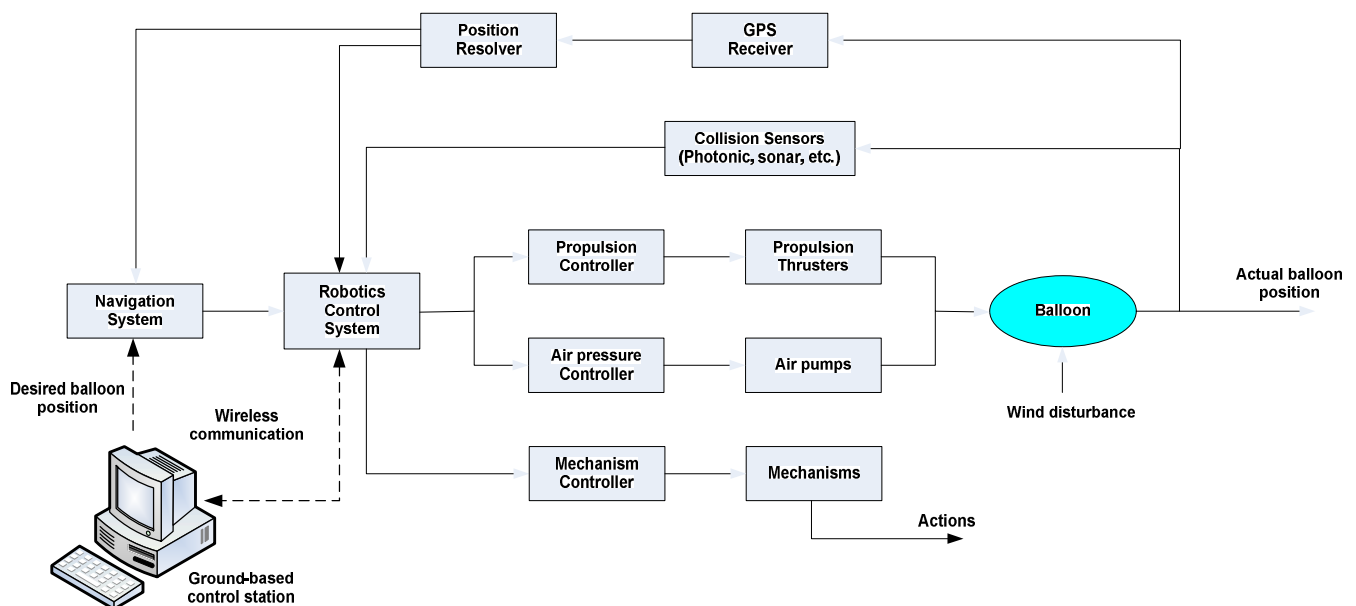
Dr. J. Cook (EE Dept.) - cpu or FPGA , 505-646-3153, jcook@nmsu.edu

Current Team Members

Laurence Flores	ME 427	Balloon	lauflore@nmsu.edu
Brandon Armendariz	ME 427	Balloon	braarmen@nmsu.edu
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Members from EE Department are expected to join the team later.

Diagram of an Ideal System (Some parts are optional)



Example problems need to be looked into and solved

- GPS-based navigation
- Balloon altitude control (pressure control may be optional)
- Propulsion/propeller system and position control
- Onboard computer system
- Power system
- Remote radio control (optional except for emergency handling)
- Wind and other weather-related disturbances (optional)
- Collision detection and avoidance (optional)
- Grippers, cameras, etc. (optional)
- Regulation for flight – safety issues
- Failure or emergency handling

Note: in order to effectively and efficiently use limited resources, the items marked “optional” has lower priorities in the development.