Unmanned Ground Vehicle (UGV) Forge

Justin Le (CpE), Jerry Lee (CpE), Kevin Ross (EE), Derrell Record (CpE)
Professor QV Dang
Department of Electrical Engineering and Computer Science

Objective

UGV is an autonomous rescue ground vehicle capable of delivering supplies to transmitted GPS coordinates. After being dropped via UAV, the UGV navigates during aerial descent using a controlled paraglider to give precise landing position. After surviving up to a 150ft land, the vehicle autonomously navigates to GPS locations provided via the Ground Station. The UGV will incorporate obstacle detection for smart maneuvering and effective navigation. This functionality is geared towards the winning 17th annual Student Unmanned Aerial Systems Competition (SUAS) hosted by the Association for Unmanned Vehicle Systems International (AUVSI).

We also later want to extend beyond the initial objective to incorporate modularization in a way that the UGV can have multiple functionalities using a single design.

Approach

- Research to determine hardware components
  - Purchase initial components
  - Build and test first prototype
- Develop Software algorithms and AutoCAD design
  - Integrate software into hardware
  - Test full system and troubleshoot problems
- Test paraglider landing and steering device on dummy object
- Make necessary changes to system to meet requirements
- Testing and design changes
- Move forward to improvements of system

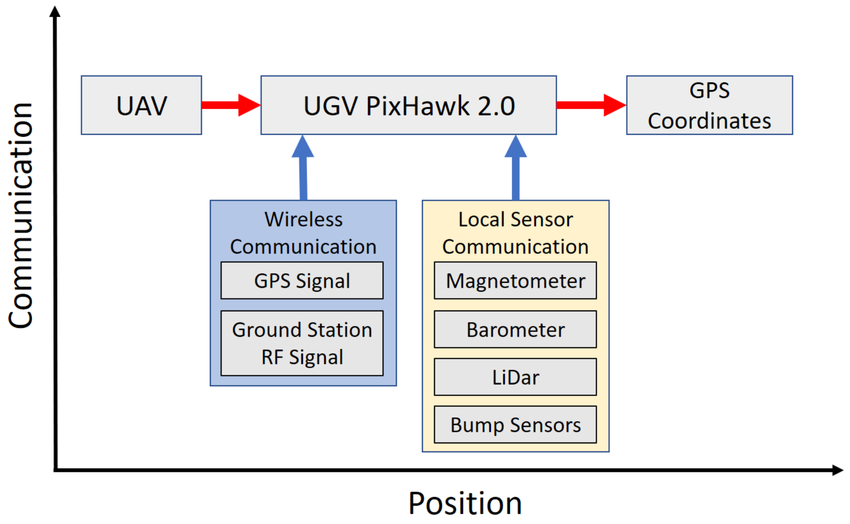
Design

Autonomous Aerial Navigation:

- Deployable paraglider
- Servo motors to pull paraglider left/right
- Barometer for altitude detection

Autonomous Ground Navigation:

- PixHawk 2.1 Microcontroller, GPS antenna, and Magnetometer
- RFD900 Telemetry Transmitter
- Futaba R6303SB Receiver for Ground Station communications
- H-Bridge for motor control



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Current vs. Future Work

Current

- Hardware
  - Components are being implemented
  - Weight is being balanced and optimized
- Software
  - Firmware for autonomous ground movement has been started

Future

- Software Continuation
  - Firmware for both ground and flight movement
- Testing
  - High altitude flight tests using landing mechanism
- Optimization
  - Optimize software for faster processing
- Modularization
  - Modularize vehicle to add additional functionalities to current design