**Project Pegasus**

*UAV Based Package Delivery System*

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**PROJECT DESCRIPTION**

- Drone delivers package to house
  - Moves within area of house
  - Executes search pattern for delivery marker
  - Detects marker, lands on it, and releases package
- Drone returns to delivery truck

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**USE CASE**

- One Stop: Multiple Simultaneous Deliveries

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**SYSTEM ARCHITECTURE**

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**CONTROL ARCHITECTURE**

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**SUBSYSTEMS**

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**BEHAVIOUR**

- Arm externally
- Take Off Here
- Reached cruising altitude
- Move To House
- Reached
- Move To Search positions
- Descend on marker position
- Descended beyond threshold
- Landed
- Package dropped
- Final Landing
- Go to a safe location and land

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**RESULTS**

**PACKAGE DROP ACCURACY**

Average distance from AprilTag: 58 cm

**OBSTACLE AVOIDANCE**

Minimum distance to obstacle: 1 m

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**SYSTEM ROBUSTNESS**

**Package Delivery**

- Success Rate: 90%
- Failure Reasons: Exposure and reflections from marker

**Package Delivery with Obstacle Avoidance**

- Success Rate: 60%
- Failure Reasons: Obstacle not in view of marker

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**REQUIREMENTS**

- Autonomously take off
- Navigate to a known position close to the house
- Detect and navigate to the drop point at the house.
- Avoids static obstacles with a minimum cross-sectional dimensions of 1.5 m x 0.5 m
- Land and Drop package within 2 m of the drop point
- Take off, fly back to and land at another visually marked platform.
- Package should weigh at most 100 g and fit in a cuboid of dimensions 9.5” x 6.5” x 2.2”.

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**VISION**

April Tags - Range
- Outer: 1.6 m to 30 m
- Inner: 20 cm to 2 m

LK Tracking - Speed on Odroid
- 8 fps detection
- 29 fps tracking

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**CONTROL ARCHITECTURE**

- Odroid Control Node
- MAVROS
- MAVlink data
- UAV

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**OBSTACLE AVOIDANCE**

- Minimum distance to obstacle: 1 m

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**SUBSYSTEMS**

- LIDAR Hokuyo UTM-30LX
- Filter Median Filter Range Filter
- Navigation Stack, ROS
- Global Planner: Djikstra Algorithm
- Local Planner: Dynamic Window Approach Planner