Maseeh College of Engineering
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Test Plan Development

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1.0 REFERENCE DOCUMENTS

1.1 Design Documentation
- System Specification
- Block Diagram
- Mathematical model
  - Aerodynamic coefficients Rev. 1.0
  - Equations
  - Control variables Rev. 3.0

2.0 OBJECTIVES

2.1 Parametric Tests
- Manual simulated flight
- Non-linear model for simulation testing
- Determine uncertain model parameters
- Determine aerodynamic coefficients
- Flight test data will be used for parameter estimation

2.2 Unit Tests
- Autonomous control loop:
  - Control mode via pilot commands
  - Fully autonomous mode

2.3 Integration Tests
- Perform a fully autonomous SITL flight to verify that the autopilot control loops operate correctly and mathematical model's accuracy
- Perform a fully autonomous HITL flight to verify model's accuracy and is ready for flight
- Perform an autonomous flight

2.4 Installation Testing
- Physical model instrumentation
- PX4 installation

2.5 Functional Tests
- Test to verify that sensors properly collect data
- GPS

2.6 Environmental Tests
- Wind condition vs UAV motion

3.0 PRETEST PREPARATION

3.1 Pre-flight check
- Upload the flight route to the computer system
- Check the connectivity and the proper functioning of PX4

3.2 Testing Equipment
- Lipo Battery
- Ground Control Station
- Pixhawk controller

3.3 Testing Components
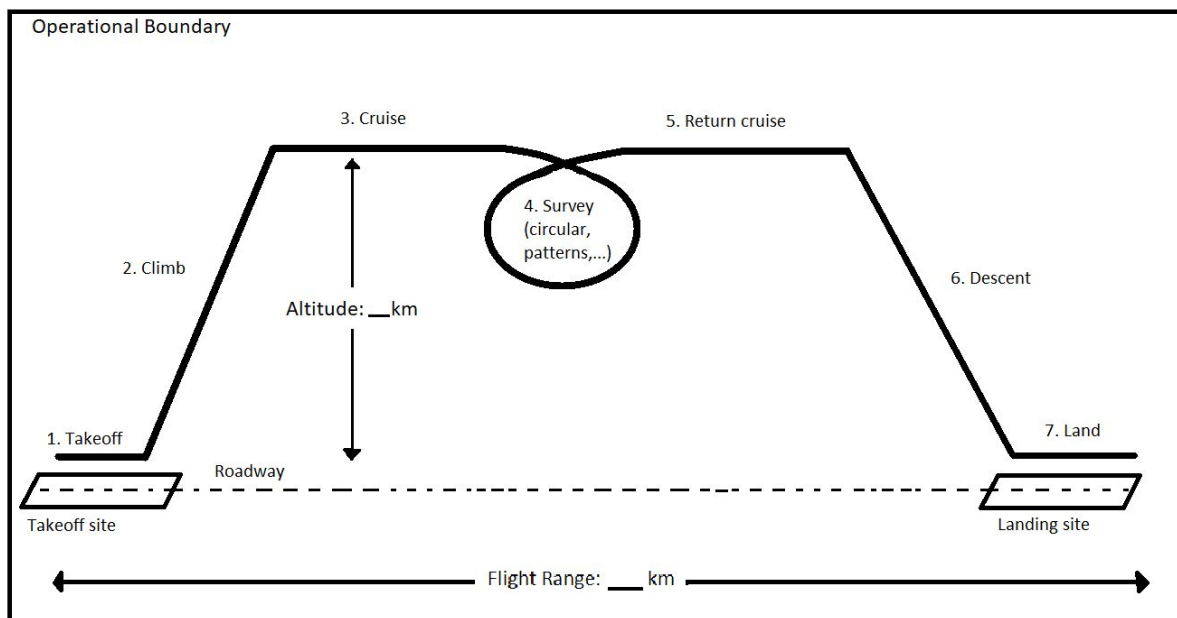- RC F-16 model

3.4 Testing Software
- Flightgear, PX4, JSBSim, QGroundcontrol

4.0 TEST MISSION SETUP

4.1 Flight Plan

Phases of Flight:
    (i) Takeoff
    (ii) Climb
    (iii) Cruise
    (iv) Survey
    (v) Return cruise
    (vi) Descent
    (vii) Land

4.2 Procedure
- Manually launch the aircraft with the radio control transmitter
- Activate the automatic flight route
- Manually lands the aircraft

4.3 Collect Data
- During the flight, the ground station operator record telemetry data:
    - Operating time
    - Waypoints
    - Current flight time
    - Battery status
    - GPS accuracy, position
    - Remote control signal received
    - Flight altitude above takeoff position
    - Roll, pitch, and yaw angles
    - Speed?
    - Distance?
    - …….

- Compute motion parameters
- Log-data of the position and attitude state estimation (Longitude, Latitude, Altitude, Φ, θ, Ψ)

5.0 SYSTEM VALIDATION
5.1 Test cases