



# Chapter 1

## Introduction

# Potential Applications for Small UAVs

## Civil and Commercial:

- Monitoring environment – meteorology, pollution, mapping, mineral exploration
- Monitoring disaster areas – forest fires, avalanches, nuclear contamination
- Communications relays – news broadcasts, disaster relief, sports events
- Law enforcement – road traffic, border patrol, drug control
- Precision agriculture – crop monitoring

## Military:

- Special Operations: Situational Awareness
- Intelligence, surveillance, and reconnaissance
- Communication node
- Battle Damage Assessment

## Homeland Security:

- Boarder patrol
- Surveillance
- Rural/Urban Search and Rescue



# Kestrel Autopilot v2.2

- 3-Axis Angular Rate & Acceleration Measurement
- 20 Point Sensor Temperature Compensation
- Kalman Filter Attitude Estimation
- Optional “piggy-back” Modem
- Configurable Failsafes
- 2-Axis Magnetometer
- 2-Axis Gimbal Support
- Dead reckoning filter  
gracefully handles GPS outages
- Multiple-UAVs
- Smart Loiters
- Auto-Trim



# UAV Test Platforms

## 46 inch Platform:

- COTS airframe
- Wing Area: 2.83 ft<sup>2</sup>
- Unloaded Weight: 11.5 ounces.
- Wing loading factor: 4 ounce/ft<sup>2</sup>.
- Cruise speed: 13 m/s.
- Flight time: 40 min.
- Additional payload: 8 ounces.



EPP Foam, rugged – gimbal or fixed cameras

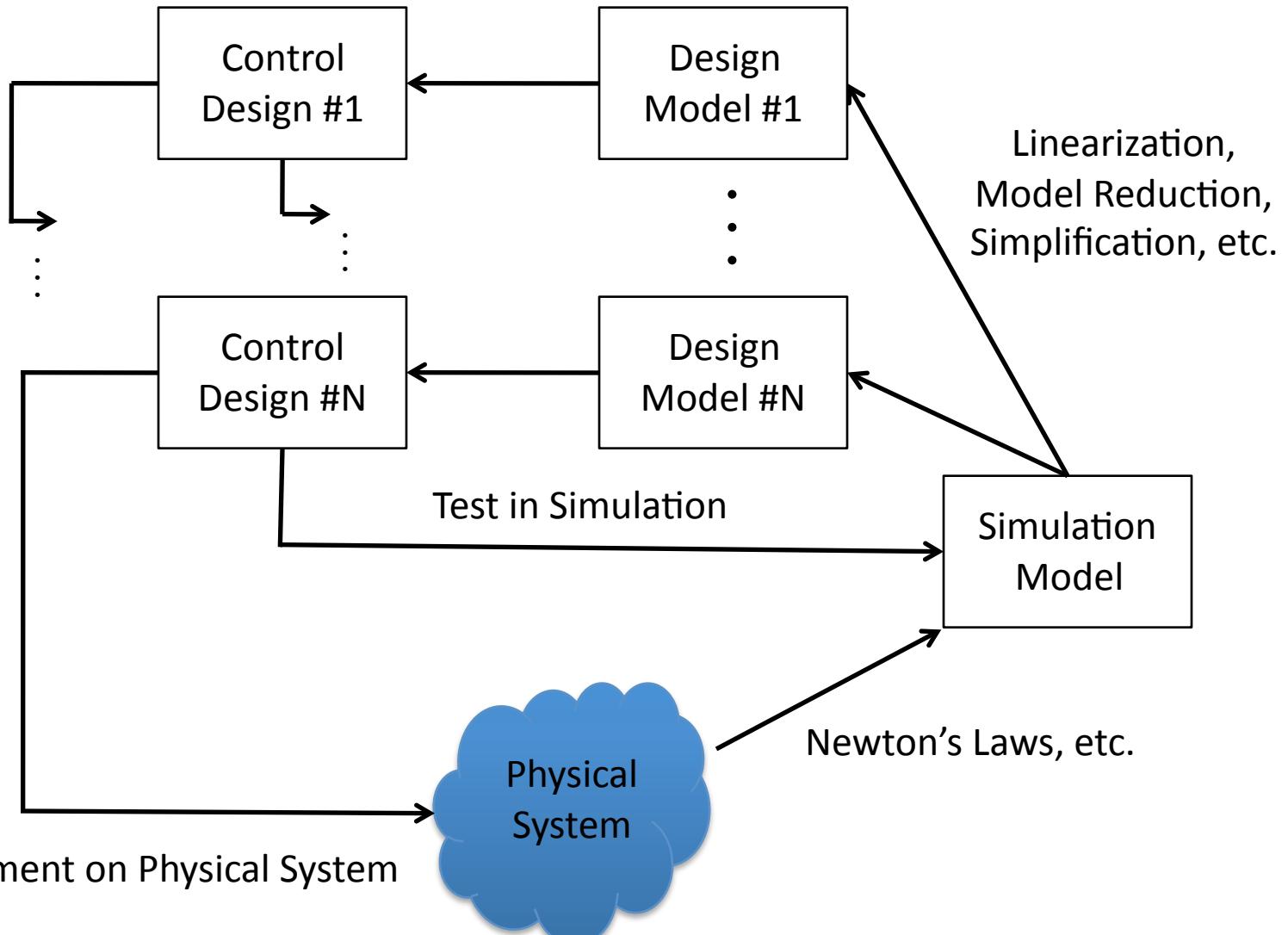


Gimbal: 76 grams  
360 pan, 90 tilt

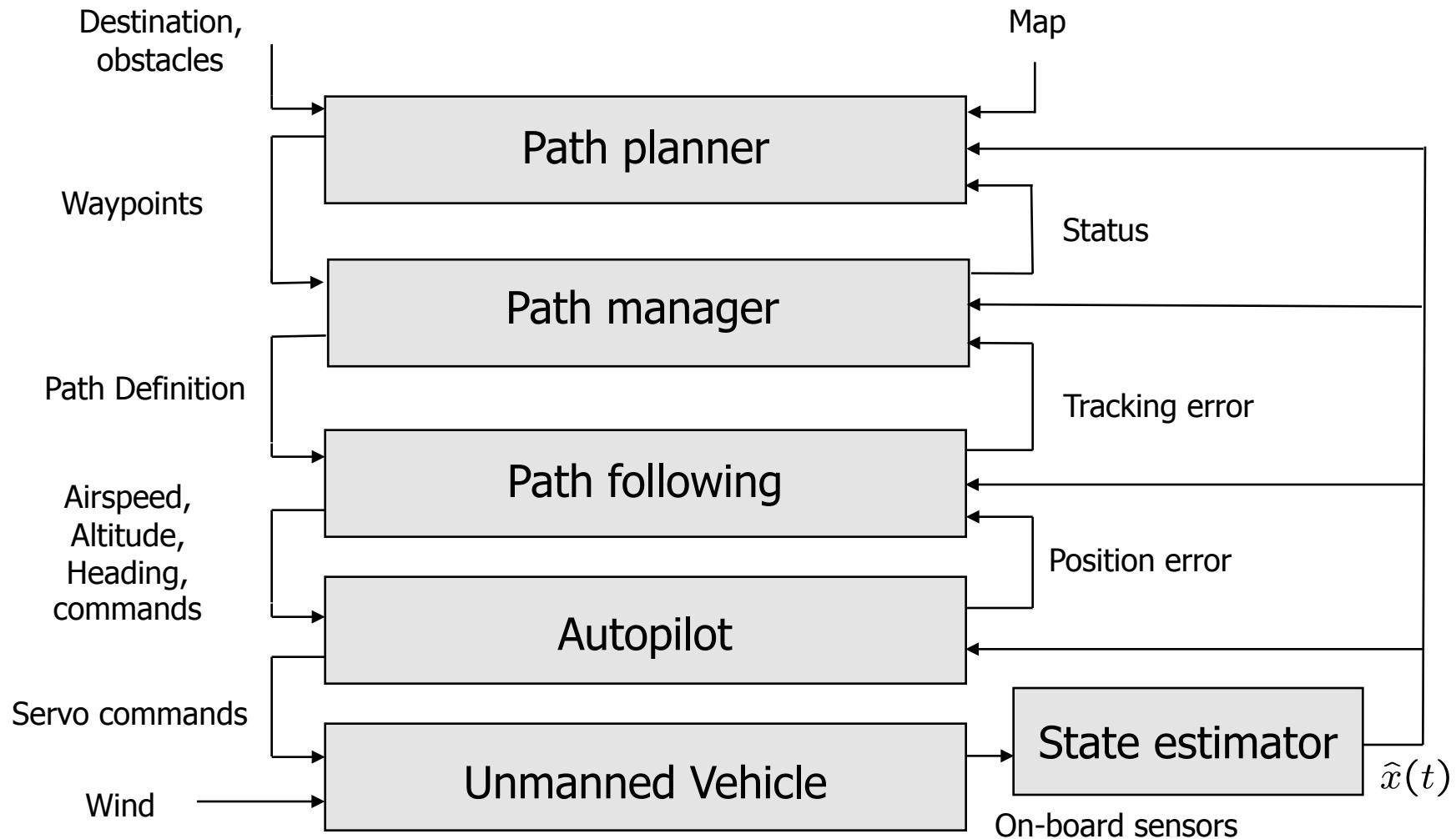


Commbox:  
wireless comm.

# Design Process



# Architecture



# Architecture w/ Camera

