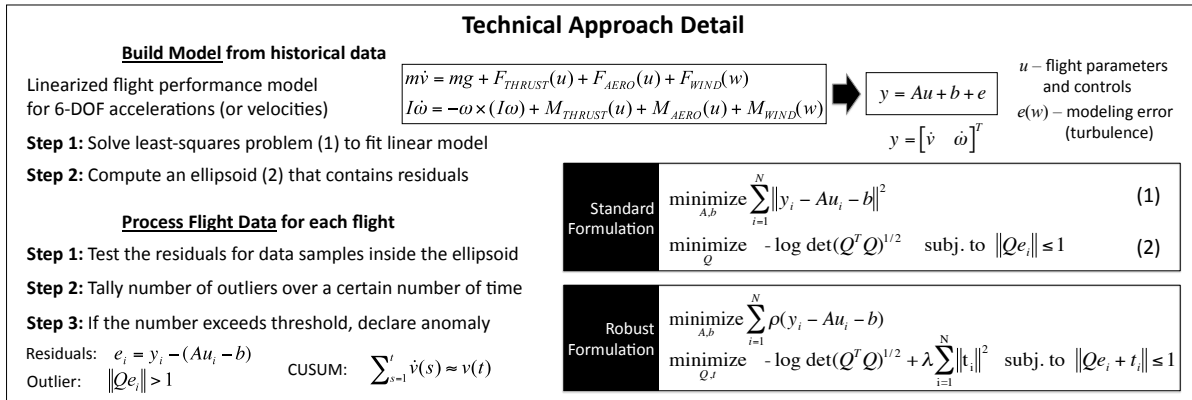
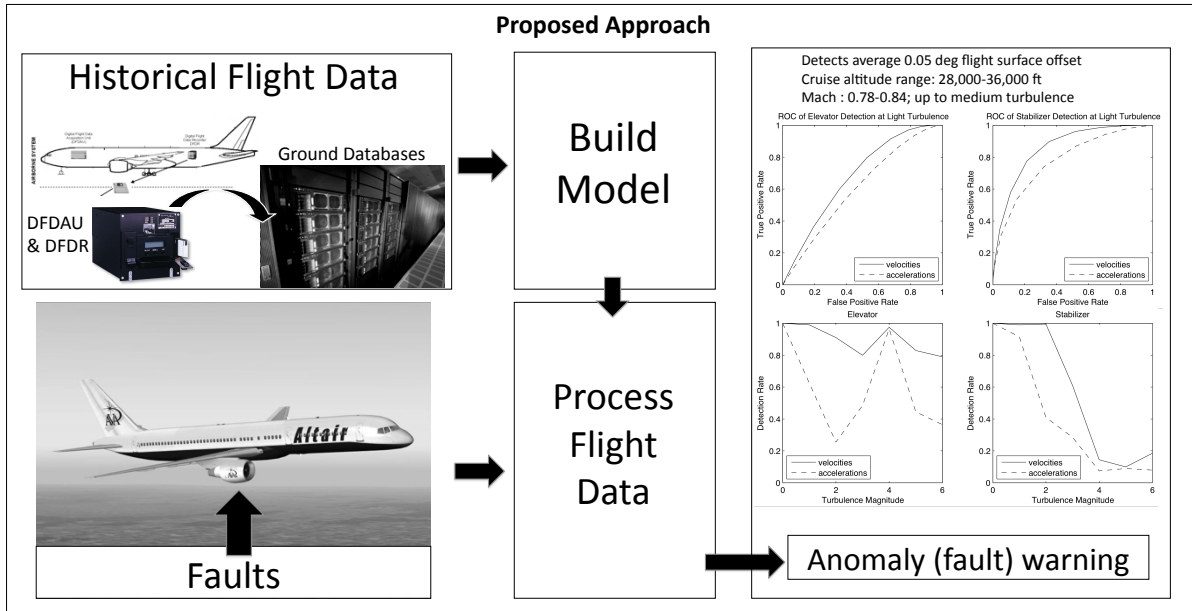




Detecting Aircraft Performance Anomalies from Cruise Flight Data

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Simulation Setup		Verification via Simulation (FLTz)		Collected Parameter	Units	
FLTz: NASA flight control and flight simulator	Advanced Concepts Flight Simulator (ACFS) plane, approx. B757 size	Autopilot cruise flight for 1 minute	Loss of actuator effectiveness faults	5% stabilizer power loss, 0.05 deg mean	50% elevator power loss, 0.05 deg mean	Assume constant mass
Randomly generate flight conditions	Dryden turbulence model:	1 - none, 2 and 3 - light (warning),	4 and 5 - medium, 6 - heavy	Altitude range: 28,000 to 36,000 ft	Mach range: 0.78 to 0.84	Collect flight data at 10 Hz (list at right)
600 data points collected per flight	400 normal flights (200 for validation)	200 flights with actuator power faults				
1	Aileron Position	degrees				
2	Differential Aileron Position	degrees				
3	Elevator Position	degrees				
4	Roller Position	degrees				
5	Stabilizer Position	degrees				
6	Mach Number	(dimensionless)				
7	Roll Angle	radians				
8	Pitch Angle	radians				
9	Dynamic Pressure	pascals				
10	Forward Body-Axis Velocity	ft/s				
11	Lateral Body-Axis Velocity	ft/s				
12	Vertical Body-Axis Velocity	ft/s				
13	Body-Axis Roll Velocity	rad/s				
14	Body-Axis Pitch Velocity	rad/s				
15	Body-Axis Yaw Velocity	rad/s				
16	Forward Body-Axis Acceleration	ft/s ²				
17	Lateral Body-Axis Acceleration	ft/s ²				
18	Vertical Body-Axis Acceleration	ft/s ²				
19	Body-Axis Roll Acceleration	rad/s ²				
20	Body-Axis Pitch Acceleration	rad/s ²				
21	Body-Axis Yaw Acceleration	rad/s ²				