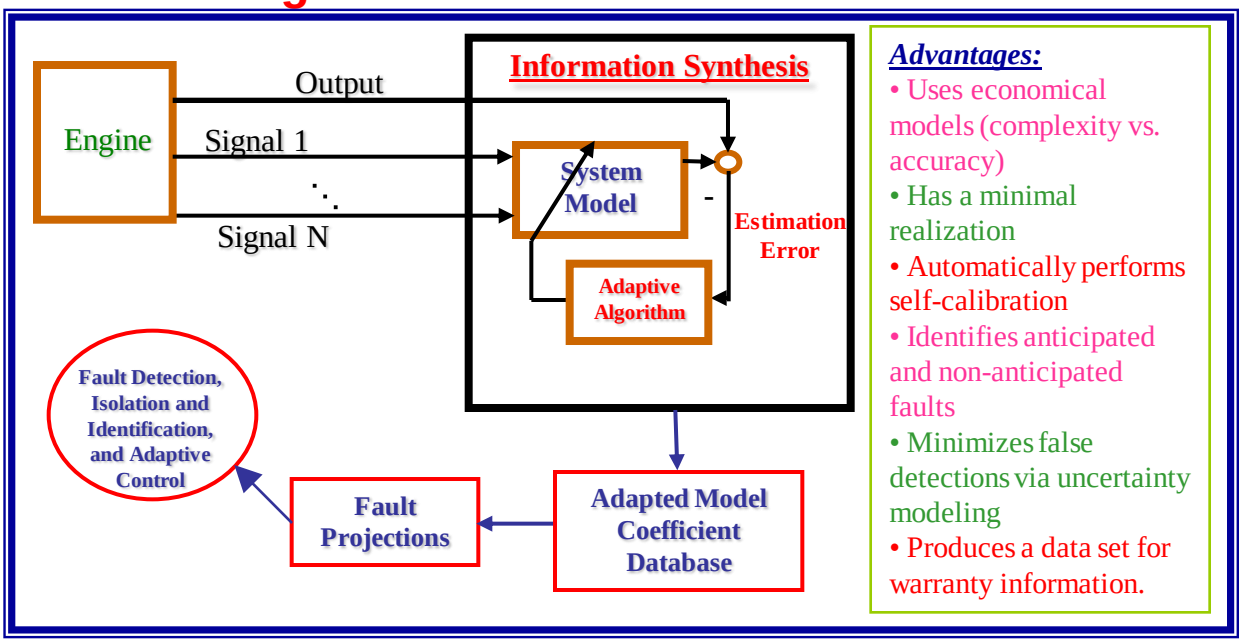
Model Based Diagnostics

Research Summary:

Information Synthesis is a knowledge basis that integrates online system identification techniques with first principle models to realize accurate prognostics of engines. This approach compresses large amounts of data into a minimal realization, significantly reduces false detections caused by system variability and sensor noise, and addresses transient operation as well as steady state operation.

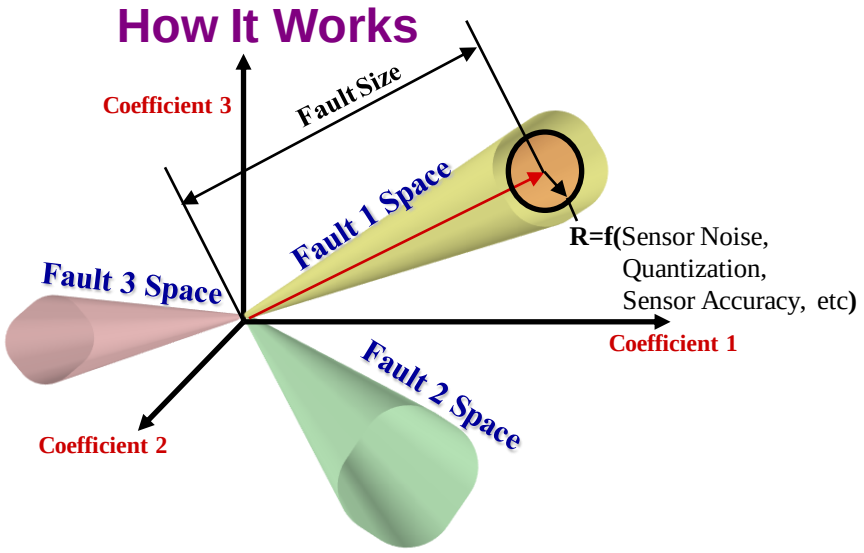
Diagnostics & Prognostics Architecture



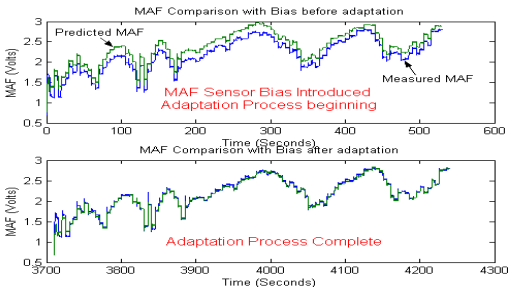
Advantages:

- Uses economical models (complexity vs. accuracy)
- Has a minimal realization
- Automatically performs self-calibration
- Identifies anticipated and non-anticipated faults
- Minimizes false detections via uncertainty modeling
- Produces a data set for warranty information.

How It Works



Sensor Bias



Regressor	Coef	Normal	Bias	% Diff.
1	$c_{0,0}$	-3.8787	-3.4791	10.3
V_{TPS}	$c_{0,1}$	7.6189	6.8289	10.4
V^2_{TPS}	$c_{0,2}$	-3.2955	-2.9557	10.3
V^3_{TPS}	$c_{0,3}$	0.4286	0.3846	10.3
V_{RPM}	$c_{1,0}$	-0.2923	-0.2640	9.7
$V_{RPM}V_{TPS}$	$c_{1,1}$	0.4222	0.3787	10.3

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