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LIS INSTITUTE OF INFORMATION AND SYSTEMS  
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## Data-driven monitoring of Systems-On-Chip for Multifunction Modular Cockpit Display

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**Introduction:**  
The ubiquity of microprocessor-based and embedded systems inspired research about their monitoring and reliability, notably in safety-critical systems. This work is a part of a project to develop touchscreens for futuristic cockpits, in which, we focus on the supervision and monitoring of the Systems-on-Chips (SoCs). We create a monitoring framework to detect drifts and faults in the behavior of the heterogeneous SoC (CPU and GPU). Firstly, we built an incremental interconnected model to estimate a set of characterizing variables for the chip. Then this model is associated with a fault detection algorithm. Estimations from the model constitute inputs to the diagnosis module. The latter generates alarms in the presence of faults or drifts in the characteristics and features of SoC. The obtained results validate the proposed monitoring algorithm and demonstrate the effectiveness of the fault detection algorithm.

**Objective: The Cockpit of the future:**

- A user-friendly interface with touchscreens
- Displays to provide pilots with intuitive interactions
- Be able to accommodate the complex functions of the aircraft and systems

**Main lines of research:**

- Incremental modeling of variable structure systems
- Characteristics drift detection
- Life Cycle Optimization (WIFI Optimization)
- Estimation of the Remaining useful life

**Online supervision through Analytical redundancy:**

- A reference model runs in parallel to the system
- The outputs from the model are compared with outputs of the system
- Through this comparison results in Residuals
- The state of the system is deduced by analyzing these residuals
- The residuals are also indicators of diagnosis and prognosis of the system

**Fig. 1. Monitoring and analysis of an embedded system**

**Model Library**

- Frequency model
- Power Model
- Thermal model
- Thermal model
- Thermal model
- Continuous operations

**Fig. 2. Interconnected and incremental modeling and online monitoring**

**Fig. 3. Intelligent Signal Processing for Frontier Research and Industry**

**Fig. 4. The S-curve and after the increase in power**

## A Calibration Algorithm to Solve the Pixel's Inconsistency for the Imaging of the HEPS

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### 5. INTRODUCTION



### 5. RESULTS

#### (1) The S-curve and after the increase in power

Fig. 4 shows the S-curve and after the increase in power.

Fig. 5 shows the pixel inconsistency.

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