

## **Accelerated Detection Method for Sensor and Actuator Intrusions in Cyber-Physical Systems Using Multiple Model Estimation Algorithm**

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**Abstract** – Although Cyber-Physical Systems play a critical role in industrial production and our daily life, the safety of the CPS sensor and actuator signals have not been given due attention. In our previous work, a new approach which successfully detects CPS sensor and actuator intrusion using the multiple model estimation (MME) algorithm with a bank of Kalman filters was described. Since the earlier detection is of importance in such applications, in the present paper, an accelerated detection method using the fading memory technique is applied to the MME resulting in significant faster detection of intrusion signals. To verify the algorithm introduced in this paper, a DC motor speed control system subject to attack by different types of sensor and actuator signals is simulated. Simulations verify that the addition of the fading memory technique allows for the faster detection of sensor and actuator intrusions.

**Keywords:** Cyber-physical system, intrusion detection, cyber-attack models, adaptive estimation, system security