

# Formal Methods for Modeling and Verification of Intrusion Detection System in Wireless Networks.– ICPS, SERB



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**Theme:** Cyber Physical System (CPS) has become common in many applications like health monitoring, smart vehicles, smart grids, traffic monitoring systems and household devices.

- CPS devices have to use wireless network for control and monitoring.
- Any compromise in security and privacy at wireless network of CPS may lead to worse consequences.

## Deliverables:

- Detailed investigation of attacks in wireless networks and identifying attacks which are difficult to be detected using standard anomaly or signature based IDSs.
- Development of IDS for wireless network using formal modeling paradigm.
- Formal verification for correctness of the IDS. IDS based on upgraded models will have high accuracy with no false alarms even for complex attacks.
- Prototype of the IDS and deployment. Execution of various attacks and their detection mechanism on a real test bed.

## Current Status:

- We have observed some new attack cases for MQTT 3.1.1 and MQTT 5.0 (spoofing and replay).
- These attack scenario would result in adding the extra security features to the MQTT protocol from prevention of our proposed attacks.

## Societal Impact:

- This project aims to fix some loophole in the security in the modern day wireless CPS.
- Verifiable IDS framework for wireless network with low false alarm rate.
- The formally verifiable IDS model will be applicable for other networks like vehicular network, mesh network, delay-tolerant network (DTN), and internet of things (IoT).
- Prevent advanced security attack in modern day CPS.

