Indo/US Collaborative Research Grants

IHFC National Science Foundation of US and Technology Innovation Hubs of India

DEPARTMENT OF
SCIENCE & TECHNOLOGY
Ministry of Science and Technology
Government of India

Title: Secure and Resilient control of Robotic Systems in Cyber Physical Assembly Line
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The use of robotic systems in cyber-physical assembly lines has become increasingly prevalent due to their ability to perform repetitive tasks with high precision and speed. However, the security and resilience of these systems are critical to ensure that they are not vulnerable to any unwanted. **By collaborating across borders, IHFC India and NYU USA are making strides toward creating a secure and resilient future for robotic systems in cyber-physical assembly lines**. Game theory is a mathematical framework that studies decision-making in strategic situations, where the outcome of one's choice depends on the choices of others. By incorporating control and game theory mechanisms into robotic systems, it becomes possible to anticipate potential vulnerabilities and to plan for secure responses. The project has taken a breadth-first approach and made progress in the development of intrusion detection systems (IDPS), which is an essential tool for identifying and responding to potential cyber-attacks. Additionally, the application of confidentiality in one CPS component has been demonstrated, thereby ensuring that sensitive data is not compromised. The project has also identified vulnerabilities in ROS1 based mobile robot, highlighting the need for robust security measures. Looking ahead, the project aims to dive deep to leverage game theory and digital twin technology to completely secure the robotic based CPS components, ensuring the safety and reliability of cyber physical assembly lines. It is a promising approach that will help to mitigate the risks associated with cyber-attacks and ensure the continued growth and success of the manufacturing industry.

Cyber Physical Assembly Line