ABSTRACT FOR THE GENERAL PUBLIC IN ENGLISH

Prognostic and health management (PHM) of complex cyberphysical systems (CPSs) has always been a top priority for governments and engineering communities around the world. **This project aims to develop a novel data-driven dynamic reliability assessment (D3RA) platform to improve PHM ability in CPSs by exactly identifying which degradation mechanism(s) are likely to cause an impending failure, and then highlighting the event to trigger maintenance service and/or electronic control operation.** To achieve this goal, in the D3RA platform a new data-driven modelling method will be developed to elaborate on the system degradation mechanisms and extract degradation features (health estimators). Upon the system degradation mechanisms, a new degradation-dependent based ensemble-learning approach will be proposed to identify the impending failure mode and predict the system remaining useful life (RUL). The D3RA platform provides new methods and tools needed to leverage failure prognostics and prognostics-informed maintenance/control (M/C) for making CPSs resilient with reduced levels of redundancy. This project will develop the methods and tools, and demonstrate proof-of-concept of the design platform using hybrid vehicle power (battery) system as a CPS application. The success of this research will produce major advancements in extending life and durability of CPSs, and will potentially lead to the development of CPSs that are more reliable and cost-effective than existing systems. This research will also raise the Poland's profile in global maintenance, repair, and overhaul markets by offering training and education in intelligent prognostics technology.