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Development of Artificial Intelligence/Machine Learning (AI/ML) Algorithms for Identifying Patterns in Industrial Bus Data.

ABSTRACT - Masterthesis

FastPRO is a tool suite aimed at identifying discrepancies in the recorded data (both at real-time and offline) and notifying users about the discrepancies based on pro-grammable set of rules. Since the recording/data acquisition is performed on the en-tire system, the tool provides the edge for determining the issues over a wider area in a single run rather than the current approach where multiple test runs are requires in identifying the issues.

In order to achieve this task, FastPRO is powered by pattern matching algorithms de-veloped at ExxpertSystems GmbH. These algorithms are tailor made and optimized for the specific use cases and need to be generalized to be adopted for wider indus-trial applications.

In order to achieve the task of introducing intelligence into the existing pattern matching system, an approach to introduce the cutting edge disciplines of Artificial Intelligence and Machine Learning is currently in consideration.

Study of Industrial Bus Protocols such as: The task for this Master Thesis will involve the development of Artificial Intelligence and Machine Learning Algorithms to match and identify patterns in the industrial bus data. The steps for the task are as follows:

1. Study of Industrial Bus Protocols such as:
    a. Ethernet Based Protocols (AFDX, EtherCAT etc.)
    b. CAN, FlexRay
    c. Video Streams
2. Study of existing algorithms involved in the classification of data and identification of patterns
3. Study and development of AI/ML algorithms for data identification
4. Validation of the algorithms on existing data and on new data
5. Verification and validation of the algorithms on unknown data for the achievement of generalization
6. Documentation and presentation of the results