

Zhenyou Zhang, PhD candidate

Zhenyou Zhang is currently working as a PhD candidate at the Department of Production and Quality Engineering. He is responsible for developing a demo: Intelligent Fault Diagnosis and Prognosis System (IFDPS) in WP2 of SFI Norman. Academic interests include Measurement, Mechanical Design, Applied Computational Intelligence (ANNs, ACO, PSO & BCA), Data Mining (Association Rules & Decision Tree), Fault Diagnosis and Prognosis, Condition-based Monitoring and Predictive Maintenance.



Zhenyou Zhang holds a Master of Science from School of Mechatronics Engineering and Automation at Shanghai University from 2009.

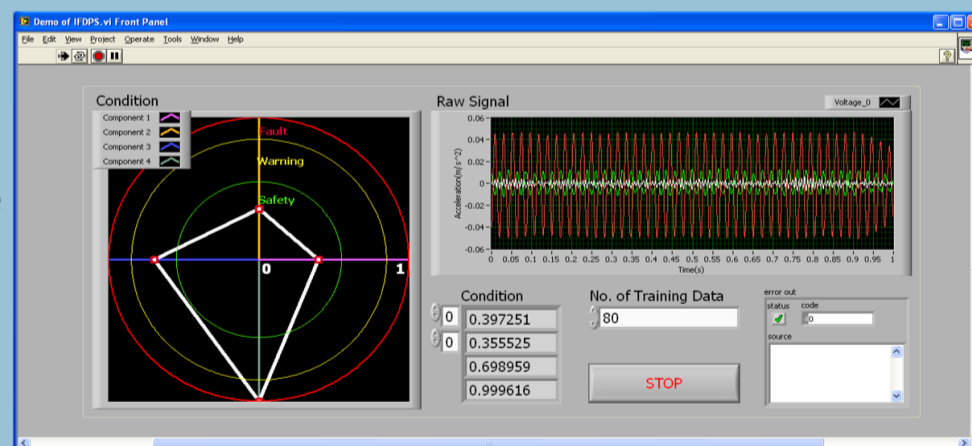
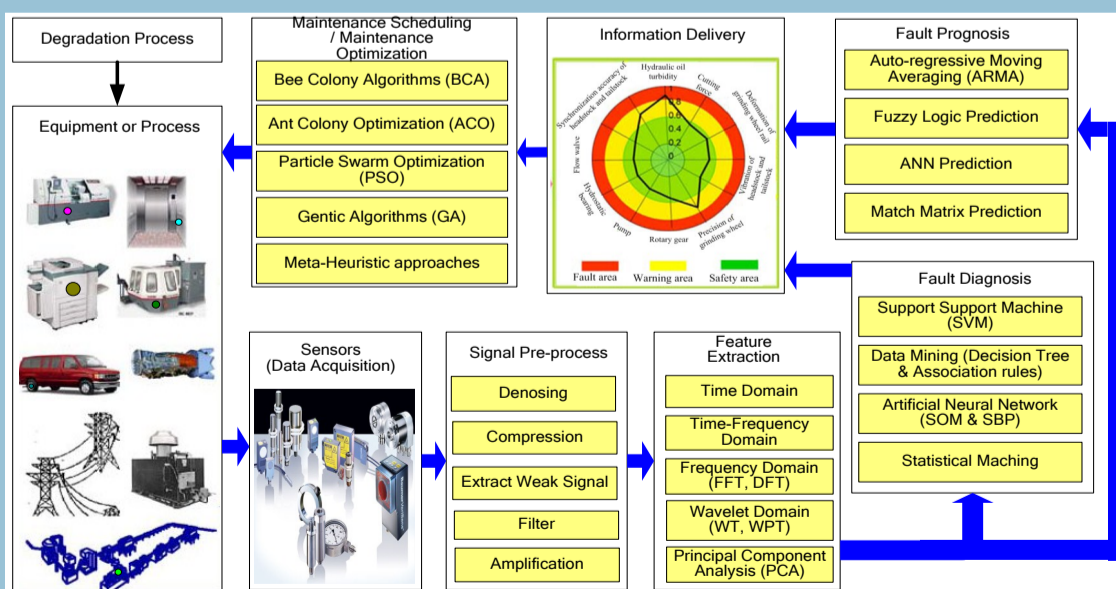
Intelligent Fault Diagnosis and Prognosis Based on Condition-based Monitoring

With the development of modern manufacturing technology, equipments have become more and more complex and complicated. Such equipments are very dependent upon the trouble-free operation of all its parts. When a fault occurs, it is critical to identify the reasons and causes as rapidly as possible and to take appropriate maintenance action. Typically, when a system goes down, only a small fraction of the downtime is spent to maintain the components that cause the fault. Up to 80% of it is spent to locate the source of the fault. For this reason, there is great interest to study the corresponding intelligent diagnostic techniques and system for Condition-based Maintenance in modern manufacturing systems and processes.

In his PhD thesis, the main focus will be on theories, methodologies and tools for a framework called Intelligent Fault Diagnosis and Prognosis Systems (IFDPS) for predictive Maintenance in Manufacturing Systems and Process. The framework of IFDPS includes five phases: Data Acquisition, Signal Pre-process, Features Extraction, Fault Diagnosis and Prognosis and Maintenance Scheduling Optimization. Nowadays, the sensors' technology is very mature and many companies can provide various sensors. The technologies of signal pre-process and features extraction are also very mature. Therefore, the thesis will mainly contribute to subsequent issues including Fault Diagnosis and Prognosis and Maintenance Optimization. In his research, many techniques of Data Mining such as Decision Tree and Association Rules, Artificial Neural Network such as SBP and SOM, and others such as Fuzzy Logic System and Auto-regressive Moving Averaging will be applied in Fault Diagnosis and Prognosis phase. Swarm Intelligence such as BCA and PSO will be applied in Maintenance Scheduling Optimization phase. With this framework, predictive maintenance will be achieved, the safety of equipments and personnel will be guaranteed and the costs of maintenance and production will be reduced.

Facts

PhD started in 2009
 Supervisor:
 Kesheng Wang
 Co-supervisor:
 Odd Myklebust
 Thesis title: Intelligent Fault Diagnosis and Prognosis for Condition-based Maintenance in Manufacturing System and Process.



Objectives planned work:

- 1) Transforming data into useful information, knowledge and wisdom
- 2) Fault diagnosis and classification
- 3) Performance degradation assessment and prediction
- 4) Optimizing maintenance service