Optimizing Condition Monitoring For Dynamic Health And Risk Management

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Agenda

• Self Introduction

• Introduction about the PhD topic
  ✓ Research Scenario
  ✓ Research Challenges
  ✓ Research Methodology and Work Plan
1. Self Introduction
1. Self Introduction

- Himanshu Srivastav
- हिमांशु श्रीवास्तव

Snow

Particles

Pacifier or calm as moon
1. Self Introduction

- Educational Background
  - M.Sc. in Mathematical Sciences with specialization in Statistics, from Norwegian University of Science and Technology, Norway (2015-2017)
  - B.E. (Hons.) in Electronics and Instrumentation, from Birla Institute of Technology and Science, India (2005-2009)
1. Self Introduction

- Work Experience

- Bharat Heavy Electricals Limited (BHEL), India (Aug’09 to Aug’15) as a Marketing Engineer
1. Self Introduction
1. Self Introduction

Start as Trainee → Write business letters → Promoted → High level business letters → bored. → TIME for Change
BE in Electronics & Instrumented

Work Exp of Energy Sector

Masters in Statistics

PhD in RAMS with SUBPRO
WARNING
Once you are in there is no way out

Welcome to Ph.D.
2. Introduction of PhD topic

• Research Scenario

✓ Dynamic and predictive decision is key strategy for management of subsea facilities from cost and safety perspectives

✓ Implementation relies on several interacting steps including data collection, data processing, prognostics, and decision-making optimization.
Data analytics: Extraction of health indicator
Dynamic process model
Sensor data
Modelled (soft) sensor data
Event data

**INPUTS**

**STEP 1**
Data analytics: Extraction of health indicator

Degradation phenomena models

**STEP 2**
Prognostics

Technical condition
Critical barrier condition

**STEP 3**
Decision-rules: Condition and prognostics based maintenance planning

**OUTPUTS**
Optimal decision rule for system operation
Selection of parameters for performance monitoring
Revised system design

*RUL: Remaining useful life*
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Critical barrier condition

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RUL: Remaining useful life
Research Challenges

In Design Phase:

- Expensive (sensor/installation/operation)- optimize placement, redundancies, choice of technology
- Cheap – integration of sensors, choice of communication network
- Consequent decision: optimal wrt ROI for prognostic & predictive decision
Research Challenges

In Operational Phase:

• Efficient models that utilizes data coming from subsea process/equipment for predictive decision

• Industrial usefulness of these models

• Consequent decision: optimal wrt ROI, for prognostic & predictive decision.

• Operating data intentionally not collected for condition monitoring based on the added value information to such models
Research Method and Work Plan

1st Year
- Course Work
- Detailed literature review
- Define the specific problem statements

2nd Year
- Development of generic models
- Make them more practical from the feedback from Industry partners

3rd Year
- Model Validation
- Statistical method and simulation will be performed to assess the generic model
- Data from One or more industry for verification
“Essentially, all models are wrong, but some are useful.”

George E. P. Box