

Student:		Assignment type:	MSc thesis
Supervisor:	Y. Pang & D. Schott	Report number:	2020.MME.xxxx
Specialization:	MME	Confidential:	YES
Creditpoints (EC):	35		

Subject:

Internet of Grabs: Designing Remote Monitoring Platform for Connected Grabs

This assignment is initiated by Nemag (<https://www.nemag.com/>)

Over 40% of all goods transported worldwide is dry bulk, typically done by large bulk carriers. These ships are unloaded at dry bulk terminals by cranes with grabs with lifting capacities up to 85 tons, grab volumes up to 60m³ and cycle times less than 1 minute.

Due to high competition, bulk terminal operators are continuously looking for ways to increase their terminal efficiency. Grabs are extremely decisive for this efficiency.

Grab manufacturer Nemag is the world leading innovator in this business. In close cooperation with international bulk terminal operators, crane manufacturers, Delft University of Technology and other stakeholders in the industry, Nemag develops groundbreaking and awards-winning grab concepts.

Besides the optimal grab design, the operational conditions are important for the efficiency. As these conditions are not always known, more insight is required. This thesis assignment aims to design an infrastructure which can autonomously monitor grab operations at the terminals worldwide by acquiring the process data and information at grabs with emerging diverse remote monitoring technologies by means of internet of things (IoT) and artificial intelligence for analysing big data. The system and results enable further grab innovations and unloading process optimisations.

To fulfil the design of such an innovative remote monitoring platform, following aspects need to be taken into account during the MSc graduation project:

- To determine the KPI's regarding the operations of the grabs together with Nemag
- To choose applicable sensor technologies to measure the desired parameters
- To propose the installation of sensors and solutions of power supply or energy harvest
- To design the architecture supporting big data communication and storage
- To conceptually design the platform and intelligence of a remote monitoring system
- To prove the feasibility and robustness of the designed system

You are challenged to build a prototype of the monitoring platform and perform a proof-of-concept with grabs in operation at terminals.

This thesis will be carried out in close cooperation with the R&D team of Nemag. A monthly allowance will be offered and the office locations of the student are open for discussion. For more information please contact:

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