

Dissertation Release**8.4.2022**

Condition monitoring and vibration measurement of rotating machines in the IoT era

Title of the dissertation	Vibration measurement of large rotating machinery with MEMS accelerometer-based Internet of Things measurement device
Contents of the dissertation	Vibration monitoring of a large rotating machinery is typically used to track machine condition. The vibration measurement is commonly conducted with wired accelerometers. However, these conventional accelerometers can be expensive and laborious to install due to the need of cabling, especially in machines where several sensors are required. Modern technology enables to cost-effectively manufacture small accelerometers which can be used to design compact wireless measurement devices with internet connectivity. With these measurement devices the instrumentation cost can be lowered. The results show that wireless measurement devices developed in this research can be used for vibration measurement of a large rotating machinery in many occasions. Research was conducted in the context of paper machines and maritime powertrains, and the results were compared to commonly used accelerometers. Typically, vibration is measured from, for example, machine frame or bearing housing, but the small size and wireless communication of the developed measurement device enables it to be mounted directly to the rotating component itself. With on-shaft mounting, more information can be measured from the machine. However, this requires more advanced algorithms – investigated also in the study – to separate the interesting information from the measurement data.
Field of the dissertation	Mechanical engineering, Mechatronics
Doctoral candidate	Ivar Koene, M.Sc. (Tech.), born in 1993 in Mäntsälä, Finland
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Place of the defence	Aalto University School of Engineering, Department of Mechanical engineering, Otakaari 4, 02150 Espoo, Finland, Auditorium 213. Defence can also be followed via Zoom https://aalto.zoom.us/j/68416191620 .
Opponents	Professor Eugenio Brusa, Politecnico di Torino, Italy Research manager Pekka Pursula, VTT Oy, Espoo, Finland
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