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DISSERTATION TITLE: *Channel-Awareness and Dependability in Industrial Wireless Sensor Networks*

Qihao Li received the M.Sc. degree in Information and Communication Technology from University of Agder, Norway, in 2013. His current research interests include industrial wireless sensor network, optimal control and optimization, wireless network security and localization. This doctoral thesis, "Channel-awareness and Dependability in Industrial Wireless Sensor Networks", concludes all his research work during PhD studies, which is summarized as follows.

Industrial wireless sensor networks (IWSNs), the network of connected computational and physical components that communicate seamlessly over different industrial applications, are performing as a value driver for industrial equipment and machinery. However, the flourish of IWSNs also hinges upon fully understanding and handling the challenges, such as channel-awareness deprivation and dependability deficiency. In this thesis, channel-awareness and dependability for IWSNs are presented.

Specifically, the main contribution of this thesis can be four-fold. First, to address issues of channel feature awareness in IWSNs, the PDF of the level crossing rate (LCR) is explored, which evaluates the probability of the received signal envelop crossing a given threshold in a positive direction. In addition, a forward learning method is proposed, which detects the hidden channel status and the channel fading duration according to a modified hidden semi-Markov model (HSMM). Second, to improve the packet transmission dependability in IWSNs, three different packet delay optimal control schemes are proposed, which are channel based sampling rate and queueing state control (CSQC) scheme, channel-based optimal back-off delay control (OBDC) scheme, and channel-based optimal transmission back-off control (OTBC) scheme. Third, to detect the misbehaviors during IWSNs data sharing, three Sybil detection schemes are proposed, which are dispersive power gain and delay spread (PGDS) scheme, multi-kernel scheme and multi-kernel expected maximization (MKEM) scheme. Fourth, to achieve high precision in localization, a noise-reduction scheme, called support vector semidefinite (SVSD) scheme, is proposed.

In short, the developed dependable solutions and research results in this thesis can be a useful step towards better understanding and implementing channel-awareness and dependability preservation IWSNs.