

Wireless Sensor Network Based Real-Time Monitoring and Control for Factory Automation

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Abstract: The growing demand for a wireless sensor network in the automated factory is mainly due to their great benefits. including low-cost products, less employee cost, higher production volume, and reducing the production time. Applying such technology will minimize human errors, avoid using a lot of wires, and reduce both the cost and the production time. This chapter deals with design and implementation of a real-time monitoring, scheduling, and control system for a factory automation using the concepts of wireless sensor networks. Any factory automation consists of load/unload stations with programmable machines, a conveyor belt, a manipulator, and mobile robots or automated guided vehicles. Each unit in the factory automation can be considered as a node in a wireless sensor network. Set of sensors and detectors together with IP cameras are used to provide the controller with feedback signals about all elements and the working environment. An intelligent decision maker has been developed to obtain the destination load/unload station for the selected object. The MATLAB Simulink has been applied and integrated with available devices to complete the required loop of hardware parts. The feedback signals from IP camera, machines load/unload stations are used by the controllers to obtain the required control signals to manage the overall operation of the automated factory. A fuzzy-based algorithm has been used for decision making, scheduling, and routing purposes. The results from both experimental and simulated systems confirm that the implemented automated factory perform the required tasks with acceptable accuracy and speed.

Keywords: *Flexible manufacturing system, Real-time monitoring, Wireless sensor network, MATLAB Simulink, Fuzzy decision making.*