Wireless Sensor Network to Monitor Environmental Parameters of Spinning Unit of Cotton Industry

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ABSTRACT

It is found that, the industrial sector is demanding sophisticated electronics system, wherein the industrial parameters should be centrally monitored. The industrial parameters such as environmental humidity, temperature, leakages of hazardous gasses from process plants etc are widely distributed and depict spatio-temporal variations. In cotton yarn manufacturing industry, monitoring of the environmental parameters such as environmental temperature and relative humidity is essential to maintain the quality of the cotton yarn. The environmental temperature and relative humidity is maintained at the précised level in cotton industry. In fact, these parameters depict site specific variability (SSV). For monitoring the indoor environmental parameters of spinning unit of textile industry, deployment of the Wireless Sensor Network is most suitable solution. To monitor such parameters the wireless sensor network is implemented, wherein the wireless sensor nodes play a important role. With the greater reliability and flexibility the wireless sensors nodes are designed, wherein ARM microcontroller, ARM LM4F120H5QR, is used as a core for computational task and RF transceiver module Xbee series-2 chip, from DIGI International Inc, is used for Wireless communication. Deploying embedded technology the sensor nodes have been designed for monitoring of the two parameters such as, environmental temperature (0C) and relative humidity in spinning unit the textile industry. The smart sensors, SY-HS-220 for humidity measurement and LM35 for temperature measurement are deployed. Deploying such sensor nodes and the coordinator node, the wireless sensor network is established by employing Zigbee technology and implemented for monitoring of the dedicated parameters of the textiles industry. The results of implementation of WSN for monitoring of environmental parameters of spinning section of textile industry are interpreted in present paper.

Keywords : Sensor Node, Wireless Sensor Networks, RF Module, ARM.

I. INTRODUCTION

It is found that, the industrial sector is demanding sophisticated electronics system, wherein the industrial parameters should be centrally monitored. The industrial parameters such as environmental humidity, temperature, leakages of hazardous gasses from process plants etc are widely distributed and depict spatio-temporal variations. The industrial environmental pollution monitoring has global significance. Therefore, emphasizing present needs of the industries, it is proposed to develop the Wireless Sensor Network (WSN), wherein typical industrial parameters are precisely monitored at central station. In fact, the WSN consists of autonomous sensor nodes, battery powered, connected to the base station using wireless networking topology[1-3]. Deploying a ubiquitous embedded technology the sensor nodes of required features can be designed. Recently, ARM technology is resulting into the microcontrollers of promising features, deploying which the wireless sensor node can be designed. The Zigbee technology is pervasively advancing. Therefore, to overcome present day problem of industrial sector and to ensure wireless data transfer with high accuracy and reliability, it is proposed to design Wireless Sensor Network and implement the same for industrial applications. The WSN is developed to monitor typical parameters of the dedicated industries and design issues are presented in this report. Present research work encompasses the field such as WSN, Zigbee, IEEE 802.15.4, embedded design etc. Therefore, it becomes possible to design the intelligent, autonomous and energy efficient sensor nodes to facilitate the desired WSN. Emphasizing an implementation at textile