A CRITICAL REVIEW ON USE OF SNSORS FOR HEALTH MONITORING

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ABSTRACT

Due to the existence of internet of things (IoT) and cyber-physical systems, RFID tag antennas and sensors have seen an integration in recent years (CPS). These sorts of sensors may be used in structural health monitoring (SHM) as they are passive, wireless, simple, small, and multi-modal. In the very near future, data derived from several devices and sensors will have a significant influence on smart monitoring. Most scientific articles that investigate the feasibility of remotely tracking and intelligently monitoring physical/chemical/mechanical qualities and the environment point to the idea that things can be tracked and monitored remotely. In the majority of the research, the design of antennas is a major concern. In this way, there is a substantial amount of knowledge that may be used. further details are required to really comprehend the passive RFID antenna sensor systems' shortcomings so that solutions may be found. The material, albeit hard to locate, is dispersed over several publications. This study will provide a complete analysis of passive RFID antenna sensors and systems as well as the many techniques available for RFID sensor sensing and transmission.

KEYWORDS: RFID, Sensors, Health, Monitoring

INTRODUCTION

Structural health monitoring (SHM) is an essential security precaution for infrastructure such as railways, pipelines, dams, bridges, and aircrafts, because of the enormous costs and liabilities involved with possible breakdowns. Structures are built to function safely under predicted conditions, but they are susceptible to degradation and damage over their lifetime of service. Deterioration, such corrosion and fatigue, will naturally occur when the operating and environmental pressures are increased on the machine during many decades of service. For example, the past few decades have seen an unparalleled rise in the number of satisfied customers in the railway business across the world. Corrosion of the rail web and foot may compromise the integrity of the rail system, and this can result in train derailments. Whether or whether the prevalence of such failures is prevalent the structures need continuous inspections to identify and avoid possible structural issues.

Although tough, intermittent manual inspections, which rely on visual clues, are difficult to perform in many settings because key environment data is not readily accessible, or problems might be concealed under the surface. This test works on structures with excellent resolution, sensitivity, and dependability, which makes it useful for checking objects for faults. Unfortunately, implementing these approaches will be costly, since they are very labor- and wiring-intensive, as well as have restricted range due to their power and resolution needs. The continual monitoring of nucleation and development of possible faults, which involves special methodologies and high expenses in time and money, might also be problematic to apply to larger-scale constructions.

HEALTH MONITORING SOLUTION

An intriguing solution for the monitoring of structural health is SHM distributed over sensor networks. With this technology, time-based maintenance may be shifted to condition-based maintenance, making it cheaper in the long run. Some previous large-scale sensor network deployment techniques required the use of vast lengths of cable to provide electricity and gather data from each sensor, but they were expensive, difficult to instal, and troublesome to maintain. With wireless sensor networks (WSNs), we are able to place sensors that don't need electric wiring, giving us the potential to gather large volumes of data that vastly improves our understanding of our surroundings. This process enables the broad and dense distribution of sensors across a huge region. It is essential for widespread ubiquitous sensor networks to be highly dependable, energy-efficient, and affordable if they are to be long-term solutions.

Spatial granularity is an important consideration for prospective future uses. Passive wireless sensors are at least two orders of magnitude less costly than battery-powered sensors, yet current sensing applications still use passive sensors, so limiting the level of detail with which they may be deployed. A further concern is that battery-powered sensors have a limited battery life, which leads to billions of batteries being disposed of in landfills. Sensor simplicity is beneficial since they're not required to be accurate or exact and hence do not need complicated or exact components. At the same time, they must have cheap cost and adequate dependability, or else they would not be widely deployed. The ultimate objective is to create “smart dust particles”, which are called motes because they have computing, sensing, and communication capabilities that are tiny enough to be disseminated in the environment. The large-scale use of this new technology encourages the development of low-cost, wireless, and passive sensors for widespread infrastructure and big data.

RFID

As this strategic ambition is realised, low-cost, wireless, and "sensing-friendly" RFID technology will be of critical importance [11]. signature and tracking ability that RFID is uniquely known for (UID). Some extra sensor or circuitry is needed in order to get more information about the target, however, in order to make the reader-tag communication analogue, there might be other physical signals analysed that would provide more information about the target. Conveniently and seamlessly integrate inside the global cyber-physical systems (CPS) and Internet of Things (IoT) with the use of RFID sensing abilities. Radio frequency identification (RFID) tag antennas, operating in the ultra-high frequency (UHF) bands, provide an interesting opportunity for study, especially with respect to the growing paradigm of the Internet of Things (IoT) as a green technology. The backdrop in the animation illustrates the new paradigm of antenna design, which takes into consideration both communication concerns as well as other time-varying parameters. The main justification for this theory is the distinct relationship between target input impedance and radar cross section (RCS).

As an unexpected benefit, RFID has shown to be an important building block for inexpensive, passive, and large-scale WSNs. Now it is feasible to implement large quantities of sensors in the actual world. WSNs based on RFID technology are being incorporated into off-the-shelf RFID systems. In other words, we are aiming to highlight projects and initiatives that are helping to move EPC Class 1 Generation 2 (C1G2) compliant RFID devices to sensors and networking in the area of RFID. Antenna sensors are only one sort of sensor, thus we refer to them as antenna sensors in this context.

As with pulsed eddy current NDT, an antenna sensor that is placed on a conductive surface operates on the concept of eddy currents pulsing through the conductive material. The loss and penetration depth of this process, however, increases in direct proportion to the working frequency. The antenna sensor's spatial resolution increases, as the operating frequency increases, and vice versa. RFID tags and readers used in low-frequency (LF) or high-frequency (HF) bands have a very narrow read range because to magnetic resonant coupling (MRC) in WPT [22]. This results from the evanescent (transition) connection. The usage of UHF and UWB antennas increases the range of communication.

CONCLUSION

This research has shown how advances in passive antenna sensors and RFID-based SHM system applications have been developed, with specific emphasis on defect detection in metals. Defect type, antenna sensor, measurement approach, and feature extraction are a set of connected concerns to be addressed. With great depth, each difficulty, cause, and state-of-the-art development has been discussed, making this information far more useful to those who are already interested in the subject. Such emerging passive antenna sensor and system implementation methods have also been addressed.

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