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Development of an Energy-harvesting Toxic and Combustible Gas Sensor for Oil and Gas Industries

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Abstract

Wireless gas leakage detection systems are necessary in the Oil and Gas industry (OGI). This is because they are more flexible in terms of installation and maintenance. However, wireless gas sensors have an average life span of 2 years. This is because of the huge energy consumption of the gas sensors. In this paper, a Wireless Gas Sensor Network (WGSN) combining adaptive sleep cycle and energy harvesting is developed. The system is able to reach a life span of 5.5 years with the help of solar panels.

Keywords: Gas Leakage Detection, Toxic, Combustible, Gas Sensor, Oil and Gas Industry

1. Introduction

The Oil and Gas Industry (OGI) encompasses oil (petroleum) and gas; exploration, extraction, refining, transportation and marketing. Most of these processes involve toxic and/or combustible gases such as Carbon monoxide, Sulfur(IV)Oxide, Hydrogen Sulfide and Nitrogen Oxides. Over the years, several accidents have occurred due to these gases [1, 2]. After investigating such accidents, United State Chemical Safety Board (USCSB) [3], found that these

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