ENVIRONMENTAL MONITORING SYSTEM FOR MILITARY ARMOURIES

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by

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Declaration

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ABSTRACT

Utilizing explosive material for human activities has taken place since the very day of civilization in several methods/forms. Creating a hazardous harmful environment due to explosive material has become a very big concern since the development of the industrial era. In order to avoid the hazardous environment created by the usage of explosives which leads to effect on human life, the environment as well as the economy of the respective country, it is a must to ensure the proper method of production, transportation, storing and utilizing of explosives be adhered. The development of the explosive chemicals industry has increased exponentially since World War I. Countries around the world maintain explosive storages for many reasons such as military purposes, the fireworks industry, and various other specialized agencies.

All chemical explosives have a safe survival period from the date of manufacture and chemical explosives drastically change their chemical properties upon expiration. However, during the past two decades, many accidents/incidents have been reported in explosive storage environments around the world with a greater impact on human life and the eco system. Hence, it is evident that explosive chemical storage management needs more studies and still there is more space for the development of safety measures to avoid such incidents in the future.

This research is mainly focused on designing a monitoring mechanism to identify the main changes in the environment of chemical explosive storages by sensing, monitoring and tracking dynamic phenomena in real-time. The proposed monitoring mechanism will detect, identify and alarm when occurring of minor changes of variable factors. The researcher follows the existing chemical explosive storage management safety standards during the study to achieve the research objectives.

This research presents an open-source sensor-based design which will check the differences occurring inside military armouries which it uses electronic components likes microcontrollers, sensors and other components comes under IOT (Internet of Things). This design is capable of monitoring quantities like temperature, humidity, availability of harmful gases, inside armouries. Further, this will detect vibration, EMI (Electromagnetic interference) in outside of the armoury. Also, visual monitoring is possible through day and night camera. The collected data and details will be maintained inside a server computer during the testing phase of the design. However, it is proposed to utilize a local server during the actual implementation of the design. The users can access the data by sitting in a control location and also from a remote location through a WAN (Wide Area Network). The aforementioned application will provide essential information to end-user where they can use same for arriving to decision. Further, this will facilitate to make notifications to users when substantial changes occur in the armoury environment. During testing, a cloud-based open-source application is utilized which is easy for monitoring and visualizing of data. The evaluation of proposed designed module has been carried out in several steps. On completion of tests at each & every function in different steps. On the photo type design, it displayed a better accuracy and reliability.

Keywords -explosive armouries, environmental monitoring, end of life of explosives.

ACKNOWLEDGEMENT

LIST OF ABBREVIATIONS

UEMS	:	Unplanned explosions at munitions sites
HE	:	High Explosives
LE	:	Low Explosive
BA	:	Blasting Agent
EMI	:	Electro Magnetic Induction
AHP	:	Analytic Hierarchy Process
SLN	:	Sri Lanka Navy
OB/OD	:	Open Burning/Open Detonation

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