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Title:

A Comparative Studies of Ten Ergonomics Risk Assessment Methods

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Abstract:

Work-related musculoskeletal disorders or WMSDs are most often cited in various studies related to the risk factors of repetition, application of excessive force, vibration, contact stress, and awkward postures. Lower back, neck, forearms, wrists, hands, shoulders, and elbow are the most often body areas that are affected from these WMSDs. The scientific literature shows that the best preventions from WMSDs are to reduce the exposure to the risk factors. In other words, risk factors of WMSDs should be assessed especially in the work area to ensure the workers have less interaction with the risk factors of WMSDs. The assessment of WMSDs risk factors can be placed in three categories, subjective judgment, direct measurement, and systematic observation. Based on the review, measurement is the most accurate and reliable methods to identify risk factors of WMSDs, but it required significant investment of resources whereas observation methods are the most commonly method used by the ergonomist. The observation method is easier and less costly compared to the other method in identifying the risk factors. It is also the most flexible method when it comes to collecting data in the actual site. The purpose of the study is to obtain the comparison results between the methods to identify the most effective ergonomics risk assessment in preventing WMSDs. While ergonomics practitioners, occupational therapists, employers, union workers, and health and safety authorities need information on the most effective assessment methods available for preventing WMSDs, the literature still offers little applied research that has tested these methods for comparison and lacks information on which methods are the best at preventing WMSDs. There is also no argument between the ergonomics practitioners as the best method to choose is to develop an experiment related to the task and compare the respective result.

Title:

A Multi-Agent K-Means Algorithm for Improved Parallel Data Clustering

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Article

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Abstract:

Due to the rapid increase in data volumes, clustering algorithms are now finding applications in a variety of fields. However, existing clustering techniques have been deemed unsuccessful in managing large data volumes due to the issues of accuracy and high computational cost. As a result, this work offers a parallel clustering technique based on a combination of the K-means and Multi-Agent System algorithms (MAS). The proposed technique is known as Multi-K-means (MK-means). The main goal is to keep the dataset intact while boosting the accuracy of the clustering procedure. The cluster centers of each partition are calculated, combined, and then clustered. The performance of the suggested method's statistical significance was confirmed using the five datasets that served as testing and assessment methods for the proposed algorithm's efficacy. In terms of performance, the proposed MK-means algorithm is compared to the Clustering-based Genetic Algorithm (CGA), the Adaptive Biogeography Clustering-based Genetic Algorithm (ABCGA), and standard K-means algorithms. The results show that the MK-means algorithm outperforms other algorithms because it works by activating agents separately for clustering processes while each agent considers a separate group of features.

Title:

A Novel Approach of Estimating the Kinematics for a Manta Ray Inspired Swimming Mobile Robot

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Advanced Structured Materials, Volume 174, 2022.

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Abstract:

This paper presents a novel approach of deriving and estimating the kinematic model of the generic configuration of a swimming mobile robot inspired by manta ray. Initially, the conventional method of mathematical model of linear and angular velocities are described, considering the kinematic model of the traverse entity on a 2-D plane. These parameters are novelly derived to represent a higher degree of motion on a complex environment. Due to the complexity of the environment, the flight dynamic stability analysis is implemented in the derivation, however, the unwanted portion is eliminated from the equation. As a result, the estimated kinematic model is characterised providing the natural performance in mobile robot applications particularly in ocean exploration. Meanwhile, the overarching concept of the proposed system is implementing the layered-architecture mobile robot control whereby the highest level control layer defines the overall perception of the environment condition. The model of the swimming trajectory within this layer and construction is using the multivariate Gaussian function. Further, the pre-planned path is projected onto the trajectory model providing a complete higher degree of freedom mobile robot kinematic equation. Simulation results are also presented which demonstrate the good performance of the proposed model under randomly generated ocean and seabed conditions.

Title:

A Review on 3D Nanomaterial: Aerogel-Derived Nanocellulose for Energy Storage

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Abstract:

Nanotechnology can help conserve renewable resources and future ecosystems. They may help tackle various energy and environmental challenges. They will be used in bioengineering, electrical gadgets, and energy storage. This research describes novel fibrous freeze-shaping procedures for 1D polymer nanofiber cellulose fibrous, isotropically linked elastic nanofibers. This is a summary of the review. In the first part, electrospinning may significantly enhance aerogel reinforcing. Our focus will be on nanofiber network aerogels and their possible energy storage. Applicability of nanocellulose fiber aerogels follows. 3D nanocellulose aerogels will improve research chances.

Title:

A Review on Critical Success Factors for Maintenance Management of Laboratory and Workshop Facilities in TVET Institution

Journal:

Advanced Structured Materials, Volume 174, 2022.

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Book Chapter

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Abstract:

Strengthening of TVET institutions is vital toward producing a knowledgeable, skilled and competence workforce for the industry. The heart of TVET education is about practicing psychomotor skills through a direct engagement with the laboratory and workshop facilities. Therefore, it demands an effective maintenance management toward ensuring a 100% availability of those facilities. Nevertheless, the literature portrays that many of TVET institutions worldwide are struggling to maintain their laboratory and workshop facilities. Thus, this review study aimed at revealing the uncovered issue related to maintenance management of laboratory and workshop facilities at technical and vocational education and training (TVET) institution. Secondary data based on previous research was gathered and scrutinized to extract a key critical success factors (CSFs) for managing the maintenance activities of laboratory and workshop facilities at TVET institution. Based on analysis, it was summarized that there are seven CSFs having the most significant impact toward improving the maintenance activities for TVET institution. All those CSFs constructs were then integrated in a simple yet self-explanatory framework to convey the conceptual idea to all stakeholders involved in managing the maintenance activities within TVET institutions. It is believed that the framework developed would benefit as an indicator and guideline in improving the maintenance activities for laboratory and workshop facilities at TVET institution.

Title:

Applying Lean Technique in Medical Records Management at Hospitals

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Abstract:

Handling manual medical records (MR) in tertiary hospitals can be inefficient, hence may affect patient's care. At present, patient waiting times at specialized clinics were affected due to the inability of preparing medical records on time. Our study applies the lean technique to examine issues and produce measurement performance indicator metrics in manual record management. This action research was carried out in the Medical Record Department, Hospital Kuala Lumpur. It was conducted over a year-period in 2017 in two main phases which were awareness and coaching of lean thinking and its application. Lean tools that have been utilized were value stream mapping (VSM), affinity diagram, 5S (i.e. sort, set in order, shine, standardize, sustain/self-discipline), Kanban, Kaizen, Heijunka and Poka-yoke. Specific performance project measurement metrics were established to determine the successful application of lean. Based on our case study, four specific performance project measurement metrics were achieved; (1) number of MR available 2 days before clinic appointment improved from 72 to 74%, (2) number of temporary MR made due to unavailable MR on clinic day reduced significantly (mean 8.43 vs. 2.53, $p < 0.01$), (3) number of MR to be traced on the clinic day for walk in patient and MR available improved significantly (mean 4.19 vs. 0.58, $p < 0.01$), (4) number of MR to be traced on the clinic day for walk in patient and MR not available reduced significantly (mean 4.24 vs. 1.69, $p < 0.01$). This study has shown the successful and positive feedback of lean technique application in manual medical record management at a tertiary hospital. Moreover, lean technique also produced the relevant and appropriate performance measurement metrics/indicators in monitoring the competency of medical record processes.

Title:

Automated Chicken Coop Management System to Improve the Quality of Chicken Production

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Abstract:

Chicken poultry is one of the important economic segments in the agricultural sector in Malaysia today. Chicken production in Malaysia has been increased gradually due to the standardized farming management and good manufacturing practices. There are few parameters that affect the health of a chicken such as temperature, water, and food supplies. These parameters need to be controlled in order to maintain the production and quality of chicken. With the advent of automation, a traditional chicken coop management system can be improved. Therefore, this study focuses on the development of an automated chicken coop management system prototype. Among the main hardware used for the project is the Arduino Mega board and sensors to control and monitor the parameters like temperature, water, and food level in the chicken coop. The parameters can also be monitored through a mobile Blynk application. The results indicate that with a more systematic control of the environmental factors that affect the health of a chicken, an ideal environmental condition can be achieved and maintained in the chicken coop.

Title:

Comparative Study on the Energy Absorption Capability of Natural Kenaf/Epoxy Reinforced Composite Tubes with Different Lengths

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Abstract:

The main aim of the current study is to investigate the energy absorption response of natural fiber/epoxy composite tubes with different shapes. Three different circular lengths, i.e., 50, 100, and 150 mm were investigated experimentally subjected to axial compression tests. Hand lay-up methods were used to prepare the composite shapes. The results showed that the length factor is significantly affected on the energy carrying capacity of circular tubes reinforced by natural kenaf fiber. Furthermore, the composite tube with a length equal to 100 mm showed higher energy absorption capability with the value of 27.42 J/kg as well as average crashing load and crash force efficiency compared to other tubes.

Title:

Compressed Air (CdA) System Energy Audit: A Case Study on Quantifying the CdA Leak with the SONAPHONE UT Technology

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Abstract:

Compressed air (CdA) has become one of the most costly utilities in a manufacturing facility. Numerous tactics are utilised to minimise energy loss and consumption when creating energy-efficient CdA systems. The systems require a multidimensional approach to energy conservation through the use of efficient compressed air generation, distribution, and application equipment. The research's initial objective is to quantify lost CdA in terms of dollars and cents. The second objective is to examine the compressed air system's performance using the SONAPHONE ultrasonic testing (UT) technology based on its auto-leak analysis. The annual cost and leakage cost of CdA were calculated using data collected from the SONAPHONE equipment.

Title:

Designation of Smart-Energy Save Light Systems Via Mobile-Based Applications and Devices

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Abstract:

Lights are command sources in our lives at all times and in all places. Alternative sources are vital to increase satisfaction on customer requirements as demand trends. Saving energy is another factor to consider when choosing a lighting system. As a result, this study explains the implementation of a smart lamp with a controlled light system based on Arduino and the use of a mobile application to save energy. A smart bulb is the best approach to save and conserve light by using a remote system to monitor and manage the intensity. This study developed a design for an energy-saving smart light system that works with mobile apps and devices. It is a little prototype that runs on an Arduino board and is entirely automated. The identification of the LDR sensor, PIR sensor, and circuit configuration is the first step in the design. Following that, the Arduino program, mobile application, and gadgets are integrated with hardware and software. Finally, the testing procedure is carried out, and the data is gathered and analyzed. With the scenario as a setup, the complete system has been empirically proven. By monitoring and adjusting light in such a way that it is always an exact match to the real requirement, it is possible to conserve energy and money while also improving human comfort and efficiency.