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**Title:**

Development and Performance Evaluation of an Augmented Reality Instructional System (Easy-AR) for Assembly Support

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**Abstract:**

This work develops and evaluates an Augmented Reality Instructional System for assembly support and its role in improving efficiency on manual, customized, or modular manufacturing. The prototype application is a tool designed to unite real and computer-based scenes and images to deliver a combined view of assembly with a marker-less based tracking system, the “Easy-AR”. Normally, such assembly process is conducted by referring to the manual instruction, often via printed graphics which are inefficient especially for new workers. To overcome, industries need to provide series of training sessions to develop worker skills until necessary performance is obtained. This will likely contribute to an increment of direct and indirect cost towards industries. The development of the “Easy-AR” application for assembly support prototype is hypothesized to help to enhance the efficiency and reduce errors of the manual assembly process with minimum training requirement. The prototype was tested in a controlled environment to minimize unnecessary variables. Time study, efficiency, and error of assembly process was done under assistance of the prototype while assistance of a printed manual is introduced as control. Time taken to assemble each component of a prototype was recorded and analyzed to identify the difference of efficiency and assembly quality under both situations and analyzed statistically. Based on testing on 60 participants, assembly time with the prototype reported to be improved by 38.9% in comparison with control. Furthermore, a 50% reduction of errors has been recorded with the prototype. As conclusion, the problem in industry related to the manual processes in daily tasks can be overcome by the implementation of the prototype app which is scalable, and the assembling process will be more interesting, attractive, and effective, in line with the fourth industrial revolution.

**Title:**

Development of a Fire Retardant Door Made of Earth Materials

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**Abstract:**

In the case of fire in buildings, fire doors installed prevent the spread of fire and smoke from crossing across the building compartments. Much recently, there is a growing interest in the development of earth materials as an alternative material in building and construction like standard bricklaying and masonry. In the present study, the earth materials performance as an additive to the fire door core material in terms of its fire resistant is evaluated. It was found that an earth materials infiltrated core at 50% has shown significant improvement in terms of its fire resistant time. In conclusion, earth materials can be used as an additive to improve the fire resistant performance of fire doors. Comparable performance to the existing fire doors will have positive impact on the development and labor cost of fire doors especially for utilization in developed countries.

**Title:**

Development of a Low-Cost Hydroelectric Generation System for Application on Water Pipelines

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**Abstract:**

Electrical energy is one of the most important sources of energy in the world, and it powers most of the equipment. However, some methods of generating energy can be damaging to the environment such as water dams which can affect marine life. There are also green systems that provide electricity while causing no harm to the environment, such as solar panels which produce electricity but are inefficient on overcast days. As a result of this challenge, a new way for producing electrical energy that is both efficient and environmentally beneficial has been developed. Thus, the development of a low-cost hydroelectric generation system for application on water pipelines is presented in this study. The project is able to harness the kinetic energy of flowing water to generate electricity that will be stored in batteries and used to power other electronic equipment. Two designs have been proposed in this project to see the effect of the Venturi shape on water flow in pipes. The system is equipped with small-sized pipes (0.5 to 1 inch), G1 turbine flowmeter, microcontroller, 5 V water flow turbine hydroelectric generator, XH-M603 charging control module, and 12 V GP rechargeable battery. Although the recommended system is lightweight and compact, the system can be improved by incorporating larger turbines and connecting to municipal canals with higher water flow to generate more electricity. As a result of the experiment, it was found that an increase in water flow would cause the turbine to rotate faster, which resulted in an increase in energy generation. The project can provide effective and efficient results in addition to features such as green technology, lower construction costs, and reliable energy production.

**Title:**

Development of a Speed Control System Using Face Recognition

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**Abstract:**

Driving when being drowsy is one of the leading causes of automobile accidents on the road. Insomnia, some types of drugs, and boredom, such as driving for lengthy periods of time, can all cause drowsiness and exhaustion while driving. Many novel devices to prevent sleepy driving have been developed in recent years. One of them is to use biological indicator techniques by measuring the heart rate, brain waves or pulse rate. This technique can detect the parameters well and accurately but requires a physical contact that needs to be attached to the driver's body. This will make it uncomfortable while driving and in addition the device cannot connect directly with the vehicle being driven. Therefore, the development of a speed control system using face recognition is proposed in this paper. Using the facial recognition method equipped with several devices such as HD web camera and LabVIEW to process facial recognition in real-time monitoring, the device will monitor the driver's eyes in real time to see if they are awake or asleep. If the driver is found to be drowsy or sleeping, the system will identify it promptly and display it on the human-machine interface (HMI) to alert the other passengers. In this study, the facial recognition system is connected with a simple prototype to show how the system operates and the overall effectiveness of the system is evaluated. The alarm buzzer will be activated to get the driver's attention back on the road, and if the condition persists, the system will send a signal to the motor driver to stop the vehicle automatically. Based on the findings of the experiments, a notification will be displayed in the graphical user interface (GUI) anytime the driver's eyes are discovered to be drowsy or closed, an alarm buzzer will be sounded, and the motor speed will be precisely controlled until it becomes slow using the PWM control method.

**Title:**

Development of Attributes of Quality Tools and Techniques for Quality Engineering Improvement

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**Abstract:**

Attribute can always be used as a mean to recognize anything because it is a characteristic or inherent part of someone or something. Nevertheless, it may become confusing if there are many attributes to characterize one thing without the attributes being sorted out following their similarities first. Therefore, the understanding toward the attribute is essential in the study of quality tools and techniques (QTT) because nowadays there are abundant of quality tools and techniques that have been developed to be used during the improvement activity or problem-solving. Given that there are various industries that use quality tools and techniques, the establishment of new quality tools and techniques becomes countless. Thus, the selection of QTT becomes difficult. Some practitioner just simply uses any QTT they once heard without prior knowledge about the QTT. Some of the selection of QTT being made without considering the whole situation thus resulting in pointless improvement or dead-end to find the solution to the problem. Apart from that, to compete in industry 4.0, all manufacturing industries should consider adapting all quality tools and techniques and all quality practitioners should have adequate knowledge in QTT or at least have some 'first-aid' to use the right QTT. That is when the development of attribute comes in handy. Correspondingly, attributes of quality tools and techniques are compulsory to be known to describe each of them since attributes are used to identify thus distinguish each individual QTT from one another. Therefore, the user or quality practitioner can understand the QTT from different standpoints. Expressly, attributes here are the characteristic of QTT that makes them 'that' QTT. That is why, review on attributes of quality tools and techniques is crucial. To collect the attributes from previous studies, researcher uses the integrated literature review where these attributes found are being summarized to establish a freshly new attributes framework but still in the same field which is the development of QTT attributes. In this paper, researcher expresses a detailed overview of various classifications of attributes that describe the quality tools and techniques and

successfully exhibit the classification of QTT attributes based on 5 main group which are categorization, input, function, output, and demographic. Consecutively, this classification group of QTT attributes will be used as main items to the development of applications that are equipped with prediction system of QTT selection using a machine learning algorithm.

**Title:**

Domain-Driven Data Mining Framework for Effective Decisions

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**Abstract:**

The purpose of this study is to obtain a better understanding of how to create a knowledge discovery database (KDD) and how to use it in maintenance. Frameworks for undertaking knowledge discovery and data mining have changed over time to meet corporate needs, according to the literature. Domain driven data mining is a KDD framework that is often used for this (DDDM). We use DDDM-KDD in this study to design an effective tire maintenance strategy for a Malaysian transportation company. The direction of the study, the utilization of research procedures, and the contribution of research are all factors to consider.

**Title:**

Effect of travel angle on microstructure at heat affected zone of as welded carbon steel

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Conference Paper

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**Abstract:**

Metal inert gas (MIG) welding is an arc welding process that is used in many industrial fields. MIG welding is remarkable because of high penetration and quickness in producing welds process. However, MIG welding has some disadvantages including less stable arc, high spatter, and production of smoke and fumes in the process of welding. In this study, the four different travel angles (90, 75, 60 and 45) are used to investigate the effect of travel angle on the welding quality, microstructure formation at heat affected zone and the mechanical property. Pure argon is used as the shielding gas with constant current, voltage, and welding speed. The result shows that the lower travel angle produces higher penetration depth and reinforcement. However, lower travel produces more porosity compared to higher travel angle. The use of lower transfer/travel angle during MIG welding contributes to the deep penetration, high reinforcement of the weld bead and produce more porosity especially when the travel angle is set at 45. The microstructure observation shows that the formation of martensite and bainite are dominant in heat affected zone of the weldment prepared by lower travel angle. This result is in line with the Charpy impact test result where the toughness of the specimen prepared by lower travel angle shows the lowest toughness. As a consequence of the formation of more fraction of martensite at HAZ, the toughness of the specimen shows the lowest value travel angle at 45.

**Title:**

Effect of Welding Parameters on Bead Dimension Using MIG Welding of EN 10025 Carbon Steel

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**Abstract:**

Welding is a process of joining two similar and non-similar metals or non-metals with the application of heat and pressure. Depth level of penetration is a key in fillet welded joints because the penetration gives the effects on the strength of the welded joint. The present work investigates the influence of the metal inert gas (MIG) welding process parameters such as welding current, welding voltage, and gas flow rate on bead geometry in EN 10025 low carbon steel material. The objectives are to determine the effect of welding current, welding voltage, and gas flow rate to the bead geometry, as well as to optimize the welding parameters for enhancing the weld penetration and to analyze the welding defects that can be considered and accepted using different welding parameter. The experimental work has been carried out using the MIG welding process. The work pieces were inspected and measured using non-destructive testing (NDT) method and a digital caliper to observe the effects of welding parameters on the weld bead condition. For optimization, the Taguchi method L9 orthogonal array and signal-to-noise ratio were used. Then, the data were analyzed using the main effect of means and analysis of variance (ANOVA). From the results, welding current, welding voltage, and gas flow rate were found to be main limitations which affect the bead geometry. The optimal welding setting for EN 10,025 carbon steel was at 180 A current, 26 V voltage and 16 l/min gas flow rate.

**Title:**

Experimental Investigation and Optimization of Process Parameters of As-Sprayed Aerogel-Soda Lime Glass/NiCoCrAlYT<sub>a</sub> Coating with Historical Data Design Response Surface Methodology (RSM)

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**Abstract:**

Atmospheric plasma spraying was employed to spray agglomerated aerogel-soda lime glass powders onto Inconel 625 substrate. This paper describes the development of statistical models to predict the optimum atmospheric plasma spray (APS) operating parameters such as current (200–800 A), powder feed rate (2.5 and 5 rpm), and spray distance (8, 10, 12, and 14 cm) on adhesion strength and thermal conductivity of as-sprayed Aerogel-soda lime glass/NiCoCrAlYT<sub>a</sub> coating using historical data design of response surface methodology (RSM) from Design Expert 11. RSM is a well-organized statistical technique in forecasting variables in order to obtain the optimum operating conditions. The statistical approach used provides a high level of confidence and improves the processing. Significant effects of the process parameters on the microstructure were also observed. Optimum process conditions favourable for the formation of coating layers with the best coverage of agglomerated aerogel were statistically predicted at the current of 800 A, the powder feed rate of 5 rpm, and the spray distance of 13.54 cm with the maximum adhesion strength and minimum thermal conductivity predicted by RSM were 11.60 MPa and 10.30 W/mK respectively.

**Title:**

Extraction, Characterization, and Comparison of Properties of Cassava Bagasse and Black Seed Fibers

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**Abstract:**

The current study presents a nontoxic, and low-cost preparation of black seeds and cassava bagasse fibers. It also aims at investigating the physical, thermal, and morphological characteristics and chemical composition of these fibers. The current study's findings revealed significant differences in the properties in terms of chemical, morphological, physical, and thermal. The findings also showed that black seed fiber had a higher ash concentration (4.5%) compared to the cassava bagasse fiber of 0.4%. A density of 1.45 g/cm<sup>3</sup> was observed for cassava bagasse fiber, while the black seed fiber exhibited a lower density of 1.22 g/cm<sup>3</sup>. From TGA results, only 21% of cassava bagasse and 38% of black seed fiber weight were observed for the highest degradation rates for both samples (200°C–500°C). In summary, this study suggests cassava bagasse and black seed fibers as promising feedstocks for biopolymers synthesis with an eco-friendly and cost-effective approach that may support the advancement of the biopolymer industry.