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Paper-1

Navigation System for Wheeled Robots

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Abstract*: In this era of automation, it is extremely necessary to find a cheap and accurate navigation system for wheeled robots, so as to bring them to commercial level. Several algorithms have been developed in order to calculate accurate X and Y co-ordinates of wheeled robot, where along with encoders, high cost Inertial Measurement Units have been used for error correction. In order to bring such navigation system at consumer level, where the robots will have to be produced in masses, it is not possible to implement such tedious processes on each manufactured robot. This paper is aimed at optimizing the odometry algorithm, required to convert the region of motion into a co-ordinate plane using encoders, or a combination of encoder and low cost gyroscopes. A reliable trajectory generation based solution for desired path of motion of the wheeled robots based on false virtual co-ordinate system is proposed.*

Paper-2

Energy Harvesting for Low-Power Electronic Devices

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Abstract: *This paper presents how the use of green energy powered device offers solutions to global energy availability problems. The present approach of alternative energy source is the based on the human energy powered device. In this paper, a multi-purpose portable human powered energy device (MPHPED) is presented to power the small electronics products. For the concept implementation, a modified sewing machine with a flexible shaft is used as a transducer and human foot is used as energy source to harvest electrical energy from DC motor (24 V) as well as to rotate a flexible shaft. The output of DC motor is used to power the electronic products like cellphone batteries, LED lamp, etc. and the rotation of flexible shaft is used to operate a small table fan at high rpm. Results show that presented multi-purpose portable human powered energy device successfully supplies sufficient amount of energy to different types of electrical and electronics Systems to full fill the purpose of charging and their direct working.*

Paper-3

Effect of Geometrical and Processing Parameters on Hot Rolling Process Using FEM

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Abstract: *Rolling is an important manufacturing process used to produce many important engineering products. In rolling process, the metals and alloys are subjected to complex stresses, strain, strain-rate,stress flow, pressure and reaction forces which make it very complex to analyse. In the present study, FE simulation of hot rolling process has been carried out using ABAQUS/Explicit software. In this study, 10% of reduction of slab thickness has been considered with different roller diameters, geometrical slab thicknesses. Effect of processing parameters are critically analysed in term of stress, strain, and reaction forces etc.*

Paper-4

Finite Element and Experimental Investigation of Viscoelastic Properties in Vapor Grown Carbon Nanofibers / Polypropylene Nanocomposites

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Abstract: *A single screw extruder is used to shear mix and extrude vapor grown carbon nanofibers (VGCF) /polypropylene mixtures through a converging-annular rectangular section die that generates fiber alignment along the flow direction and fabricate long strips of rectangular cross-section. Loss factor and storage modulus of VGCF/pp specimen is measured by using a Dynamic Mechanical Analyzer (DMA) in dual cantilever bending mode. The experimental results are employed to validate the FEM/Strain energy method, extended rule of mixtures (ERM) and Cox model for the prediction of damping and stiffness of VGCF/pp composites having a preferential fiber orientation in the direction of injection. Good agreement between measured and predicted storage values is found over the* range of fiber volume fraction investigated. Predicted and measured damping *values are in the same range, and show decrease trend with fiber volume fraction. Atomic force microscopy (AFM) has become one of the most valuable tools for investigating the morphology of VGCF/PP nanocomposites.*

Paper-5

Towards a Passive Dynamic Based Motion of a Quadruped

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Abstract:*Robotic quadrupeds which can function as transportation machines present many advantages due to their high mobility and ability to traverse rugged terrain as opposed to conventional wheeled robots. However the high degrees of freedom and large number of actuators associated greatly increase their energy expenditure. This problem can be overcome by exploiting the natural or passive dynamics of the system in order to maximize the energy efficiency. The analysis of passive dynamics involves the derivation of the dynamic equations of motion which are then numerically integrated to generate the trajectories of the states of the system. We propose to create a dynamic model of a quadruped and generate optimal starting configurations by simulating the quadruped on Simulink/MATLAB and using the SimMechanics Toolbox. The method is verified by analysis of a two legged kneed walker.*

Paper-6

Feature Selection and Performance Evaluation for Fault Diagnosis of Rolling Element Bearings using Support Vector Machine

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Abstract: *Rolling element bearings are critical part of rotating machinery. Any defect in bearing may result in breakdown of the machinery and also affect the associated system. Sometimes these failures may be catastrophic in nature. In order to avoid these failures and to minimize the operating cost early detection of fault is very necessary. Vibration based fault detection is widely used due to its more responsiveness to presence of faults. Support Vector Machine (SVM) is one of the promising tools for early detection of faults in bearings. In this study the method for selection of features from various statistical measures has been proposed. SVM is used as classification tool for healthy and faulty bearings. Performance of SVM is evaluated using different kernel functions, box constraint and sequential minimal optimization (SMO) technique. SVM shows potential classification accuracy of the tested data.*

Paper-7

"Effects of Machining Parameters on Surface Finish over Hardened Die Steel working on Wire Cut EDM Machine"

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Abstract: *In last forty years there is tremendous research in machining and development in technology. With increase in competition in market and to attain high accuracy now a days the unconventional machining methods are become lifeline of any industry.Surface integrity of machined parts is one of the major machining characteristics that play an important role in determining the quality of engineering components. It is well known fact that good quality surfaces improve the fatigue strength, corrosion and wear resistance of work piece. The purpose of study was to investigate the effects of wire- electrical Discharge machining variables on surface topography of k-100 die steel.*

In the present work the effects of pulse current and gap voltage on surface Roughness during machining by various parameter setting were done. It is evident that as process parameters increases the surface roughness of the work piece becomes worsen.

Selection of optimum machining parameter combinations for obtaining higher accuracy is a challenging task in WEDM due to the presence of a large number of process variables and complex process mechanisms. The improvement is limited because finishing process becomes more difficult due to wire deflection and vibration when the energy is gradually lowered. After analyzing the effects of each relevant factor on surface roughness, appropriate values of all parameter are chosen and a fine surface of roughness Ra equals to 0.22μm is achieved.

Paper-8

Development of Extruder Head for Fused DepositionProcess

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Abstract:*This paper presents a model of the three-axis CNC-assisted extruder head for fused deposition modelling process. The model is designed using the modular approach and the developed modularity in extruder head design offers benefits such as augmentation (adding new solution by merely plugging in a new module), and exclusion so that tool can easily compatible with different three-axis CNC- milling machines. To show its feasibility, the developed fused extruder head for the fused deposition modelling process is coupled to the spindle holder to demonstrate the tool-movements using numeric codes with a three-axis CNC-assisted machine. The feasibility behaviour of the fused extrusion tool is compared to the generic machining tool and experimental results obtained using modal testing under different movement's conditions of three axis CNC machine. For the feasibility study, different movement modes, including rapid traverse, linear, circular interpolation and feed and spindle speed modes are studied. The feasibility results between the generic machining tool and proposed extruder head is shown satisfactory for all movement modes tested during this study. It is concluded that using three axis CNC milling machine as a Rapid Prototyping (RP) machine, presents a major hope in the development of low cost FDM technique for the small and medium industries.*

Paper-9

Time Response of Automobile Suspension System Using Full-car Model

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Abstract: *The suspension system of an automobile helps to support the car body, engine and passengers, and at the same time absorbs shocks received from the ground while vehicle moves on rough roads. The study of vibrations of the suspension system has been a topic of interest to many researchers in the past. Most of them have studied using quarter car model and half car model. These models represent the original system in an approximate way. Very few people have been working on full car model. Most of the literature presents the final results without and details regarding equations and their development. In this paper it is aimed at development of equations of motion and also time response of the automobile due to different types of disturbances.*

Paper-10

Motion control of servomotor with microcontroller using MATLAB

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Abstract:*This paper presents an experimental study on the control of rotation angle and speed for Direct Current (DC) servo motor. Automatic control of DC servo motor in terms of rotation angle and speed has played a vital role in the development of different types of user specified numeric control machines. Because various machine movements are controlled through rotation angle and speed by servo motors along with guide ways. In this experimental study motion parameters of DC servo motor are controlled with microcontroller using Matlab and designed in such a way that it can easily interface to different type of DC servo motor with Computer. The motion study has been carried out on the servo motor along with Arduino software interfaced through Matlab by variation of pulse width and no. of pulses. Results show that the use of proposed interface system is a flexible solution to control the rotation angle and speed through Matlab. This work gives knowledge of controlling the servomotor through Matlab. Matlab is used in this experimental study for the controlling purpose because it is widely used as programming software.*

Paper-11

Modelling and Trajectory Tracking Control of a Planer Parallel Robotic Platform ($XY\theta_Z$ Motion Platform)

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Abstract*: This study addresses the modelling and trajectory tracking control of a three degrees of freedom (3-DOF) planar parallel robot manipulator in the presence of parameter uncertainties and external disturbances. The proposed planar parallel manipulator is a singularity free manipulator and has three legs (1 - PPR and 2 - PRP) located on the same plane consist of only one active prismatic joint each leg connecting a moving platform. The kinematic solution (both forward and reverse kinematics) of the platform obtained. Further, the Euler-Lagrangian energy based formulation method is used to derive its dynamic model. The proposed controller based on computer torque control along with a disturbance observer. Disturbance vector such as disturbances due to parameter variations, payload variations, frictional effects and other effects is estimated using a nonlinear disturbance observer. The observer uses only position and velocity feedback measurements. Simulations with typical desired trajectory are presented, and the results show that good tracking performance is achieved in the presence of parameter uncertainties and external disturbances.*

Paper-12

FEM and VEM Based Casting Simulation

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Abstract: *At present there are many casting simulation software's which can be used in a foundry. We have concentrated on two popular but different programmes: ProCAST (based on FEM) and AutoCAST (based on VEM) to verify their workability from user point of view. This simulated result is verified with the help of a benchmark stepped component. Simulation is performed for industrial casting, during simulation comparison done for pre processing for both FEM and VEM on the basis of part import, mould box size, minimum section thickness, identifying hole opening, part orientation and parting line creation. After comparison on the basis of pre processing, FEM and VEM based solution done. Evaluate the result after FEM and VEM based solution for fraction solid, air entrapment, velocity magnitude , filling time, feed path and solidification time.*