Foreword and Editorial

International Journal of Control and Automation

We are very happy to publish this issue of an International Journal of Control and Automation by Science & Engineering Research Support Society.

This issue contains 39 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

In paper “Analysis about Static Characteristics of Machine Tool Bolted Joint Based on Virtual Medium”, the bolt joint of Heavy NC machine tool as the research object. Combination of bolts binding kinetics model is established by using the virtual medium method. The parameters change the dynamics of model, the influence of bolt pretightening force, tool materials and processing, has been part of the characteristics and rule of machine tool joint.

The study “Development of the Logging System for LKAS Electronic Control Unit Algorithm Verification” developed a verification logging system for the electronic control algorithm of a lane keeping assistance system camera. The developed system can not only acquire the lane information of a road through the camera, but also analyze such information and adjust a vehicle automatically through controlling the control board.

The paper “Further Result for Globally Asymptotic Stability of a Class of Memristor-Based Recurrent Neural Networks with Time-Varying Delays” investigates the uniqueness and globally uniformly asymptotic stability for a class of memristor-based recurrent neural networks with time-varying delays. By employing a homeomorphism and suitable Lyapunov functional and differential condition, a sufficient conclusion for the uniqueness and globally uniformly asymptotic stability of a class of memristor-based recurrent neural networks is attained. Comparing with the previous corresponding results, they can derive that their results are new and improve the previous result reported on global uniform asymptotic stability. Two illustrative examples are given to demonstrate the applicability and advantages of their result.

Authors of the paper “Research on Two-Wheeled Self-Balancing Robot Control Strategy Based on LQR-Fuzzy Algorithm” take two-wheeled self-balancing robot as the experimental object, designing an advanced controller which not only solves the defect of the over-reliance on precise mathematical model for modern control theory, but also solves the problem of complex handling issues of the fuzzy controller under multi input and multi output situation. The designing idea is: firstly, a fusion function is gained through the feedback matrix by LQR method; the fusion function is adopted to reduce the input dimensions of the fuzzy controller, thus to control the system. Secondly, due to the quantization factor and proportional factor of fuzzy control are mainly obtained by experience, they use particle swarm algorithm to optimize the quantization factor and scaling factor of fuzzy controller in order to get an ideal control effect. Thirdly, constructing two fusion functions to fuse the six dimensional input variables from the robot, which solve the existence error between the designed decoupler from theoretical calculation and the actual situation of the system, also solve the difficulties through
decouper designing. Finally, proving the validity of the control strategy through the simulation and real-time control, it shares a good theoretical and practical significance.

The paper “Modeling the Noise in Narrowband Power Line Communication” present a model for the noise in narrow-band power line communication. They first derive a statistic model for the distribution of noise in a narrow-band power line. The noise consists of three parts such as impulse noise, background noise, and narrow-band interference. For each part, they analyze its characteristics with the Markov Chain Monte Carlo (MCMC) method. The model is evaluated with extensive field measurement data and compared with a classical noise model.

The study “Research and Improvement of Kinematics Algorithm of Industrial Robot based on the D-H Coordinate System” sets the six-joint industrial robot as research object and establishes forward and inverse kinematics equations based on the D-H coordinate system. Then, an algorithm of searching the proper inverse kinematic solutions was presented based on the characteristics of the solutions and the geometric structure of the robot. The proposed algorithm control position and orientation comprehensively in the Cartesian coordinate space and gives speed-related Jacobian matrix. The algorithm is simulated on the MATLAB and applied to a 6R manipulator in the laboratory to verify the effectiveness.

According to researchers of paper, “Low cost Dynamic Switching Technique for Improving the Power in Partially Shaded Photo Voltaic Array” shading of PV panel is inevitable, this greatly reduces the power generated from the PV module. In the proposed idea, switches connecting the PV modules changes the connections periodically. As the connecting pattern of the PV module changes the shading is cornered and thus the power is enhanced .Using this idea they can go for any size of the PV module.

Authors of “Research on the Cooperative Optimization Mechanism and Methods for Urban Regional Traffics”, states that with the rapid development of urban traffics, recently many big cities have established lots of modern traffic networks extended in all directions, but there are still some severe problems caused by traffic congestions and traffic accidents. So for improving these unsatisfactory states in the urban traffic, inspired by the immune cooperative phenomenon from the biologics, firstly the regional traffic cooperative objective function is purposefully constructed, then special immune cooperative optimization schemes for urban regional traffics are particularly designed and discussed based on dynamic sub-area priorities and niche techniques, and at last some traffic state data are elaborately analyzed and verified in a simulation, thereby this research may be very helpful for promoting the regional traffic travel capacity and improving the adaptation to the dynamic urban traffic tasks.

According to researchers of paper “Compensation and Control of Bearingless Induction Motor’s Unbalanced Exciting Force Based on LMS Filter”, to solve the problem of bearingless induction motor’ unbalance vibration that is caused by rotor mass eccentricity, the generation mechanisms of unbalanced exciting force and unbalanced vibration displacement are analyzed firstly. Then, the extraction method of unbalanced radial displacement based on LMS algorithm is presented, and the compensation strategy of unbalanced exciting force is researched. By real-time regulation and calculation, the compensation forces of unbalanced vibration and unilateral magnetic pull are achieved, and the impacts of unbalanced exciting force and unilateral magnetic pull are compensated.
The paper “A Novel Wave Energy Harvesting System for Ocean Sensor Network Applications” represents a solution for avoiding a common hurdle of harvesting ocean energy using Oscillating Water Column that, though being an efficient technology OWC based harvesters often suffer from performance disruption due to rough sea weather. The solution reveals an idea for a completely closed, double chambered, half water filled oscillating water column with two bidirectional air turbines inside, which shows efficient performance in the bad weather condition as well as in general. The system has the unique feature that, it produces electric power without any interaction with outside ocean water or atmospheric pressure and having a simple, closed structure that can be build using the lower vessel type part of any old ship or boat, adds extra facilities like cost effectiveness and less maintenance effort. Offshore ocean environment monitoring wireless sensor network or floating projects like fish farm can use this system for powering the sensor nodes used for measuring temperature, ph buffer, salinity.

The study “Probability Threshold Scheme in Fast Model-set Adaptive IMM” is devoted to overcome the underflow problem and poorly cost-effective limitation of model-set adaptive IMM algorithm. Cause of underflow problem in Novel-IMM is addressed firstly, based on which an underflow prevented selection probabilities (UPSP) algorithm is presented to solve this problem. This paper then presents a fast model-set adaptive (FAIMM) IMM algorithm based on steady state Kalman filters that decrease the computational burden greatly while keeping acceptable tracking accuracy. Finally, the threshold choosing strategy of UPSP algorithm is presented, which could make the FAIMM algorithm achieves ideal performance.

The paper “A Smoothing Newton Method for Absolute Value Equation” investigate the NP-hard absolute value equation (AVE) $Ax - |x| = b$, where $A$ is an arbitrary square matrix whose singular values exceed one. The significance of the absolute value equation arises from the fact that linear programs, quadratic programs, bimatrix games and other problems can all be reduced to the linear complementarity problem that in turn is equivalent to the absolute value equation. This paper present a new smoothing function to the AVE. Based on this function, a smoothing Newton method is proposed for solving the AVE under the less stringent condition that the singular values of A exceed 1. The global convergence of the method is established under appropriate conditions. Preliminary numerical results indicate that this method is promising.

According to “Energy-Efficient Three-Variables Unsupervised Fuzzy Control Model of Wind Strength for Ceiling type Air-conditioning System”, there is a growing need for intelligent energy-efficient control of air conditioning systems. Traditional PID controlling structure is not appropriate for modern energy efficiency requirements and they need some intelligent procedure to compensate such control. Among many intelligent algorithms available, they propose an unsupervised fuzzy control of wind speed for ceiling type air conditioning systems with three variables - the temperature of the space, the humidity of the space, and the temperature of the walls that is affected by outside radiation heat. Temperature variables are represented as the form of color distribution images.

The paper “Automatic Gauge Control of Plate Rolling Mill” states that the design and implementation of a steel plate mill is discussed together with the impact on the design of process models, available measurements, available control actuators and material properties. Rolling process is a high-speed system which requires high-speed control and communication capabilities. Meanwhile, it is also a typical complex electromechanical system and distributed control has become the mainstream of computer control system for rolling mill. A high-level software design approach provides the ability to make quick and
accurate modifications to both control loops and tuning constants. Control loop strategies and theoretical concepts of steel plate rolling are discussed.

The paper “Experimental Analysis on the Multipath Interference Error of Obstacles Effect” focuses on the multipath interference by an obstruction or rough terrain is studied. The detriment of Glide path information to an aircraft that is approaching the airport with a precision ILS (Instrument Landing System) landing is due to the wrong siting. Terrain irregularity or roughness is the worst and most common glide slope siting deficiency. The degrading effect of rough terrain results from the random dispersion and/or phase shift of ground plane signal. In order to study the possibility of glide path signal interference, the new site that is under construction a big apartment complex and 3km distance away from glide path antenna is selected as a representative model in domestic airport. In the study, computerized simulation technic is employed to predict the probable reflected energy caused by the multipath conditions from antenna, obstructions and siting criteria. This study suggests the solution of a similar case through this analysis method.

In paper “Research on Simulation Speed of Continuous System Based on SimPowerSystems”, simulation speed is a noteworthy issue in the simulation of continuous system. Although previous research has to some extent obtained some achievements, it is still very slow for complex system simulation. A schematic diagram is formulated to describe and analyze the simulation process of continuous system in SimPowerSystems environment. Three simulation methods are proposed based on different ways of discretization mathematical model, namely continuous method, discrete method and hybrid method, and their implementation approaches are presented as well. Meanwhile, the characteristics of modules in Simulink and SimPowerSystems are also studied.

In paper, “Tightly Coupled Integration of a Low Cost MEMS-INS/GPS System using Adaptive Kalman Filtering”, the integration of Inertial Navigation System (INS) and Global Positioning System (GPS) can produce accurate results if four or more GPS satellites are tracked. However, in GPS attenuated signal environment the errors of a low accuracy MEMS/GPS system rapidly grow to the unacceptable level. A tightly coupled integration scheme is utilized to improve the performance and reliability of the low accuracy integrated system in the areas such as tunnels, tall buildings, urban canyon, and forest canopy. This model is capable to detect the GPS fault and to track the errors of the integrated system even when less than four satellites are being tracked. Practically in INS/GPS integration, the system noises are not known correctly. Therefore, an Adaptive Kalman filter is proposed to merge the data of the two systems accurately. The algorithms are tested using the real data of MEMS-IMU (STIM300) and a single frequency NovAtel GPS receiver for land navigations. The integration results indicate a significant improvement in the accuracy of attitude, velocity and position parameters. Moreover, gyro drift which is the main source of errors in INS parameters is significantly reduced.

In paper “Robust $H_{\infty}$ Guaranteed Cost Control for a Class of Uncertain Nonlinear Time-delay Systems”, the design of robust guaranteed cost nonlinear controller is studied for a class of time-delay nonlinear systems with norm-bound time-varying uncertainties. By means of Lyapunov functional and linear matrix inequality (LMIs) technique, a sufficient condition of $H_{\infty}$ robust stabilization which satisfies guaranteed cost index is obtained for the systems. Furthermore, the state feedback nonlinear controller of the systems is given in terms of the feasible solutions of LMIs. Finally, an illustrative example shows the effectiveness of the proposed method.
The paper “Dynamic Pricing Strategy of Shared Devices in IIU Federated Cloud”, states that according to the usage features of the shared devices in IIU federated cloud, the commercialized processing of these devices is conducted. With the consideration of the price mechanism and supply-demand mechanism in sharing process, as well as the commodity remaining rate and the device usage conditions in transaction procedure, a dynamic pricing strategy of the commodities in federated cloud market is proposed. The strategy allows a small amount of commodities to be left in the market to avoid being in short supply. The device utilization rate at non-working time is increased through discount on commodities.

In paper “Design of the Twelve-bands MIMO Antenna for the Metal Cover Mobile Phone”, broadband MIMO antenna, using the metal cover which is one of the antenna radiators, is designed and implemented on the PCB. The antenna consists of a monopole and an IFA that is fed by the coupling structure and a metal cover radiator. Therefore, a monopole and an IFA with a metal cover radiator operate simultaneously through a hybrid form of operation. The proposed antenna satisfies VSWR 3:1(S-parameter -6dB) at the bands of LTE class 12 ~ 14, class 17, CDMA, GSM900, DCS, KPCS, USPCS, WCDMA, LTE class 40 and WiFi. The maximum ECC is 0.186 over the desire bands. The average gain and efficiency were measured from -5.14~1.28dBi and 30.87~74.48%, respectively.

According to authors of “GA-Support Vector Regression Based Ship Traffic Flow Prediction”, the observation and forecasting of vessel traffic flow is the fundamental of design for ships’ routing system. An integrated Genetic Algorithm (GA) based Support Vector Machine (SVM) model for vessel traffic flow forecasting with input factors selection procession is presented in this paper. GA based SVM forecasting model is established whose parameters were optimized through genetic algorithms. Finally, the prediction model is used for ningbo-zhoushan port and the prediction result shows that the improved model reflects the actual growth of vessel traffic flow trend more reasonable and effectively.

Results of paper “The Application of Improved Genetic Algorithm on Damage Identification for Frame Structure”, states that genetic algorithm was used to identify the damage of frame structure. Stiffness coefficient damage factor is selected as design variable, and the weighted array difference value between inherent frequency and vibration mode of structure calculated and measured. According to the difficulty in selecting crossover rate and mutational rate for fundamental algorithm, the process of selection operator, crossover operator and mutation operator was improved. All operators were operated on parent individual. Crossover rate and mutational rate were set for 100%. Punishment function was applied for keeping the difference among individuals. The improved genetic algorithm can conserve the better individual in parent and keep off fall into local optimum. Through a 3-story frame with single variable damage and multiple variables damage study, the results showed that the improved genetic algorithm can identify the damage location and degree.

In paper “An Ensemble Framework for Object Detection in Intelligent Video Surveillance System”, they present an ensemble framework with hierarchical and feedback mechanism for object detection. The proposed method is mainly composed of three phases: coarse detection, fine detection and tracking filter. In coarse detection, moving foreground can be rapidly extracted by improved ViBe background subtraction algorithm. FPDW as a fine detector scans the foreground image area, not entire the image, to determine the precise location and the number of targets. In the tracking filter, the detection results are processed to generate trajectories by the Kalman filter. And the current and the next status of the pixel is fed back from the former phases. For assessment of the effectiveness, they
implement the proposed framework into pedestrian counting method. Several experiments are carried out based on the benchmark datasets.

Paper “The Design of Overload Synchronizing Controller Based on the Model of Supersonic Missile’s Feature Points” states that since the model of hypersonic missile cannot be built accurately and it can change unpredictably, traditional design method is not very effective. A synchronizing control method is introduced in this paper. A synchronizing system that has the similar structures with the controlled system is constructed, then a control law is design to make the synchronizing system trace the controlled system. So the controlled system can be controlled by controlling the synchronizing system. Finally, detailed numerical simulation was done and it showed that the synchronous control method is proved to be more effective than PID control method.

The paper “A Method of Line Fault Location Based on Traveling Wave Theory” combines traveling wave distance measuring principle with the wavelet transform and applies it to the detection and localization of power system short-circuit fault to avoid the severity and multiple of line short-circuit fault. Firstly, according to the current or voltage traveling wave signals detected by traveling wave detection devices put on the bus bar ends, they take traveling wave distance measuring principle as the theoretical basis to extract signals. Then, using wavelet transform to process the signal in order to extract the singular points. Also, traveling wave fault location is established by using B-type double-terminal traveling wave fault location algorithm. Finally, in order to locate the fault precisely and make simulation on different fault types and different sampling frequencies to come to a conclusion, they make wavelet transform of the transient fault signals and make further simulation about the location of single-phase grounding fault.

The paper “Approximated Model Checking for Multirate Hybrid ZIA” states that virtually all control systems nowadays perform various behavioral aspects such as discrete control mode transformation and continuous real time behavior. The interaction of these different types of dynamics and information leads to a lot of safety and control problems. In this paper, to verify these systems they propose a specification model combining interface automata, initialized multirate hybrid automata and Z language, named MZIA. This model can be used to describe temporal properties, hybrid properties, and data properties of hybrid software/hardware complements. And then, they propose a temporal logic for MZIA. Next, considering the measuring errors of real-numbered variables in practice, they study the approximated model checking method of MZIA.

According to authors of “Research on the Input Power Measurement and Control Technology for Ozone Production Process with DBD”, the key device of power supply for ozone production process with DBD can cause the distortion of voltage and current and seriously affect the input power measurement and control. This paper presents a power measurement method based on quasi-synchronous algorithms for ozone production process with DBD and designs the power control strategy based on the load frequency tracking phase shift PWM mode. The experimental results show that the accuracy of power measurement can reach 0.3% and the accuracy of power control can reach 5%.

In paper “The Drunk Driving Automatic Detection System Based on Internet of Things”, the view of the drunk driving traffic accidents caused the frequent problems, proposed drunk driving automatic detection system. The system makes use of internet of things technology, take A STC12C5A16AD single chip as the core, through four MQ-3 alcohol sensors to detection to determine whether alcohol drunk driving. When the system detects alcohol concentration which exceed the standard, the system sends out sound and light alarm and prohibited to start the car, at the same time, the GPRS module can locate the
car’s position, then the information can be sent to driver’s relative and traffic control department through GPRS module.

According to authors of “Delivering High Performance Result with Efficient Use of K-Map”, the Karnaugh map popularly known as the K-map is a method to simplify a given Boolean expression. The Karnaugh Map (K-Map) based technique breaks down beyond six variable. Telecommunication engineer at Bells lab Maurice Karnaugh refined the works of Edward Veitch ad created these k maps. The results are transferred from truth table to the rectangular grid numbering of cells is done according to a special code called Gray code and then assigning the 0s & 1s to the cells of the grids. After that Recognition of the pattern of collecting most number of entries starts. Now write the minimal expression for the required truth table. With the help of k maps one can get a rapid overview of interdisciplinary field in a short time.

According to paper “Research on a Shortest Routing Algorithm of Wave Propagation in Wireless Sensor Networks”, the shortest routing problem is the key to the efficiency of routing in Wireless Sensor Network. This paper aimed at the problem of no obtaining the real-time shortest routing and the poor adaptability of the large-scale wireless sensor network, which is caused by considering adequately the network topology in those present shortest routing algorithms, simulating water diffusion, puts forward a shortest route algorithm of WSN. In the diffusion process, water waves gradually expand to the surrounding, and iterate over all the area, the region is treated as the network which consists of a large number of nodes and arcs. The algorithm simulates the spread of the wave movement through multiply operation, and emulates the single coverage of water wave through die operation, then simulates the motion law of the real water wave using the substitution operation, it can avoid the dead diffusion zone by overlapping operation, achieve full traversal and determine the shortest route according to the arrived wave information of each node recorded in a shortest period of time. Meanwhile, the algorithm's time complexity and space complexity are analyzed in the paper, and concluded that the time complexity of the algorithm is linear change along with the square of the node number, the space complexity is linear change along with the node number in the worst case.

According to researchers of “A New Method of Multi-sensor Data Fusion Based on Multiscale Analysis and UKF”, Unscented Kalman Filtering (UKF) and signal multi-scale analysis are frequently implemented in the application of multi-sensor data fusion technology. This paper proposed a new algorithmic method based on Unscented Kalman filter and wavelet transform for multi-sensor data analysis. Details of five modeling technologies were presented in this research, including distributed multi-sensor dynamic system model, mathematical expression of Kalman filtering model and wavelet transform, the representation method and the fusion estimation algorithm of multi-scales signal. The procedure of multi-sensor data fusion started with filtering applied on the multi-sensor data collected using Unscented Kalman filter, and then, wavelet decomposition was conducted on the model of multi-scale to remove the high-frequency interference signals that contaminated the measuring signal. After that, the filtered signals were reconstructed assisted by wavelet reconstruction, it was necessary to perform confluent procedure for reconstructed data utilizing adaptive weighted algorithm.

In paper “Design of Acceptance Test Process with the Application of Agile Development Methodology”, an acceptance test refers to a test that confirms whether the specified requirements are met. Recent studies on acceptance test automation appear to focus only on easy and simple test automation, while the importance of living documentation for the general application life cycle, which is the ultimate goal, is overlooked. Compared to
traditional development methodologies, it points to marked absence of systematic planning and prediction, overhead due to the application of new process and tools, and in turn, a decline in development productivity. This study designed an architecture that can be used repeatedly through the common application of the agile software. Concrete action plans for automating the acceptance test are presented.

In paper “The Research on PMSM Fuzzy Control in the Marine Electric Propulsion System”, speed-regulation characteristic of PMSM (permanent magnet synchronous motor) in marine electric propulsion system is studied in this paper. Governing method based on vector control is analyzed according to the mathematical model in two-phase rotating coordinate system. After that, a noble PID control strategy which raises dual closed-loop i.e. speed loop and stator current loop is proposed based on fuzzy control theory. Speed deviation and its rate are taken as inputs for adjustment of the PID controller. The strategy proposed in this paper improves the response of system, static and dynamic characteristics of PMSM servo system as well as anti-jamming capability.

The paper “Cognitive Regulation and Emotion Modeling for Micro-expression” proposes an effective system about micro-expression cognition and emotional regulation. First, the micro-expressional face was mapped into Arousal-Valence-Stance 3D emotion space. The micro-expression recognition is based on 3D-Gradient projection descriptor and the gradient magnitude weighted Nearest Neighbor Algorithm (NNA) in facial feature regions. Second, Gross cognitive reappraisal strategy was introduced to emotion analysis. In this research the emotional regulation process operated in the continuous emotional space enabling a wide range of intermediary emotions to be obtained. Finally, the micro-expression recognition algorithm was tested with the Yale University’s facial database. The cognitive emotional system was applied to the human-robot interaction.

According to “HDL Implementation of a Compositional Microprogram Control Unit with e-DIA”, in order to reduce hardware amount in a control unit, the CMCU (compositional microprogram control unit) that makes use of a property of operational linear chain by adopting counter into next-state logic, and DIA (dedicated input area) that splits control memory into two parts having different microinstruction formats are reviewed, and then the concept of TMI field of a DIA is extended to e-DIA in order to supplement the operation of a DIA. The occurrence of idle cycles is removed and microoperation missing or duplication in some cases is protected by applying the e-DIA to CMCU. CMCU with e-DIA is implemented using VHDL, and the improvements are validated through simulation.

In paper, “Particle Swarm Optimization Applied to Generalized Predictive Control of a Solar Power Plant”, generalized predictive control based on particle swarm optimization (PSO-GPC) was applied to the control of linear Fresnel distributed collector system, of which the purpose was to reduce the system error in the dynamic process. The main goal of solar thermal power generation system control was to control the collector outlet temperature in a certain range. Using the the rate of heat transfer oil in heat collector as input, outlet temperature as output and solar radiation intensity as a disturbance signal, model of Controlled Auto-Regressive Integrated Moving Average(CARIMA) was established. The control task of generalized predictive control (GPC) was to make the actual outlet temperature of systems as close as possible to the desired output trajectory. Gradient optimization without constraints was used to obtain the optimal control input, and gradient optimization with constraints and PSO optimization were matched with each other. A multi-mode hybrid optimization method was formed, which can obtain the optimal control increment of system quickly and accurately. GPC and PSO-GPC
technology was applied to Lanzhou 200kW linear Fresnel solar thermal power generation demonstration system.

The study “A Low Voltage Tunable Filter for Analog Baseband of Software Defined Radios” presents a new low voltage tunable Low Pass (LP) filter for Software Defined Radios (SDR) wireless transceivers. The proposed LP filter attempts to optimize the performance of SDRs as it operates at relatively low voltage while providing wide tunable range at the same time. It is constructed using Gm-C technique employing three Operational Transconductance Amplifiers (OTA) and two grounding capacitors. The filter also exhibits independent electronic tuning of center frequency (fc) and quality factor (Q) providing more accuracy in its frequency response. Also its circuit can be synthesized to produce multiple other filter frequency responses by varying inputs which can be useful in other applications. The OTA is the main active element in the filter operating at input supply voltage of 1 V and providing open loop dc gain of 38 dB with power dissipation of 270 uW. The proposed LP filter is envisioned as a part of Zero-IF SDR architecture operating at a baseband section. Simulations are done in HSPICE using CMOS 0.18µm process parameters as functional verification of the presented theory.

The paper “Analysis and Simulation of Scraper Configuration on Roughcast Mechanism” states that to roughcast processing in construction is a complicated and inefficient working procedure, and now the equipment is defective in market. A new type of semi-automatic roughcast scraper mechanism was design in this paper, and the scraper board which is the key components been carried on the structure analysis and calculation, and to determine the formation of the scraper movement and the best installation angle; to analyzed the force of the scraper and provided theory basis for the optimal design.

Paper “Maneuvering target tracking with UKF and EKF for indoor RFID system”, states that due to the uncertainty of the RFID measurements and limit of the placement of the readers, it’s necessary to use the estimation method to obtain more accurate trajectory in RFID indoor tracking system. While the traditional recursive estimation from K to K +1 sampling point may fail, because the measurement of RFID system is irregular sampling due to the data-driven measurement mechanism. This paper develops the tracking method for indoor RFID system, including estimation dynamic model based on the estimated states and nonlinear fusion estimation algorithm for variable-irregular sampling measurements. Two estimation methods were given based on the Extended Kalman filter (EKF) and Unscented Kalman filter (UKF), respectively.
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