

IEEE 2010- 11 EMBEDDED PROJECTS

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1.A Low Cost Microcontroller Implementation of Neural Network Based Hurdle Avoidance Controller for a Car-Like Robot

Abstract:

This paper describes the implementation of a neural network based hurdle avoidance controller for a car like robot using a low cost single chip 89C52 microcontroller. The neural network is the multilayer feed-forward network with back propagation training algorithm. The network is trained offline with tangent-sigmoid as activation function for neurons and is implemented in real time with piecewise linear approximation of tangent-sigmoid function. Results have shown that up-to twenty neurons in hidden layer can be deployed with the proposed technique using a single 89C52 microcontroller. The vehicle is tested in various environments containing obstacles and is found to avoid obstacles in its path successfully.

2.A Performance Comparison of Energy Conservation between Idle Mode and Power Down Mode for Microcontroller in Wireless Mobile Node

Abstract:

In the regular of wireless network, conserving energy is important to extending the lifetime of mobile nodes and network. The goal of this paper is investigated the comparison of energy conservation between idle mode and power down mode based on the microcontroller. The LWM-433H wireless module is applied with the microcontroller. The operation of idle mode and power down mode are controlling the energy supply while the data transmission only. Based on experiment, the data transmission of wireless node is every 5 minutes, 15 minutes and 30 minutes at the transmission range is 65 meters. The time of each transmission successfully at 0.33 seconds that the frame size is 10 bytes, the battery is 12V2.6Ah. The result shows that the energy conservation of microcontroller in power down mode is more than idle mode by up to 14.59 percents, 14.64 percents and 14.65 percents, respectively. In addition, the battery lifetime in mobile node is 89.55 hours, 89.62 hours and 89.64 hours. The result can be explained, the power down mode that is stop the operation of an oscillator circuit while the idle mode closes the internal clock signal only. The result may be applied for some mobile application and support working with lifetime such as wireless mobile node, etc.

3. An Intelligent Road Traffic Control System

Abstract:

This paper reveals the use of a microcontroller to optimize timing plans according to traffic conditions in realtime. The control system is designed to be able to optimize the traffic flow using several kinds of strategies, which are green time split and time slot, green time extension, and offset optimization strategy and the transfer of data related to local conditions to a network control base. This provides diversity in control and shows how several control strategies can be used and switched over to provide best control. The solution is cost-effective too employing minimum number of sensors. Keywords- Intelligent Traffic Control System (ITCS), Microcontroller, Network base, Timing Matrix

4. Data Transmission System of an Optically Steered Modulated Laser Beam

Abstract:

The main goal of this project is to develop and implement a prototype optical transmission system supporting point-to-point communication link. A free space laser link and a plastic fiber link have been designed and implemented in this present work. Both links have been tested with two data source systems: “PC as a host” and “PIC as a host” by asynchronous serial transmission. Since any serial data from either host is represented by turning the laser beam on for a one and off for a zero, visible red laser diode is the heart of this project. Just up to the maximum speed of serial port that can be offered, 115200 bps, has been tested and is reliable at distances of 30 feet. As a result of this work, wireless laser system was designed and can be used as a direct link between adjacent buildings whereas plastic fiber link in short range communication network architecture without EMI, impossible direct interception and the transmission can be detected by no instrument. Any information in all types of files and any images can successfully transfer by Hyper Terminal and self-developed software through those links.

5. Design of Synchronous Sampling System Based on ATT7022C

Abstract:

Higher and higher demands of power quality detection are asked approach to the further demand to understanding of power quality. Moreover, harmonics in the grid is detected how fast and synchronous appears especially important. An approach to detect harmonics is presented in this paper. The design is mainly composed of a single ATT7022C chip and a microcontroller. Working principle is introduced firstly. Then the structure of the system is discussed. A software design approach of data acquisition, based on the chip ATT7022C and low cost DSP TMS320F2812 (F2812), is given in this paper. This design is given to verify fast speed, high detection accuracy and poor calculation.

6. Design of the Temperature Control System of Solar Cell Lamination Machine

Abstract:

The temperature control is the key step in the laminating process of solar cell lamination machine. The traditional controlling method is PLC temperature control. The method being used has some shortages such as high price, low control precision, and so on. In order to improve the control precision and its performance-price ratio, a new control system taking the double microcontroller (MCU) as its core is introduced in this paper. Based upon the system, the expert PID was designed to adjust the requirements of the temperature control. The method can adjust the temperature parameters and establish an accurate laminating temperature under the condition of changing temperature and different control targets. The practical operation results show that the controller has a better robustness and a higher control precision. In addition, it can adapt to an external changing condition, and has a strong anti-jamming capability.

7. Designing Switching System for AC Powered Appliances Using Microcontroller

Abstract:

This paper describes the first phase of the development process of this project. There are two phases involve in this research work. In the first phase, PROTUES simulation tools were used to design, study and analyze the proposed research work. Results from the simulation will be use as reference to re-design and develop the real-time hardware-based system. In the second phase, the hardware will be

developed based on the study and analysis carried out in the first phase. The developed hardware will be integrated to a stand-alone source powered via photovoltaic technology. This will be an added advantage to this system because it will be able to operate without having to connect to the electrical network system. Furthermore, the system is integrated to light dependent resistance and negative temperature coefficient sensors to automatically operate the system based on the sensors characteristics.

8.Embedded Programmable Web-based ECG Monitoring & detection System Using a Fast Algorithm

Abstract:

This paper presents the design of a complete portable package for a low cost embedded programmable ECG measurement and monitoring system implemented by a fast algorithm in detecting ECG characteristics points. This proposed system is expected to monitor the electrical activity of heart of the patient under critical care more conveniently and accurately for diagnosing which can be interfaced with computer to bring it under a network system widely for the doctor to monitor the patient's condition sitting in his own office without being physically present near to the patient's bed.

9. Fabrication of Microcontroller Based Multipurpose Measuring system with Inbuilt Data Acquisition

Abstract:

The designed measuring system is a low cost, flexible, portable Holter which can be used for long time Continuous Monitoring. Here in this paper, the designed system is implemented for impedance measurement and is based upon the principle that when the fixed input current is fed to the cross section of object, corresponding output voltage can be obtained which further leads to determine the conductivity of the region of that object. These measured impedance changes are especially utilized in biomedical field viz Electrical Impedance Tomography, Respiratory measurement, Brain Activity analysis, Pneumography etc. Further data acquisition software is also developed in VB to capture data points in PC. The designed system is tested on various conducting models under different current patterns and frequency. The observed values are found suitable according to the experiment

10. Microcontroller Based Low Cost Controlled Rectifiers Training Module for Power Electronics Laboratory

Abstract:

The junior level Power Electronics Lab is an important component of Electrical Engineering curriculum at University of The Punjab, Lahore. It serves to familiarize the students with the design simulation and analysis of power electronic converters. In this paper, design and implementation of a low cost microcontroller based controlled rectifier training module for single-phase system to be utilized in Power Electronics Lab is presented. The module comprises of various units. The first unit is zero crossing detector followed by the pulse shifting unit, pulse shaping unit, pulse isolation unit, thyristor unit, diode unit, load unit, current sense unit, voltage sense unit and finally rpm sense unit. Various experiments are designed to study the different configurations of the controlled rectifiers. These configurations include half converter, semi converter, full converter, dual converter, series semi converter and series full converter. Some types of AC voltage controllers can also be studied. This system may readily be extended to study three phase-controlled rectifiers

11. Microcontroller-Based Two-Axis Solar Tracking System

Abstract:

The main goal of this project is to develop and implement a prototype of two-axis solar tracking system based on a PIC microcontroller. The parabolic reflector or parabolic dish is constructed around two feet diameter to capture the sun's energy. The focus of the parabolic reflector is theoretically calculated down to an infinitesimally small point to get extremely high temperature. This two axis auto-tracking system has also been constructed using PIC 16F84A microcontroller. The assembly programming language is used to interface the PIC with two-axis solar tracking system. The temperature at the focus of the parabolic reflector is measured with temperature probes. This auto-tracking system is controlled with two 12V, 6W DC gear box motors. The five light sensors (LDR) are used to track the sun and to start the operation (Day/Night operation). Time Delays are used for stepping the motor and reaching the original position of the reflector. The two-axis solar tracking system is constructed with both hardware and software implementations. The designs of the gear and the parabolic reflector are carefully considered and precisely calculated.

12. Wireless Measurement and Control System for Environmental Parameters in Greenhouse

Abstract –

According to the environmental parameters monitoring requirements in greenhouse, a wireless measurement and control system for temperature and humidity is developed. It overcomes the disadvantages of wired monitoring system, such as complicated wiring, and difficult maintenance. The environmental parameters in every greenhouse were measured and controlled by microcontroller. The hardware and software of the monitoring system are discussed in detail. The experimental results show that the developed monitoring system has the following features, such as simple structure, high reliability, good extensibility and flexible configuration. It can control and adjust automatically the environmental parameters in every greenhouse, and has project practicality and vendibility.

13. A novel approach of maximizing energy harvesting in photovoltaic systems based on bisection search theorem

Abstract—

This paper presents a new approach of maximizing energy harvesting in photovoltaic (PV) systems using bisection search theorem (BST). The fundamental of the BST and its application into maximum power point tracker (MPPT) in PV systems are described. A microcontroller is used to control a DC/DC boost converter to realize the MPPT function. Experimental results from solar array simulator show that the proposed technique can track maximum power point very fast within a few steps. The feasibility of the proposed MPPT is also verified in natural environment condition with two solar modules in parallel. Since the proposed technique is simple in computation, cheap in implementation and fast in tracking, it is expected to be widely used to replace conventional MPPT techniques in PV systems

14. Adding New Functions to the Remote Airfield Lighting System

Abstract—

There are many remote airfields that are not connected to the power grid. Providing adequate lighting to these airfields is necessary and challenging. The Federal Aviation Administration (FAA) has sponsored a research project, Remote Airfield Lighting Systems (RALS), through the Center for General Aviation Research (CGAR). The findings from the RALS research specified a light that had low power needs and a color/intensity to meet the requirements for airfield identification and landing. To make these lights more appropriate to wide spread applications, the research team is conducting an exemplary operational test. In this paper, we discuss the new functions added to these lights for the operational test, including both automatically/remotely switching on/off the lights and smart charging of the batteries using solar panels under the control of a microcontroller. In addition, we consider future new functions such as low cost pilot controlled lighting as well as wireless networking for health monitoring and controlling of the lighting system. These new functions can greatly improve the convenience of the usage of RALS while vkeeping the same low cost.

15. Design and Built of on - Load Fully Electronic Tap-Changer with Triac Switch: Simulation and Practical Results

Abstract:

This paper, introduces a new solid-state on – load Tap-changer that has four steps. One of the main requirements of any electrical system is that it should provide a voltage to the consumer which remains within closely defined limits regardless of the loading on the system. Industrial equipment such as speed drives, electronic and control systems are sensitive to voltage variation and affected by bad power quality and poor power factor. Voltage dips can cause shutdown of plants or result in damage of devices. By using of electronic tap-changer, most of the voltage dips can be avoided and lead to good power quality and thus, result in good operation of equipment. The prototype was built with triac switches as the switching devices and A VR microcontroller as the control circuit. In this work a fully electronic tap changer with four taps for 2 KV A, 220/1200V single phase transformer is designed and built. Also some of problems that caused to limitation of electronic tap changer application at high power and voltage system and technical solution ways for theses problems are described. The discrete cycle modulation (DCM) has been used in this tap changer.

16. Microcontroller Based Neural Network Controlled Low Cost Autonomous Vehicle

Abstract—

In this paper, design of a low cost autonomous vehicle based on neural network for navigation in unknown environments is presented. The vehicle is equipped with four ultrasonic sensors for hurdle distance measurement, a wheel encoder for measuring distance traveled, a compass for heading information, a GPS receiver for goal position information, a GSM modem for changing destination place on run time and a nonvolatile RAM for storing waypoint data; all interfaced to a low cost AT89C52 microcontroller. The microcontroller processes the information acquired from the sensors and generates robot motion commands accordingly through neural network. The neural network running inside the microcontroller is a multilayer feed-forward network with back-propagation training algorithm. The network is trained offline with tangent-sigmoid as activation function for neurons and is implemented in real time with piecewise linear approximation of tangent-sigmoid function. Results have shown that upto twenty neurons can be implemented in hidden layer with this technique. The vehicle is tested with varying destination places in outdoor environments containing stationary as well as moving obstacles and is found to reach the set targets successfully.

17. A Self-powered Power Management Circuit for Energy Harvested by a Piezoelectric Cantilever

Abstract-

This paper presents development of a self-powered power management circuit for energy harvested by a piezoelectric cantilever. A full-wave rectifier followed by a buck-boost converter running in the discontinuous conduction mode rectifies the AC output, matches the source impedance, and generates a regulated DC output provided the input power is sufficient to charge up the load. A low power microcontroller unit is used for the maximum power point tracking and the output voltage regulation. Experimental results show that the circuit can harvest up to 3.5 mW with a 50x31.8 mm² piezoelectric cantilever under 0.5g (rms) base acceleration. Detailed loss analysis is presented for efficiency enhancement in the future

18. Application of Complementary Signals in Built-In Self Testers for Mixed-Signal Embedded Electronic Systems

Abstract—

This paper concerns the implementation of shapedesigned complementary signals (CSs), which were matched to the frequency characteristic of the circuit under test, in built-in self testers (BISTs), dedicated to mixed-signal embedded electronic systems for testing their analog sections. The essence of the proposed method and solution of CS BIST is low-cost realization on the base of hardware and software resources of microcontrollers that were used in contemporary embedded systems. This paper presents a description and a theoretical basis of known bipolar CSs and unipolar CSs proposed by the authors, results of investigations of metrological properties of CSs, and a solution of CS BIST and its experimental verification on the examples of testing second- and fourth-order Butterworth filters

19. Design and application of an automatic packaging machine controller based on ATmega 128

Abstract—

In this paper we investigate the major function units of an automatic F/F/S packaging machine including bag forming, material filling, sealing temperature control, status display, fault detection and alarm etc. ATmega18 microcontroller is used as the central manager to coordinate the individual control function modules. AC motor is used to fulfill the film drawing in both fixed length mode and colour tag tracing mode. Under the same precision control, it costs much less than using servo or stepper motor. This controller has the advantage of easy installation and maintenance compare to the normal implementation with a complex interface circuit

20.Design and Application of Mobile Embedded Systems for Home Care Applications

Abstract—

Applied biotelemetry is of growing importance in today's world. Specificity of biotelemetric data put special requirements on real biotelemetric system. This article describes some of conclusions acquired in development of real biotelemetric system using off the shelf embedded hardware technology, namely ARM microcontrollers, FRAM memory and dedicated ZigBee chipsets. Described biotelemetric system is partitioned into logical parts that communicate using custom data protocols. Devices participating in biotelemetric system use ZigBee and Ethernet networks as underlying structure for data communication.

21. Design and realization of low cost discrete psd controller for power Electronics a pplications

Abstract—

Most systems are controlling by common PID controllers. These PID controllers are available in variety possibilities. They are divided by types of controlling systems, by speed of action interference, by complexity, by robustness etc. Most of industrial controllers are very expensive and except of some basic setting they are not offering any other way, how to involve into controlling process. On the other side, developing new analog controller to control simple systems is not reasonable in financial or time issue. That's why we decided to build simple, discrete controller and implement its algorithm into single chip eight bit microcontroller (MCU). This discrete controller – PSD – is characteristic its simplicity and variability. It can control plenty of less complicated systems by a mere change of its characteristic parameters. Thanks to modern approach is possible to create a full - featured controller including power action element on an area equal to 7cm².

22. Microcontroller Based Neural Network Controlled Low Cost Autonomous Vehicle

Abstract—

In this paper, design of a low cost autonomous vehicle based on neural network for navigation in unknown environments is presented. The vehicle is equipped with four ultrasonic sensors for hurdle distance measurement, a wheel encoder for measuring distance traveled, a compass for heading information, a GPS receiver for goal position information, a GSM modem for changing destination place on run time and a nonvolatile RAM for storing waypoint data; all interfaced to a low cost AT89C52 microcontroller. The microcontroller processes the information acquired from the sensors and generates robot motion commands accordingly through neural network. The neural network running inside the microcontroller is a multilayer feed-forward network with back-propagation training algorithm. The network is trained offline with tangent-sigmoid as activation function for neurons and is implemented in real time with piecewise linear approximation of tangent-sigmoid function. Results have shown that upto twenty neurons can be implemented in hidden layer with this technique. The vehicle is tested with varying destination places in outdoor environments containing stationary as well as moving obstacles and is found to reach the set targets successfully.

23. Microcontroller Controlled ECG Simulator

Abstract:

Electrocardiogram (ECG) is a signal designed to work as result of contraction of the heart muscle that make up the electrical biopotentials, using body surface electrodes obtained by obtaining are marked. The result of the heart losing healthy working conditions, disturbances on frequency and amplitude of ECG signals recorded by electrocardiograph according to the healty ECG signal, occurs. The study performed, is a work to help educational problem in the fields of Faculty of Medicine and Biomedical Engineering Education, and calibration of ECG devices without a real heart. In this study, heart rhythm disorders under the supervision of the microcontroller designed a system that may occur due to be displayed in a virtual environment analysis of all disease has been made with prepared simulator (virtual reality application) to reduce medical errors and the spending time and costing at the same time provide more effectively healty service with well-trained physicians

24. A Low-cost Real-time Closed-loop Epileptic Seizure Monitor and Controller

Abstract—

Epilepsy is a neurological disorder, which sometimes cannot be successfully treated. We propose a real-time closed-loop monitoring and controlling device for epileptic seizure detection and suppression. This wireless-networked embedded device includes signal conditioning circuitry, a stimulator, and a microcontroller with a wireless transceiver. A TI CC2430 receives the conditioned EEG signals and performs feature extraction on them to determine if a seizure has happened. The ZigBee-based wireless transceiver transmits the EEG data to the backend computer for future off-line study. If a seizure is detected after the real-time computation, an enabling signal is sent to the stimulator to generate stimulating pulses to suppress the seizure. The feature extraction is implemented using entropy and spectrum analysis, followed by an LLS classifier. A fast seizure detection response time of around 0.6 s and a seizure detection algorithm accuracy of above 95%, when applied to a standard dataset, were achieved with the proposed portable embedded device

25. A New Distributed Localization Algorithm for ZigBee Wireless Networks

Abstract:

Node localization becomes an exciting research area for recently large emergence of ZigBee based wireless applications, where received signal strength indication is adopted as a coarse but simple method on range measurement. Compared with the centralized approach, distributed algorithm that nodes locally calculate their own position coordinates can significantly reduce location-related network traffic; however, this is an intensive process. Unlike commercial digitalhardware- block based method used in CC2431, we propose a novel distributed algorithm that can be implemented based on common 8-bit MCU. In this algorithm, instead of ‘log-normal’, ‘piecewise linear’ path loss model was established, which let only linear operation when estimating range from RSSI. Besides, min-max method, other than maximum likelihood estimation method, was used to simplify coordinate calculation. Furthermore, ZigBee compatible sensor node modules were developed to carry out the contrast experiments, and results demonstrate the new method has close or even better precision compared with basic algorithm, but with lower cost.

26. A Node Localization Scheme for Zigbee-based Sensor Networks

Abstract—

The localization problem consists in estimating the position of the nodes within the network. This is a crucial issue for location-dependant applications. This paper presents an implementation of a localization scheme based only on the received signal strength (SS) in a Zigbee-based sensor network. This is done by taking advantage of the inherent radio communication capability present in each node. The algorithm is intended for an outdoor environment. It is based in a model, which infers distance between neighboring nodes using the SS. A coordinate system is then derived employing a multidimensional scaling (MDS) technique. The signal power level variability due to ground reflection is approached using Lloyd Effect (from optics) and incorporated in the model.

27. A Security Analysis for Wireless Sensor Mesh Networks in Highly Critical Systems

Abstract—

Nowadays, critical control systems are a fundamental component contributing to the overall performance of critical infrastructures in our society, most of which belong to the industrial sector. These complex systems include in their design different types of information and communication technology systems, such as wireless (mesh) sensor networks, to carry out control processes in real time. This fact has meant that several communication standards, such as Zigbee PRO, Wireless HART, and ISA100.11a, have been specified to ensure coexistence, reliability, and security in their communications. The main purpose of this paper has been to review these three standards and analyze their security. We have identified a set of threats and potential attacks in their routing protocols, and we consequently provide recommendations and countermeasures to help Industry protect its infrastructures

28. A Smart ZIGBEE Based Wireless Sensor Meter System

Abstract—

A temperature, humidity and light meter has been designed and implemented using open standards technology and commercial components in order to monitor environmental indoor and outdoor conditions. At the heart of the smart meter lies a microprocessor processor using the ZigBee protocol to communicate the data transmitted by commercial wireless sensors. A prototype has been built and preliminary measurements have been taken. The potential of this configuration is being discussed.

29. A Surveillance Robot with Hopping Capabilities for Home Security

Abstract —

Most traditional home robots have always had problems with stairs, doorsills and other obstacles that humans cross with ease in cluttered indoor environments. This paper presents the development and characterization of a surveillance robot with hopping capabilities for home security. The proposed robot, which is 9cm in height and 250g in weight, can leap over obstacles more than 4 times its own size. It depends on the elastic elements in a six-bar linkage leg system to enable hopping locomotion. It can also roll freely on flat floors and change its directions by the two-wheeled differential drive system. It adopts the ZigBee protocol for wireless communication and therefore can be added to a ZigBee-based home control network as a mobile video sensor node. Experimental results verify that the prototype robot is a powerful home security device that can patrol in cluttered home environments with ease

30.A Zigbee Based Wireless Sensor Network for Sewerage Monitoring

Abstract —

Blockages in sewers are major causes of both sewer flooding and pollution. Water companies which fail to tackle this problem face hefty fines and high operational costs if they unsuccessful to provide a practical solution to prevent flooding. As a result, the detection of sewer condition is routinely required to inform on the best course of action to eliminate this critical problem. This paper presents a novel low cost wireless sensor technology to detect blockages proactively, and feed these event data back to a central control room. The practical deployment of the proposed WSN in an urban area will be demonstrated. In addition, the challenges of this technology in a field trial and the recorded data in terms of the sensor and communication reliability will be addressed

31. A ZigBee-Based Home Automation System

Abstract —

In recent years, the home environment has seen a rapid introduction of network enabled digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. Moreover, with the rapid expansion of the Internet, there is the added potential for the remote control and monitoring of such network enabled devices. However, the adoption of home automation systems has been slow. This paper identifies the reasons for this slow adoption and evaluates the potential of ZigBee for addressing these problems through the design and implementation of a flexible home automation architecture. A ZigBee based home automation system and Wi-Fi network are integrated through a common home gateway. The home gateway provides network interoperability, a simple and flexible user interface, and remote access to the system. A dedicated virtual home is implemented to cater for the system's security and safety needs. To demonstrate the feasibility and effectiveness of the proposed system, four devices, a light switch, radiator valve, safety sensor and ZigBee remote control have been developed and evaluated with the home automation system.

32. Application and Evaluation of High Power Zigbee Based Wireless Sensor Network in Water Irrigation Control Monitoring System

Abstract—

The application of wireless sensor network (WSN) for a water irrigation control monitoring is composed of a number of sensor nodes with a networking capability that can be deployed for an ad hoc and continuous monitoring purpose. The parameters involved in the water reservation control such as the water level and motor movement of the gate controlling the flow of water will be measured in the real time by the sensors that send the data to the base station or control/monitoring room. This paper proposes how such monitoring system can be setup emphasizing on the aspects of low cost, easy ad hoc installation and easy handling and maintenance. The use of wireless system for monitoring purpose will not only reduce the overall monitoring system cost in term of labor cost, but will also provide a flexibility in term of distance or location. In this paper, the fundamental design and implementation of WSN featuring a Zigbee Technology together with the IEEE 802.15.4 compatible transceiver and the simple water flow control circuit is proposed. The developed platform is cost-effective and allows easy customization. Several preliminary results of measurement to evaluate the reliability and effectiveness of the system are also presented

33. Combined Scheduling of Ultrasound And GPS Signals in A Wearable ZigBee-Based Guidance System for The Blind

Abstract—

We have designed and implemented a wearable ZigBee-based guidance system in which a main controller collects ultrasound and GPS signals from sensors attached to subcontrollers and provides appropriate directions to a blind person. The signals from the different sources need to be handled separately, which reduces the effective sampling rate, and may impact the quality of the guidance provided. To address this, we propose a new scheduling scheme that interleaves the two signals without collision, based on the on-line estimation of signal handling times. Experimental results show that this scheme increases a sampling rate by up to 71% compared with the simple scheme1.

34. Design and Implementation of the Zigbee-based body sensor network system

Abstract—

Traditionally the medical monitoring used in hospital brought a lot inconvenience because of the complex wires between patients and equipments. In order to solve these problems, a human health wireless monitoring system based on Zigbee wireless communications is proposed. The system proposes multiple wireless physiological sensors to form a expandable wireless sensor network system architecture. Then the structure of the system used in wireless sensor nodes is introduced and the purpose is to collect the patients' physiological information, such as pulse, temperature, basically realize remote medical monitoring for patients. This system can not only realize accurate measurement of indicators, but also save the patients' travel between home and the hospital

35. Design and Implementation of ZigBee Based Wireless Sensor Network for Remote SpO2 Monitor

Abstract—

A wireless sensor network which consists of SpO2 sensor devices, a router, and Personal Area Network (PAN) coordinators was proposed in this paper. These devices of the network are all developed on ZigBee module which consists of a MCU (MSP430F1611) and a ZigBee chip (CC2320). The sensor devices measure the SpO2 data from patients and transmit it to the router. The router schedule a sending time for each associated device and use hierarchical routing to forward data to a specific device. The PAN coordinator extracts the received packages and passes them to the personal computer. A web-based management method is used to manage the physiological signals which can be displayed on the web page. The system can collect sensitive health information remotely and has a good applied prospect in remote healthy hare field.

36. Full-wave-based location system method evaluation

Abstract —

Evaluation of received signal strength (RSS)- based indoor location system is presented. The proposed method starts from the field amplitude decay law in free-space conditions, but also taking into account the near-field terms for those cases where the distance between transmitter and receiver does not meet far-field conditions. The proposed method is tested in a real indoor scenario, being the field level measured at different positions. The recorded field data are used to evaluate the method accuracy when determining the position of the RF transmitter. Practical considerations of a location system implementation using a ZigBee-based sensor network are finally discussed

37. InfoPods: Zigbee-Based Remote Information Monitoring Devices for Smart-Homes

Abstract —

Recent developments in ad-hoc wireless networks, single-chip embedded systems and the wide-spread availability of Internet in homes has made it possible to remotely monitor status of external data sources and home appliances using small, independent wireless devices. This paper presents an open-architecture and an implementation of such a system called the Infopods System. This architecture is based on a Zigbee-based controller. The architecture allows multiple family members to simultaneously monitor their home appliances as well as external Internet resources using cheap, stand-alone hand-held mobile wireless devices. The proposed architecture can be easily integrated with existing smart-home systems. The architecture is implemented and demonstrated in the context of an existing Java-based smarthome architecture.1

38. Location-Aware Fall Detection System for Medical Care Quality Improvement

Abstract—

Falls are one of the most common adverse events in hospitals and fall management remains a major challenge in the medical care quality. Falls in patients are associated with major health complications that can result in health decline and increased medical care cost. To deliver medical care in time, reliable location-aware fall detection is needed. In this paper, we propose a patient alert alarm for fall management. It is ZigBee-Based location awareness fall detection system that provides immediate position information to the caregivers as soon as the fall happened. Obviously, the integration of location awareness and fall detection technologies fulfills the requirements of delivering critical information to relative professions and improve the medical care quality.

39. Route Navigation System in Zigbee-based Sensor Networks

Abstract:

During the research of supplementary system for visual impairment people, it has been discovered that it is better to use ZigBee wireless technology considering the reliability, portability and flexibility. Through the independent regionally-covered Zigbee networks and the Zigbee terminal with voice prompts, clients will be able to get to the destination correctly and independently according to the data which has been inputted in advance. At the same time, the Zigbee networks will be connected to the local signal system in order to ensure clients' security on their way to the destination. This project has been experimented with the help of simulation platform and proved effective in solving the problem about the clients' security to a large extent.

40. Wireless Sensor Network for Performance Monitoring of Electrical Machine

Abstract—

To avoid unexpected equipment failures and obtain higher accuracy in diagnostic and prognostic for the health condition of a motor, efficient and comprehensive data collecting, monitoring, and control play an important role to improve the system more reliable and effective. A novel wireless data collection for health monitoring system of electric machine based on wireless sensor network (ZigBee™/IEEE802.15.4 Standard) is proposed and developed in this paper. The unique characteristics of ZigBee networks such as low power, low cost, and high flexibility make them ideal for this application. As the focus of this paper, the hardware design and implementation of a multiple nodes Zigbee based wireless sensor network are discussed. The communication protocol and software design for both wireless sensor network node and base station based on the CC2430 system on chip are presented in detail. Experimental results of the proposed wireless sensor network for its applicability to investigate different operating conditions such as electrical faults and mechanical faults are investigated and discussed.

41. ZigBee Based Intelligent Helmet for Coal Miners

Abstract

A cost effective ZigBee-based wireless mine supervising system is presented in this article. This scheme used intelligent helmets as voice terminal and ultra-low-power nodes of wireless sensor network. The programme adopted ZigBee wireless technology to build wireless sensor networks, realized real-time surveillance with early-warning intelligence on methane, temperature, humidity in mining area, and used speech communication to reduce potential safety problems in coal production

42.A 2g-rfid-based e-healthcare system

Abstract

Radio frequency identification technology has received an increasing amount of attention in the past few years as an important emerging technology. However, the intrinsically passive features of existing RFID systems, to which we refer as first-generation RFID systems, render their adaptation to real-world dynamics in order to efficiently comply with up-to-date application specific requirements difficult. To address this challenging issue, we propose an evolution to second-generation RFID systems characterized by the introduction of encoded rules that are dynamically stored in RFID tags. This novel approach facilitates the systems' operation to perform actions on demand for different objects in different situations, and enables improved scalability. Based on 2G-RFID-Sys, we propose a novel e-healthcare management system, and explain how it can be employed to leverage the effectiveness of existing ones. It is foreseeable that the flexibility and scalability of 2G-RFIDSys will support more automatic and intelligent applications in the future

43. An RFID-Based Closed-Loop Wireless Power Transmission System for Biomedical Applications

Abstract—

This brief presents a standalone closed-loop wireless power transmission system that is built around a commercial off-the-shelf (COTS) radio-frequency identification (RFID) reader (TRF7960) operating at 13.56 MHz. It can be used for inductively powering implantable biomedical devices in a closed loop. Any changes in the distance and misalignment between transmitter and receiver coils in near-field wireless power transmission can cause a significant change in the received power, which can cause either a malfunction or excessive heat dissipation. RFID circuits are often used in an open loop. However, their back telemetry capability can be utilized to stabilize the received voltage on the implant. Our measurements showed that the delivered power to the transponder was maintained at 11.2 mW over a range of 0.5 to 2 cm, while the transmitter power consumption changed from 78 mW to 1.1 W. The closed-loop system can also oppose voltage variations as a result of sudden changes in the load current.

44. Design and Development of RFID Label for Steel Coil

Abstract—

Although RF identification (RFID) technology has had a remarkable impact on various industries in recent years, designing RFID tags for metallic objects with satisfactory performance is still a challenge. So far, only few success stories have been reported in the steel industry. This paper presents the design and development of RFID labels for steel coils. In order to achieve automatic inventory during the product-delivery process, a novel antenna structure based on the principle of a monopole antenna has been designed, and the performance has been verified through measurements. In order to minimize the implementation cost added to the product line, the RFID tag is embedded into a barcode label with special perforations. A site test demonstrates that the developed tag has excellent performance, enabling automatic inventory using fixed readers.

45. An Intelligent Telecardiology System Using a Wearable and Wireless ECG to Detect Atrial Fibrillation

Abstract—

This study presents a novel wireless, ambulatory, realtime, and autoalarm intelligent telecardiology system to improve healthcare for cardiovascular disease, which is one of the most prevalent and costly health problems in the world. This system consists of a lightweight and power-saving wireless ECG device equipped with a built-in automatic warning expert system. This device is connected to a mobile and ubiquitous real-time display platform. The acquired ECG signals are instantaneously transmitted to mobile devices, such as netbooks or mobile phones through Bluetooth, and then, processed by the expert system. An alert signal is sent to the remote database server, which can be accessed by an Internet browser, once an abnormal ECG is detected. The current version of the expert system can identify five types of abnormal cardiac rhythms in real-time, including sinus tachycardia, sinus bradycardia, wide QRS complex, atrial fibrillation (AF), and cardiac asystole, which is very important for both the subjects who are being monitored and the healthcare personnel tracking cardiac-rhythm disorders. The proposed system also activates an emergency medical alarm system when problems occur. Clinical testing reveals that the proposed system is approximately 94% accurate, with high sensitivity, specificity, and positive prediction rates for ten normal subjects and 20 AF patients. We believe that in the future a business-card-like ECG device, accompanied with a mobile phone, can make universal cardiac protection service possible.

46. Development of Remote Waste Gas Monitor System

Abstract –

In order to effectively supervise factory chimney waste gas circumstance, a kind of remote waste gas monitor system is designed, with the ARM as its core controller, collects the chimney pollutant indexes consisting of exhaust particulate, sulfur oxides, carbon oxides as well as nitrogen oxides through different gas sensors, and takes advantage of Global Positioning System(GPS) to obtain the chimney position accurately, after that, the information it collects is transmitted to the center control computer via GSM or the complete public switched telephone network. Moreover, in order to provide the environment protection departments convenience in supervising factories making little environmental pollution, the system also uses Global System for Mobile Communications wireless transmission way in which it alarms when the collected data exceeds the national standards. All the real-time data is not only transmitted by the public switched telephone network or GSM system to the core computer, but also stored into SD memory card through SPI interface. Practical run shows that the system is well realized the function of GPS positioning, remote data transmission, exceeding-standard-alarms, and data storage, and the precision of system is no higher than 2.5 percent.

47.GPS-GSM Integration for Enhancing Public Transportation Management Services

Abstract—

This paper proposes and implements a solution for enhancing public transportation management services based on GPS and GSM in Punjab province of Pakistan. The system consists of four modules: BUS Station Module, In-BUS Module, BASE Station Module and BUS Stop Module. Equipped with PC and GSM modem, BUS Station Module sends the initialization information containing the bus number and license plate number to In-BUS Module and BASE Station Module using SMS. The microcontroller based In-BUS Module consisting mainly of a GPS receiver and GSM modem then starts transmitting its location and number of passengers to BASE Station Module. BASE Station Module equipped with a microcontroller unit and GSM modems interfaced to PCs is designed to keep track record of every bus, processes user request about a particular bus location out of BUS Station and updates buses location on bus stops. BUS Stop Module is installed at every bus stop and consists of a GSM modem, memory unit and dot matrix display all interfaced to a microcontroller. This module receives buses location information coming towards that stop from BASE Station module and displays the information on a dot matrix display. A per stop statistical analysis is

carried out based on the number of passengers and a recommendation report along with this analysis is sent to Punjab Government Transportation Department to have a check on the performance and services offered by transporters to common people. The results have shown that the developed system is useful for facilitating people using public transportation services.

48. Gsm Based Ecg Tele-Alert System

Abstract:

Cardiac arrest is quoted as the major contributor to sudden and unexpected death rate in the modern stress filled lifestyle around the globe. A system that warns the person about the onset of the disease earlier automatically will be a boon to the society. This is achievable by deploying advances in wireless technology to the existing patient monitoring system. This paper proposes the development of a module that provides mobility to the doctor and the patient, by adopting a simple and popular technique, detecting the abnormalities in the bio signal of the patient in advance and sending an alert sms to the doctor through Global system for Mobile(GSM) thereby taking suitable precautionary measures thus reducing the critical level of the patient.

49. Open Wireless Sensor Network Telemetry Platform for Mobile Phones

Abstract—Mobile phones are an underutilized resource for connecting low-power wireless sensor networks (WSNs) to the internet. WSNs typically expend most of their battery power on data transmission. Mobile phones carried by the public could enable a hybrid approach where data makes a low-power short distance hop to phones in the vicinity using Bluetooth or a similar short range protocol, then uses the phones' long distance connectivity to upload to the Internet. Because a large fraction of mobile phones have Bluetooth short-distance radio, this paper describes low-cost hardware for a generic WSN-to-Bluetooth gateway and open-source software that allows a wide subset of mobile phones to download and save WSN data.

50. Power-Accuracy Tradeoffs in Human Activity Transition Detection

Abstract —

Wearable, mobile computing platforms are envisioned to be used in out-patient monitoring and care. These systems continuously perform signal filtering, transformations, and classification, which are quite compute intensive, and quickly drain the system energy. The design space of these human activity sensors is large and includes the choice of sampling frequency, feature detection algorithm, length of the window of transition detection etc., and all these choices fundamentally trade-off power/performance for accuracy of detection. In this work, we explore this design space, and make several interesting conclusions that can be used as rules of thumb for quick, yet power-efficient designs of such systems. For instance, we find that the x-axis of our signal, which was oriented to be parallel to the forearm, is the most important signal to be monitored, for our set of hand activities. Our experimental results show that by carefully choosing system design parameters, there is considerable (5X) scope of improving the performance/power of the system, for minimal (5%) loss in accuracy.

51. Proposal of Plug and Play Ego-motion Estimator for Mobile Robot

Abstract-

In this paper, for an ego-motion estimating problem of mobile robot, we propose a plug and play ego-motion estimator that a user can freely select the sensor type and flexibly install the sensor. In this algorithm, each sensor is dealt with a sensor unit that has some computing equipment, and each sensor unit estimates the ego-motion and the sensor parameter. Moreover, the sensor units are connected via a network, and the ego-motion estimate of each unit are exchanged each other. Then the exchanged information is fused by Covariance Intersection method, which is one of a decentralized estimator. By this, this algorithm can estimate ego-motion not affected by number of sensors and sensor type. Furthermore, user can flexibly install the sensors by this algorithm because sensor parameters are estimated in each unit and compensated information are exchanged each other. In addition to this high flexibility, an experimental results denotes that our method estimate ego-motion with adequate accuracy.

52. Real-Time Automization Of Agricultural Environment for Social Modernization of Indian Agricultural System

Abstract—

The paper “Real time atomization of agricultural environment for social modernization of Indian agricultural system” using ARM7 and GSM’ is focused on automizing the the irrigation system for social walfare of Indian agricultural system and also to provide adequate irrigation in particular area. The set up consists of ARM7TDMI core, which is a 32- bit microprocessor, GSM serves as an important part as it is responsible for controlling the irrigation on field and sends them to the receiver through coded signals. GSM operates through SMSes and is the link between ARM processor and centralized unit. ARM7TDMI is an advanced version of microprocessors and forms the heart of the system. Our project aims to implement the basic application of automizing the irrigation field by programming the components and building the necessary hardware. This project is used to find the exact field condition. GSM is used to inform the user about the exact field condition. The information is given on user request in form of SMS. ng. GSM modem can be controlled by standard set of AT (Attention) commands. These commands can be used to control majority of the functions of GSM modem.

52. Research and Development of the Remote I/O Data Acquisition System Based on Embedded ARM Platform

Abstract—

With the rapid development of the field of industrial process control and the fast popularization of embedded ARM processor, it has been a trend that ARM processor can substitute the single-chip to realize data acquisition and control. A new kind of remote I/O data acquisition system based on embedded ARM platform has been researched and developed in this paper, whose hardware platform use 32-bit embedded ARM microprocessor, and software platform use the uC/OS-II core of real-time multitask operating system which is open-source and can be grafted, cut out and solidified. This system can measure all kinds of electrical and thermal parameters such as voltage, current, thermocouple, RTD, and so on. The measured data can be displayed on LCD of the system, and at the same time can be transmitted through RS485 or Ethernet network to remote DAS or DCS monitoring system by using Modbus/RTU or Modbus/TCP protocol. The system has the dual redundant network and long-distance communication function, which can ensure the disturb rejection capability and reliability of the communication network.

53. Self-Sustaining Control of Two-Wheel Mobile Manipulator using Sliding Mode Control

Abstract—

Two wheel mobile manipulator has the potential to become multi-skilled robot in the field of robotics engineering and it is already implemented by using inverted pendulum control. Centre of gravity position is controlled to achieve the balancing of robot. Due to the unbalanced nature and the nonholonomic property of the two-wheel mobile manipulator, balancing is challenging task. On the other hand sliding mode control is a good candidate to address the nonlinear/under actuated system. This paper presents the control methods for balancing of two-wheel mobile manipulator. This paper proposes a novel second order sliding mode controller using twisting algorithm, disturbance observer and dynamics of double inverted pendulum. Dynamics of double inverted pendulum is used to design the control equation of sliding mode controller. Twisting algorithm is used to design the control input. Disturbance observer is compensated model uncertainties and external disturbances. Posture of two wheel mobile manipulator can successfully stabilized by this novel controller

54. ZigBee-based Vehicle Access Control System

Abstract—

Vehicle access control system is an important sub-system of the intelligentized residence section. Today, in a growing emphasis on personal and property safety, the control of vehicles' access authorization and the management of the vehicles' access authority, access time and access method via computer, is safe and convenient. This paper describes a set of vehicle access control system based on ZigBee wireless technology. In this system, ZigBee coordinator and its terminal nodes installed respectively in the entrance of the district and the vehicles, together form a ZigBee wireless sensor network. This paper mainly introduces the overall structure, hardware platform and software design of this system. The implementation and performance tests of this system are fairly good.