

WIRELESS OSCILLOSCOPE USING ZIGBEE MODULE IN MATLAB

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Abstract:- Portable Digital Signal Oscilloscopes currently in the market are very expensive, less power efficient and have small low resolve shows. In this plan we are offering the novel project and execution of a low price, portable, light-weight; low control, dual-channel Digital Pointer oscilloscope, containing of a hardware expedient and a software application. The device is prepared with a Zigbee module to provide connectivity to a device with PC, running the on Laptop OS, in direction to display the waveforms. Oscilloscope's software application can be developed in Matlab. The hardware expedient includes circuitry to capture the idea voltage signals and an embedded zigbee module for transmitting the captured signal information to laptop for displaying the waveform. The Software request advanced in Matlab obtains the information conveyed after the hardware device and plans the waveform according to the display settings configured by the user. These display configurations are conveyed to the hardware device once they are set by the user, and are used by the hardware device to set the selection rate and the values of samples. For best use of the obtainable bandwidth, the application offers two styles of process, specifically single station mode anywhere only station 1 is working and double channel mode wherever both stations 1 and 2 are operational. The operator can choice a style from the request, which in turn directs a communication to the microcontroller which then variations the sample frequency accordingly: a higher sampling rate for single channel and half of that for dual channel. It is also possible to provide features like mathematical operation on signals like FFT, addition, subtraction, multiplication, PSD calculation etc. it is also possible to store acquired analog signal.

Index Terms— FFT, addition, subtraction, multiplication, PSD calculation.

I. Introduction

Rationale and Motivation behind the Project Anybody who has ever used a CRO or a DSO has faced the following problems: Slightly tricky operation and control, the bulkiness of the device makes it difficult to use, isolation between the two channels is not provided this helped us come up with the idea of Wireless DSO modules. Being PC based, the usage is very simple and handy. Being light and wireless, the DSO modules are portable. Being wireless, an operator can monitor multiple distant signals and compare them just sitting at his work station in almost real-time. Since these DSO modules provide isolation between two channels, we can measure and compare independent signals. The RF link also provides isolation between the PC and the modules. Oscilloscope is a kind of electronic examination tool that allows observation of continuously variable signal voltages, usually as a flat conspiracy of one or additional signs as a purpose of time. Oscilloscopes are used to detect the alteration of an electrical signal over time, such that voltage and time label a figure which is unceasingly graphed against a calibrated scale. The observed waveform can be analyzed for such properties as amplitude, frequency, rise time, time interval,

distortion and others. Oscilloscopes are used in the sciences, medicine, engineering, and telecommunications industry. General-purpose instruments are used for upkeep of electric equipment and laboratory work. In this project we are offering the new design and implementation of a Digital Signal oscilloscope, consisting of a hardware device and a software application low cost, portable, light-weight; low power, dual-channel.

II. Literature Survey

Due to the pending of the digital age as a result of the increasing convenience of the Internet and wireless data transmission networks, local area measurement systems are slowly being extended to wide area dimension systems. In this paper, we suggest a design and application of a wireless remote measurement system, which is an adding of a client-server remote Windows-based signal generator, a digital storage oscilloscope, and a transmission channel of an Internet and wireless network. The new results display that the broadcast rate of the remote measurement system can reach 1.2 K samples per second that can aim some dine delay in the whole system operation. However, due to the batching skimming mechanism in the waveform rebuilding, the overall bandwidth limitation of the measurement system is limited by the physiognomies of the interface circuits. The primary consequences from the test tour slow by a local oscilloscope and our new scheme agree with each other. In the literature survey we found that Oscilloscope is very important testing instrument in field research Portable Digital Signal Oscilloscopes currently in the market are having following drawbacks: -very expensive -less power efficient -have small low resolve displays. -Bulky The transmitter circuit uses Microchip's dsPIC33FJ16GS504 for the analog-to-digital change of the input signals on two stations. The treated data on the dsPIC are then conveyed to the phone (for waveform display) via the LMX9838 bluetooth SPP module.

Bluewave DCE User Guide:-

This paper describes the design and implementation of an extended distributed object-oriented environment, DCE++, on top of DCE. The design goal was to overcome some observed shortcomings of DCE namely that is only well-suited for client-server applications. Opposed to DCE DCE++ supports a uniform object model, location independent invocation of fine-grained objects, remote reference parameter passing, dynamic migration of objects between nodes, and C++ language integration. Moreover, the implementation is fully integrated with DCE, using DCE UUIDs for object identification, DCE threads for interobject concurrency, DCE RPC for remote object invocation, and the DCE Cell Directory Service (CDS) for optional retrieval of objects by name. An additional stub compiler enables automatic generation of C++-based object communication interfaces. Low-level parameter encoding is done by DCE RPC's stub generation facility using the C-based DCE interface definition language (IDL). The system has been fully implemented and tested by implementing an office application. Experiences with the existing system and performance results are also reported in the paper.

Radiated immunity requirement for equipment operational during high-voltage network switching operations:-

It is well known that EMI arises from any operation that interrupts or changes an electrical current. During switching operations in substations, very fast, high field transients occur which can adversely affect, whether by radiated or conducted interference, the electronic equipment in equipment rooms unless it is adequately protected. The environment in which this equipment is installed therefore needs to be fully characterised in terms of electromagnetic interference levels. With this knowledge it is possible to provide adequate immunity for electronic equipment, and design efficient, effective and reliable protection, control and monitoring systems. The paper identifies two areas where the IEC 61000-4-10 Standard appears to be deficient. These are the required test frequencies of 10 kHz and 10 MHz, and testing at these frequencies are recommended at repetition rate as determined by the formula given in the Standard

Fast transient radiated & conducted electromagnetic interference measurement within power system substations

Radiated and conducted interference is a major concern in modern power systems as increasingly, control is being performed by highly susceptible electronic circuitry. It is therefore necessary to characterise this interference in order to guard against it. There are a number of methods of achieving this, and this paper looks at the method which has been developed and used by the University of Strathclyde in conjunction with work sponsored by Scottish Power plc and The National Grid Company plc. The measurement system consists of two parts, a radiated interference system and a conducted interference system. These two parts can be used independently or can be linked by a common trigger system to allow both sets of measurements to be referenced to a specific point in time. A number of sensors and probes are used to enable coincidental measurements at various points over a large range of frequencies, field levels, voltages and currents

The measurement of fast transient electromagnetic interference within power system substations:-

Gas-insulated substations (GIS), owing to their compact nature, offer an attractive alternative to conventional substations in areas where space is limited such as in urban areas. Consequently, it is important to address the issue of environmental conditions within the substation and in the surrounding areas. This paper reports the results of radio interference (RI) and transient field measurements at two GIS in Ontario, Canada. For comparison with RI levels taken at the GIS, RI levels outside two hospitals in the Toronto area were also measured. The transient field study covers electromagnetic interference (EMI) levels generated during switching operations, and includes measurements inside and outside the GIS. Measurements show that RI levels from the GIS were either below background levels, or contributed little to the background. RI levels outside the GIS and the hospitals were similar. Peak transient field values up to 580 V/m were measured inside the station building, and dropped to background values of 10 V/m at about 120 m from the station. The transient field (E) dropped off at a rate of 3/2 power with distance (d) from the air-insulated 115 kV bus, i.e. $E \propto d^{-1.5}$

Bluetooth Socket:-

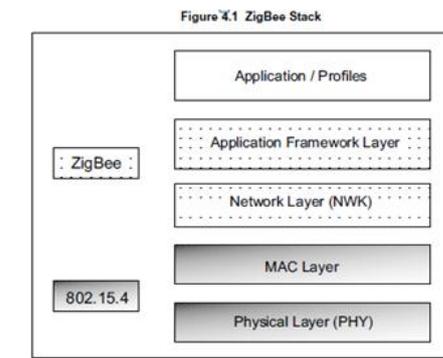
In industrial robotic environments, there are many different robots performing a variety of tasks. Each robot is controlled by its own teach pendant or via a networked socket application. However, to monitor the status or make minor changes to the programming of the robot, the user must obtain access to the teach pendant or terminal. In an effort to eliminate this need, this paper introduces an android platform that communicates with robots over a Bluetooth connection.

III. Block Diagram Description

Analog signal gaining
Converting analog signal into Digital
Transmitting data on zigbee module through zigbee module.
Receiving digital data via other zigbee module.
Transmitting that data to PC through microcontroller and serial to usb converter.
Acquisition of digital data in Matlab.
Performing following operation on signal in Matlab GUI
Time per division setting
Volt per division setting
Channel Selection
Arithmetic Operations
Addition, deduction, multiplication etc
FFT transformation
PSD plotting.
Signal Storage facility.

A. Zigbee:-

The zigbee communiqué is a communication technology to connect local wireless nodes and provides high firmness and transfer rate due to data communiqué with low power. In the nodes away from coordinator in one PAN, the signal strength is weak causing the net a lack of low performance and incompetent use of capitals due to transferring delay and increasing delay time and thus cannot conduct seamless communication. This study suggests the grouping makes it possible to perform wide range information moving depending on the bulge signal strength in zigbee node and analyzes the suggested algorithm through simulation. Based on IEEE 802.15.4 Low Rate-Wireless Individual Area Network (LR-WPAN) standard, the Zigbee standard has been future to intersect humble, low rate and battery powered wireless devices.



The de-ployment of Zigbee networks is expected to facilitate many requests such as Home-appliance net-works, home healthcare, medicinal monitoring and environmental sensors. An real direction-finding scheme is more imperative for Zigbee mesh networks. In order to achieve effective routing in Zigbee Net networks, a Zigbee procedure module is realized by NS-2. In order to solve this problem, an Improved Tree Routing Procedure is presented using ZigBee network. This procedure can find the shortest path by computing the direction-finding cost for all of router that stored in neighbor table, and transmit the packet to the national router that can reduce the hop total of transmission. The greater tree routing algorithm can achieve more stable and better efficiency then the preceding traditional tree direction-finding algorithm. Matlab software request of wireless DSO method, that a more complicated protocol between channels.

V. Result

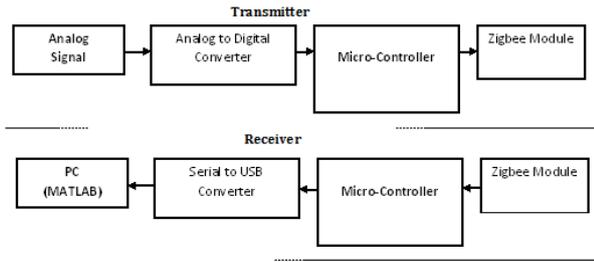


Fig1. Hardware unit of Wireless DSO

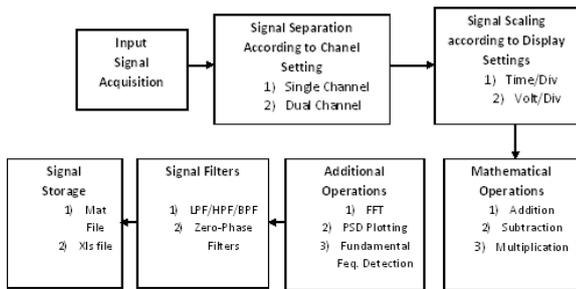


Fig: Matlab software application of wireless DSO

IV. Algorithm:-

- Start
- Analog signal acquisition
- Converting analog signal into Digital
- Transmitting data on zigbee module through zigbee module.
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- Receiving digital data via other zigbee module.
- Transmitting that data to PC through microcontroller and serial to usb converter
- Acquisition of digital data in Matlab.
- Performing following operation on signal in Matlab GUI
- Time per division setting
- Volt per division setting
- Channel Selection
- Arithmetic Operations
- Addition, subtraction, multiplication etc
- FFT transformation
- PSD plotting.
- Signal Storage facility.

The operation of the device was tested by providing test signals from the signal generator and ac voltages from the ac power supply. Both modes of operation of the device were tested with different voltages and frequencies applied to the channels. Fig.shows screen shot of the displaying the waveforms of various test conditions

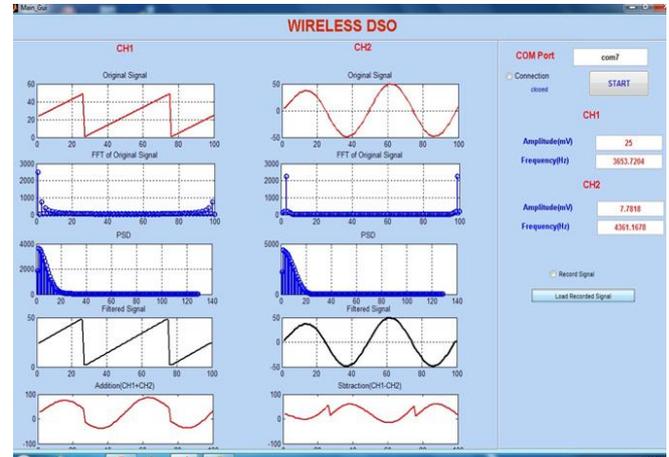


Fig shows the main GUI of wireless DSO

AS shown in fig channel 1 shows the triangular wave and channel 2 shows the sine wave.after that the waveform shows the operations on the sine and triangular wave are FFT,PSD,Filtering addition and subtraction of the channel 1 & channel 2.

VI. Conclusion

Here we are implementing wireless DSO using zigbee module in matlab in which a commercial DSO has many more functionalities such as autoset, cursor for accurate measurement, spectral analysis mode, automatic measurements etc. These can be implemented by further processing the signal obtained. Bandwidth can be increased by using faster ADCs, processors and wireless links. More sophisticated interpolation techniques can be used for plotting the signal waveforms. The number of channels can be increased by implementing. We are implementing in this project additional operations like FFT, Filtering

VII. REFERENCES

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