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Industrial Based Gui Monitoring and Control System

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Abstract
The advancement of science and technology made as increase the facilitates of the human life to be sophistication in our day to day life. The Graphical User Interface (GUI) based systems are becoming accepted by the users to interact with electronics environment through graphical icons and visual indicators. In the industries GUI based systems are really essential to monitor and control the surroundings with a central supervisor. In this paper a GUI based system is described which can sense and monitor multiple number of sensors and also can be used to run number of machines and also has the ability to control a motor belt. These implemented control systems can be used in the medicine, beverage, chemical production and packing industries.

Keywords
Serial Communication, Baud rate; Flow code, PWM

I. Introduction

The concept of Human Computer Interaction brought out the idea of Graphical User Interface. Now it is in such a stage that in our every spares of daily life we are expecting some graphical windows which will make our life easier. GUI's are used in the applications like home security power managements and in laboratory instruments Some GUIs are also developed for the blind or visually impaired human class. There have been several popular graphical software applications in the market like Visual Basic, C#, Java applets, Adobe Flash CS4 etc; that integrate graphical user interface and programming scripting functions all-in-one for interface designer and software developer to work seamlessly for a software development work.

Universal Serial Bus is an input/output port standard for computers and digital equipments that allows easy transfer of data at high speeds via a direct connection or cable and can be interfaced with microcontrollers straightforwardly. It is intended is a high speed upward extensible fully standardized plug and play interface between one computing device using a single port and number of peripherals using one port each with all control being accomplished by signals within the data stream.

In this paper a complete industrial GUI system is proposed where GUI is developed using visual basic and the control system is interfaced with the computer using USB serial communication protocol.ARM processor is used here as the communication bridge between the computer bridge between the computer and exterior devices.

II. Methodology

A. Design and Implementation of GUI System

The developed system is divided into two parts .one is the GUI system for monitoring and controlling and another part is microcontroller hardware interfacing and implementation..The central controller of system ARM processor is interfaced with a computer through USB .One temperature and humidity sensor is connected with the arm processor along with a dc motor and industrial Machines. The overall supervision is done by visual basic based GUI which is Capable of sensing temperature and humidity, controls three machines or Devices and also can run a DC motor.

B. Implementation Of Interfacing USB

The universal serial bus (USB) is a well admired method to communicate between a peripheral and a computer. USB is a plug and play type interface which can also provide power to the USB devices by only this means that the computer does not plug in or unplug device from the computer. The goal Of the USB is to broaden the range of external peripherals that can be used on a computer.

The USB serial device is used to stream data between the microcontroller System and a pc. This method of USB is good for transferring both small and large amounts of data in an Adcock or as required manner USB serial". The Flow code USB serial component creates a virtual com port on the pc which is connected to which enables easy software access to the device data streams. Every USB device must have a unique set of PID (product ID) and VID(vendor ID) codes for this device the VID is 0X12bf and PID is 0x12bf and PID is 0xf010 Here the USB communication is done with a standard –B type Plug in connector

C. The GUI Controller and Peripherals design

The project Graphical user interface (GUI) is developed using visual basic has a default serial communication prototype. Designer only has to configure that according to required serial device. The whole GUI panel is divided in to four sections. The first section is designed to connect the GUI with the USB or disconnect. The Baud rate is fixed to 9600 bps in code. The user only has to select the com port where device is connected. In sensor panel temperature and humidity is shown. The sensor data is received as a string value. For categorizing and recognising different sensor values an initial identifying different sensor values an initial identifying character is received for corresponding sensor. The number of sensors can be imposed in the GUI.

In control panel three on and off switches are given to control three machines. The string value is send to the microcontroller to control a particular pin for switching operation. The motor panel is also implemented to control the forward and reverse rotation and also a stop button is there to stop the Motor instantly and speed control slide bar is also included. The GUI can be used in chemical and medicine production industries.

AS a central controller Arm 7 processor is used in this project . 16-bit/32-bit and10-bit DAC ARM with USB interfacing module. The USB interfacing is done by a type B connector. For temperature sensingDS18B20 is used in this project.DS18B20 is a single bus intelligent temperature Sensor which can generate serial output the temperature range of -55-125 cDS18B20 can be used in parasite power mode where the communication With master and power taking both are done the 1-wire bus one wire..One Wire communication can be established with any i/o or analogy

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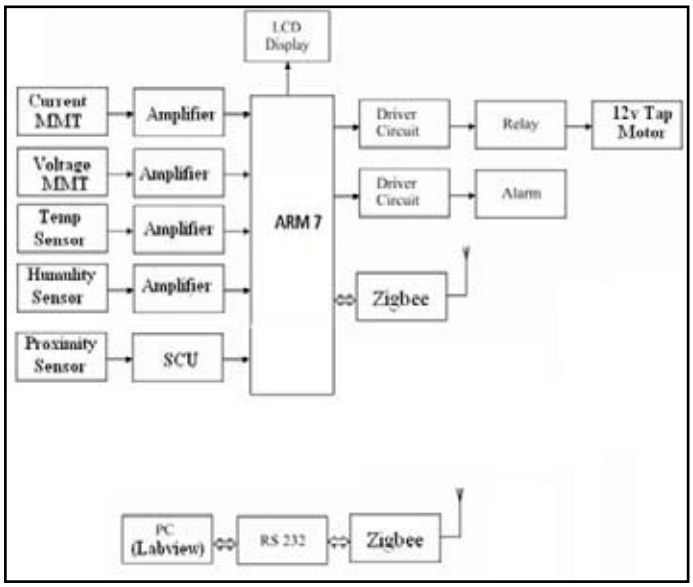
pin of microcontroller .For humidity measurement HDK series humidity sensor is used. IT is a linear humidity sensor we can control different high power machine or device through the microcontroller output by using relay and power machine or device through the microcontroller output by using relay and Optocoupler in between the relay and microcontroller. Optocoupler is used to isolate the microcontroller optically for its safety from any kind of disaster. For motor speed controlling pulse width modulation of microcontroller is used Arm 7 has two built in pwm channels. So both the channels are used for speed controlling and direction controlling along with a motor driver. High power motors also can be driven by using MOSFET driver circuits. Through optocoupler are used to keep the microcontroller safe from the back EMF of the relay. This project is tested on a board which was developed for advanced level project testing. This board includes many advanced level project testing. This board includes many advanced features like FAT, external EEPROM,stepper motor, real time clock, ultrasound sensor etc.For testing this project the USB type B port, sensors(DS18B20 and HDK humidity) are used.

III. Block Diagram.



A. Current Transformer

A current transformer (CT) is a measurement device designed to provide a current in its secondary coil proportional to the current flowing in its primary. Current transformers are commonly used in metering and protective relaying in the electrical power industry where they facilitate the safe measurement of large currents, often in the presence of high voltages. The current transformer safely isolates measurement and control circuitry from the high voltages typically present on the circuit being measured.

B. Voltage Transformer

The working principle of potential transformer is the same as of other transformers. It transforms voltages from high to low. A potential transformer functions for single and three phase technique and is attached at a position where it is suitable to measure the voltage. Voltage transformers (VT) or potential transformers (PT) are another type of instrument transformer, used for metering and protection in high-voltage circuits. They are designed to present negligible load to the supply being measured and to have a precise voltage ratio to accurately step down high voltages so that metering and protective relay equipment can be operated at a lower potential.

C. Temperature Sensor

Temperature is the most common of all physical measurements. We have temperature measurement-and-control units, called thermostats, in our home heating systems, refrigerators, air conditioners, and ovens. Temperature sensors are used on circuit boards, as part of thermal tests, in industrial controls, and in room controls such as in calibration labs and data canters. A thermostat is a type of resistor whose resistance varies with temperature.. Thermostats are widely used as inrush current limiters, temperature sensors, self-resetting over current protectors, and self-regulating heating elements.

D. Humidity Sensor

A humidity sensor also called a hygrometer, measures and regularly reports the relative humidity in the air. .The humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature.

E. Amplifier

An electronic amplifier is a device for increasing the power of a signal. It does this by taking energy from a power supply and controlling the output to match the input signal shape but with larger amplitude. In this sense, an amplifier may be considered as modulating the output of the power supply. Negative Feedback is the process of "feeding back" some of the output signal back to the input, but to make the feedback negative we must feed it back to the "Negative input" terminal using an external Feedback Resistor called Rf. This feedback connection between the output and the inverting input terminal produces a closed loop circuit to the amplifier resulting in the gain of the amplifier now being called its **Closed-loop Gain**

F. Precision rectifier

The precision rectifier, also known as a super diode, is a configuration obtained with an operational amplifier in order to have a circuit behave like an ideal diode and rectifier. It is useful for high-precision signal processing

G. Driver Circuit

In electronics, a driver is an electrical circuit or other electronic component used to control another circuit or other component, such as a high-power transistor. The term is used, for example, for a specialized computer chip that controls the high-power transistors in AC-to-DC voltage converters. An amplifier can also be considered the driver for loudspeakers, or a constant voltage circuit that keeps an attached component operating within a broad range of input voltages

H. Motor

A **motor** is nothing but an electro-mechanical device that converts electrical energy to mechanical energy. An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse conversion of mechanical energy into electrical energy is done by an electric generator. Fleming's left

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hand rule says r, middle finger and thumb of our left hand in such a way that the current carrying conductor is placed in a magnetic field perpendicular to the direction of current then the conductor experiences a force in the direction mutually perpendicular to both the direction of field and the current in the conductor.

I. Relay

The relay is a protective part of the power system. It helps to minimise damage of equipment and improve the service. The protective relaying is used to give an alarm or to cause prompt removal of any element of power system from service when the element behaves abnormally.

J. Zigbee senor

ZigBee is a wireless networking standard that is aimed at remote control and sensor applications which is suitable for operation in harsh radio environments and in isolated locations. The mission of the ZigBee Working Group is to bring about the existence of a broad range of interoperable consumer devices by establishing open industry specifications for unlicensed, untethered peripheral, control and entertainments devices requiring the lowest cost and lowest power consumption communications between compliant devices anywhere in and around the home

K. Arm 7 processor

It has16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package. and 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory.128-bit wide interface/ accelerator enables high-speed 60 MHz operation In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms. Embedded ICERT and Embedded Trace interfaces offer real-time debugging with the on-chip Real Monitor software and high-speed tracing of instruction execution. USB 2.0 Full-speed compliant device controller with 2 kB of endpoint RAM. In addition, the LPC2146/48 provides 8 kB of on-chip RAM accessible to USB by DMA. One or two (LPC2141/42 vs. LPC2144/46/48) 10-bit ADCs provide a total of 6/14analog inputs, with conversion times as low as 2.44 µs per channel. Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only).Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.

IV Result and Discussion

Flow code is a high level programming language dedicated to simplifying complex functionality with advanced level simulation environment. the simulation window for this project. Here USB serial communication module, I-wire communication module one knob for ADC ,two PWM channels and for output representation five LEDs are added in the simulation panel. Arm 7 is the central controller along with the USB type Connectors interfaced with it in RC4 and RC5 pin. The I-wire temperature sensor is connected into the R 1 although it is an analog pin, here it is used as digital i/o pin and the humidity sensor is connected in analogy pin ANI or RAl. Motor driver IC L293D is connected in the RC1 and RC2 which are the PWM pins of this us. Again from RBO, RB 1 and RB2 three relays are controlled through optocoupler.

V. Conclusion

The system is designed for high precision industrial works. The controller uses USB communication for PC based control over the speed of the motor and also monitoring for different sensing parameters. The developed system can be used in different industrial machines and also any number of machines can be maintained. lab view based GUI provides the opportunity to build the installation file and to use in any Pc. The plug and play makes the USB to interface and use easy. The overall system is low cost and beneficial for any industry use.

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