INTERNATIONAL JOURNAL OF RESEARCH
In Advanced Engineering Technologies

Volume 4, Issue 2 JULY 2015

MYOELECTRIC INTERFACES BASED ASSISTIVE ROBOT FOR HUMAN COLLABORATIVE WORK

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Abstract: This paper describes a new approach for a course and laboratory designed to allow students to develop low-cost prototypes of robotic and other embedded devices that feature Internet connectivity, I/O, networking, a real-time operating system (RTOS), and object-oriented C/C++. The application programming interface (API) libraries provided permit students to work at a higher level of abstraction. A low-cost 32-bit SOC RISC microcontroller module with flash memory, numerous I/O interfaces, and on-chip networking hardware is used to build prototypes. A cloud-based C/C++ compiler is used for software development. All student files are stored on a server, and any Web

browser can be used for software development. Breadboards are used in laboratory projects to rapidly build prototypes of robots and embedded devices using the microcontroller, networking, and other I/O subsystems on small breakout boards. The commercial breakout boards used provide a large assortment of modern sensors, drivers, display ICs, and external I/O connectors. Resources provided include eBooks, laboratory assignments, and extensive Wiki pages with schematics and sample microcontroller application code for each breakout board.

Microcontroller with its associated circuitry like Crystal with

Key words:

Mems, Zigbee, Rfid, Motors, Ethernet, Pc

II. Introduction

Forecasters have predicted that the robotics industry will undergo exponential growth [1], becoming a $66 billion industry worldwide by 2025 as a result of the rapid advances in the enabling technologies, which include computer hardware, artificial intelligence (AI), vision, energy storage, actuators, and sensors. For many robotics applications, networking is now critical. Over half of the new devices announced at the 2012 Consumer Electronics Show (CES) featured Internet connectivity. It is estimated that there are currently 9 billion connected devices, and that there will be 24 billion connected embedded devices by 2020 . Embedded devices already accounted for over 98% of the world's processors in 2003 .A course dedicated to embedded systems design is typically found at the junior or senior level in Electrical Engineering (EE)

III. The Hardware System

Micro controller: This section forms the control unit of the whole project. This section basically consists of a

capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

I. Design of Proposed Hardware System

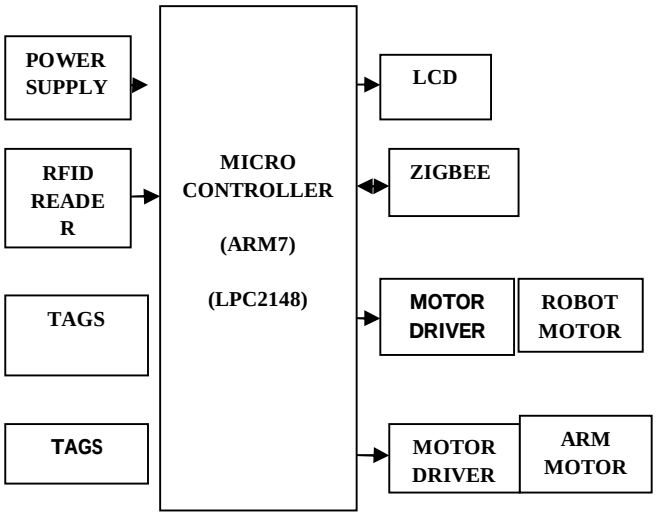

Fig.1.Block diagram

With the advancement of technology, we can overcome above drawbacks we are going this proposed method. In this method we are going to maintain a library using my controller based system. Here in this system we will be using touch panel to operate my robot section like move front, back, left, right and placing wireless camera on the robot section. It will capture the images of books in shelf and send data to receiver section. Then we can monitor the captured images using software and we will be using here MEMS technology to pick and place the objects like books and we are maintain the information in memory. They maintain records for giving books and taking books from the users. This leads time consuming, wastage paper books and also maintaining of more workers that means cost is increased. These are the drawbacks of above system.

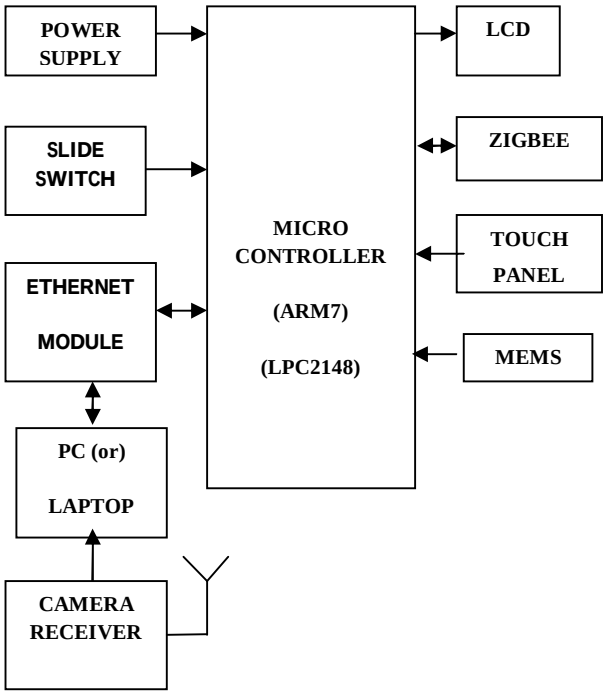

Fig.2.Block diagram

I. Board Hardware Resources Features

Ethernet

Networking is playing vital role in current IT era where data distribution and access is critically important. As the use of communication between two or more entities increases the networking technologies need to be improved and refurbished over time. Similarly the transmission media, the heart of a network, has been changed with the time improving on the previous one. If you know a little bit about networking you surely have heard the term Ethernet which is currently the dominant network technology. Wide spread of the Ethernet technology made most of the offices, universities and buildings use the technology for establishment of local area networks (LANs).

To understand what actually Ethernet is, we need to know about IEEE first which is a short of Institute of Electrical and Electronics Engineers. IEEE is a part of International Organization for Standardization (ISO) whose standard IEEE 802.3 is defined for Local Area Network. The standard 802.3 commonly known as ETHERNT defines the communication standards for how data is transferred from one network device to another in a local area network.

Since the limit for Ethernet cable is few hundred meters manufacturers for use in desktop and notebook PCs and also Ethernet is commonly deployed for networks lying in a single building to connect devices with close proximity. The same standard for Ethernet enables manufactures from around the earth to manufacture Ethernet products in accordance with the ISO standards that are feasible for all computing devices worldwide.

Zigbee

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this ase is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The below table gives the pin description of transceiver. The X-Bee RF Modules interface to a host device through a logic-level asynchronous Serial port. Through its serial port, the module can communicate with any logic and voltage Compatible UART; or through a level translator to any serial device.

Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.

PC

Keyboards on an OEM basis to leading global PC

supplies for retail keyboard OEMs.

Features:

- Internal Sourcing of almost all of main Parts

Almost all components - frame, key switches and membrane sheet - other than connecters and cord are manufactured in-house, giving Minebea an un-matched advantage in terms of quality, supply capabilities, cost-competitiveness and speed of delivery.

Especially, these products capitalize on Minebea's ultra-precision machining technology of components.

- Efficient Production System

Plant in China which supplys the global market employs the Minebea's vertically integrated manufacturing system, whereby all process, from machining components to final assembly are conducted in-house.

Rfid:

Many types of RFID exist, but at the highest level, we can divide RFID devices into two classes:active and passive.

Active Tag Passive Tag

Active tags require a power source i.e., they are either connected to a powered infrastructure or use energy stored in an integrated battery. In the latter case, a tag's lifetime is limited by the stored energy, balanced against the number of read operations the device must undergo. However, batteries fabrication technology enables fabrication of large arrays of make the cost, size, and lifetime of active tags impractical for the retail trade.

Passive RFID is of interest because the tags don't require batteries or maintenance. The tags also have an indefinite operational life and are small enough to fit into a practical adhesive label. A passive tag consists of three parts: an antenna, a semiconductor chip attached to the antenna and some form of encapsulation. The tag reader is responsible for powering and communicating with a tag. The tag antenna captures energy and transfers the tag's ID (the tag's chip coordinates this process). The encapsulation maintains the tag's integrity and protects the antenna and chip from environmental conditions or reagents.

Mems

Micro electro mechanical systems (MEMS) are small integrated devices or systems that combine electrical and mechanical components. Their size range from the sub micrometer (or sub micron) level to the millimeter level and there can be any number, from a few to millions, in a particular system. MEMS extend the fabrication techniques developed for the integrated circuit industry to add mechanical elements such as beams, gears, diaphragms, and springs to devices.Examples of MEMS device applications include inkjet-printer cartridges, accelerometers, miniature robots, microengines, locks, inertial sensors, micro transmissions, micromirrors, micro actuators, optical scanners, fluid pumps, transducers and chemical, pressure and flow sensors. Many new applications are emerging as the existing technology is applied to the miniaturization and integration of conventional devices.

These systems can sense, control and activate mechanical processes on the micro scale and function individually or in arrays to generate effects on the macro scale. The micro

devices, which individually perform simple tasks, but in combination can accomplish complicated functions.

MEMS are not about any one application or device, or they are not defined by a single fabrication process or limited to a few materials. They are a fabrication approach that conveys the advantages of miniaturization, multiple components and microelectronics to the design and construction of integrated electromechanical systems. MEMS are not only about miniaturization of mechanical systems but they are also a new pattern for designing mechanical devices and systems.

I. CONCLUSION

The Wiki proved to be extremely useful in providing documentation and code examples for laboratory experiments. Students felt comfortable with this approach, and it worked well to disseminate the information needed for both traditional laboratory experiments and student design projects. Using the cloud compiler for software development was easier for students and required less support effort than the traditional approach of using tools that run locally. No computer support was required other than initially handing out student passwords, enabling network access for the bed modules,and installing the virtual com port driver.

Availability of the cloud-based compiler and server has been excellent, but schools with extremely slow and unreliable Internet connections would probably want to use one of the offline compilation options. Initially, the virtual com port driver used for serial communication from mbed to the PC with C/C++ stdio functions such as printf(), locked to each individual device's serial number. When students moved the module to a different computer, the driver had to be reinstalled. A recent registry change can now fix this problem.

Breakpoints are not currently supported for debugging in the cloud compiler; this triggered some initial concerns. The majority of student problems were actually a result of errors in wiring up breadboards rather than coding errors. It is also now possible to compile, set breakpoints, and debug code via the USB cable using ARM's Keil Tools traditional offline compiler or by using software emulation. Using bread boarding, a wide range of interesting robots and embedded devices were successfully prototyped for the design projects. The low-cost robot kits were popular with students, and a large majority of the projects used the Internet or wireless networking. Students need to select a design project idea early in the term to allow ample time for any custom parts to arrive. Supporting diverse design projects also requires a larger assortment of robots and breakout boards. Fortunately, all of the robots and breakout boards can be reused. Coverage of RTOS topics and the new debugging tools is being expanded this term. Currently, the embedded module is being incorporated earlier in the ECE curriculum for several in-class active learning demonstrations.

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