Rtos Based Automatic Scheduling For Military Application

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Abstract - This paper is an RTOS based architecture designed for the purpose of metal detection. The main objective of the RTOS is to manage the allocation of the resources to users in an orderly and controlled manner. Here, scheduling is the one which is used to avoid the delay between one application with another. We are using in the mobile communication to receive the condition of the border level. Using mobile communication we are giving the indication to the monitoring section. The RTOS based automatic scheduling is done all applications at a time without any time delay.

Keywords: ROBOTICS, RTOS, GSM, ARM.

I. INTRODUCTION
RTOS is a Process which will be done between hardware and application. The job of the RTOS is to manage the allocation of the resources to users in an orderly and controlled manner. This sensor node is composed of a micro-processors, transceivers, displays and analog to digital converters. Sensor nodes are deployed for military process monitoring and control. The basic view of this technique is to reduce the damages to the human and gives the information about mine in the border section. If the light intensity is reduced means based on the sensor the lighting system will on condition. Any sound will come due to mine explored it will detect by the sensor and through mobile communication it will send information to military section. The project deals with the data receiving from sensor nodes without any delay. The data receiving time is increased with the mobile communication.

II. DESIGN AND IMPLEMENTATION

The figure shows the block diagram of proposed system. It mainly deals with the interfacing of different IO devices and operating them by using RTOS concept.
The ARM7 is a family of processors TDMI, TDMI-S, 720T and EJ-S processors. The ARM7TDMI architecture core is the enterprise’s mainly used 32-bit embedded RISC microprocessor. Optimized for price and power-sensitive functions, the ARM7TDMI answer presents the low energy consumption, small dimension, and excessive efficiency needed in portable, embedded functions. The ARM7TDMI-S architecture is the synthesizable variant of the ARM7TDMI architecture, existing in both the languages VERILOG and VHDL, able for compilation into tactics supported by in-condominium or commercially available synthesis libraries.

- Operating techniques reminiscent of Linux, SYMBIAN OS, palm OS and windows CE.
- Additional with 40 real-time running programs, together with Qnx, win driver’s Vx works and mentor graphics

LPC2148 microcontroller is based on a 16-bit or 32-bit TDMI-S central processor with real-time emulation and embedded trace help that combine microcontrollers with embedded excessive-velocity flash memory ranging between 32kB-512kB. A 128-bit vast memory interface and particular accelerator structural design allow 32-bit code execution at the highest clock fee. The means of LPC is Low power Low cost microcontroller [2]. That is 32 bit microcontroller manufactured by way of Philips semiconductors (NXP). Due to their small size and little power utilization, LPC2148 is ideal for applications the place miniaturization is key.
Metal detecting sensor will detect metal objects up to 7cm. If it detects any metal then it will give active low output with LED indication and buzzer ON. The heart of this sensor is the inductive oscillator circuit which monitors high frequency current loss in coil. The circuit is designed for any metallic body detection by detecting the variations in the high frequency Eddy current losses. With an external tuned circuit they act as oscillators. Output signal level is altered by an approaching metallic object. Output signal is determined by supply current changes. Independent of supply voltage, this current is high or low according to the presence or the absence of a close metallic object. If the metal object is near by the searching coil, the output current will flow more. in contrast, the current will be decrease when the object is far from the searching coil.
Specifications

- Detection range variable up to 7 cm.
- Operation range vary according to size of the metallic object.
- Power Supply: 5V DC Power
  Consumption: 50mA max.
- Detection Indicator LED and Buzzer.
- Digital output. Active with logic “0”.
- Dimensions: 52x71 mm.
- Full SMD design.

If the metal detecting sensor will detect the metals. Then it will send the alert message using GSM module. GSM is a digital mobile phone system that's greatly utilize in many elements of the sector. GSM uses a variation of Time Division Multiple access (TDMA) and is probably the most broadly used of the three digital Wi-Fi telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of consumer knowledge, each and every in it’s possess time slot. GSM operates within the 900MHz, 1800MHz, or 1900 MHz frequency bands. GSM provides suggestions, not requirements. The GSM [3] specifications outline the capabilities and interface standards in detail however do not tackle the hardware. The cause for that is to limit the designers as little as possible but still to make it viable for the operators to purchase gear from distinct suppliers. The GSM community is split into three essential systems: the switching procedure (SS), the base station procedure (BSS), and the operation and aid process (OSS). The basic GSM network factors are shown in below figure.

![Fig 4: Block diagram of GSM community elements](image_url)
GSM MODEM

A GSM modem is a Wi-Fi modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The predominant change between them is that a dial-up modem sends and receives information through a constant mobile phone line even as a wireless modem sends and receives data by way of radio waves.

A GSM modem will also be an external gadget or a laptop Card / PCMCIA Card. In general, an outside GSM modem is attached to a laptop via a serial cable or a USB cable. A GSM modem within the type of a laptop Card / PCMCIA Card is designed for use with a laptop computer. It must be inserted into one of the computer Card / PCMCIA Card slots of a computer laptop. Like a GSM cellular phone, a GSM modem requires a SIM card from a wireless carrier to be able to operate.

In addition to the common AT commands, GSM modems support a multiplied set of AT commands. These elevated AT instructions are defined within the GSM standards. With the elevated AT commands, you are able to do things like:

- Studying, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the sign strength.
- Monitoring the charging reputation and cost level of the battery.
- Studying, writing and looking cell phone e-book entries.

The number of SMS messages that may be processed by using a GSM modem per minute could be very low only about six to ten SMS messages per minute.

Although the M1 has a Sunrise / Sunset clock built in that will determine when the sunrises and sets, hence if it is dark or light outside, often inside light is a totally different subject. The system needs to know what the light level is in a particular room so when automating internal lighting it needs to know if the lights should be activated or not. Otherwise it defeats the purpose of energy saving by automating the lights for cost savings.

One way of doing this is with a $5.00 item from Ness with our Ness-LDR. This LDR wires directly into a M1 Zone Input (Any Zone). The Zone need to be programmed as a Analog Zone. The more light the LDR sensor has on it the lower the voltage the zone will read and the lower the light level, the higher. The zone voltage. The following table will provide a summary of the type of voltages v’s light (Lux) you could expect to read. As the Ness LDR is very small (approx. 5 mm x 4mm x 2 mm) it can be installed anywhere. Although it can be installed on a PIR detector consideration must be given as to the amount of light near the ceiling in a corner compared to lower near the floor. As a suggestion you could mount it on a blank electrical plate attached to the wall near the floor power point level where the light is more even. This would change from site to site; room by room The LDR Sensor is wired directly to any Zone input. (Even the Keypad Zone input (where a good location for the LDR could be on the keypad!)) It does not need power.
The sound sensor board listens to incoming sound through MIC. When it detects sound activity it generates output for a specific amount of time. This output can be given to microcontroller directly. During silence there is no output from board. This board is useful in making projects where sound activation features are required like Security Camera which takes pictures upon sound activity. You can also make a robot which moves when it hears a sound and stops on detecting silence. Although this board is not intelligent to separate different sounds this is a low cost alternative for sound controlling applications.

An accelerometer is an electromechanical device that measures acceleration forces. These forces may be static, like the constant force of gravity pulling at our feet, or they could be dynamic - caused by moving or vibrating the accelerometer. There are many types of accelerometers developed and reported in the literature. The vast majority is based on piezoelectric crystals, but they are too big and to clumsy. People tried to develop something smaller, that could increase applicability and started searching in the field of microelectronics. They developed MEMS (micro electro mechanical systems) accelerometers. The first
micro machined accelerometer was designed in 1979 at Stanford University, but it took over 15 years before such devices became accepted mainstream products for large volume applications [1]. In the 1990s MEMS accelerometers revolutionized the automotive-airbag system industry. Since then they have enabled unique features and applications ranging from hard-disk protection on laptops to game controllers. More recently, the same sensor-core technology has become available in fully integrated, full-featured devices suitable for industrial applications. Micro machined accelerometers are a highly enabling technology with a huge commercial potential. They provide lower power, compact and robust sensing. Multiple sensors are often combined to provide multi-axis sensing and more accurate data.

RTOS is an operating system which is used to perform a task with in a particular time interval i.e. within the specific allocated time. It is a real time operating system. A real-time OS that can usually or generally meet a deadline is a soft real-time OS, but if it can meet a deadline deterministically it is a hard real-time OS. Compared with OS and RTOS, RTOS only supports the multitasking operations and time scheduling tasks. Real-time OS is the level of its consistency concerning the amount of time it takes to accept and complete an application's task. If we are implementing any task without RTOS, it is less accuracy and time delay of the specified time and normally it can possible to perform only one task at a time. So in normal operations systems perform a task one by one. So we are implementing our project using real time operating system.

The multitasking is a process to perform a more than one application or task at concurrently, it means possible to perform a so many operations at the same time. In the normal operating systems are not supported this type of multitasking. So in this project we are implementing RTOS concepts. As The main advantage of RTOS is multitasking and time scheduling and rescheduling etc. In RTOS due to the internal minimum time delay of the time scheduling process it will give the output within the specified time. However, due to the lack of uniform programming model and system components for these different teams, the migrations costs of a function model from software to hardware are high. But these actions are necessary in the hardware-software partitioning of embedded systems, especially in the prototype designs. To cope with this problem, we adopt a uniform multi-task model and implement UCOS II RTOS (Red- Time Operating System).

III. COMPLETED SYSTEM

As we are willing to develop a RTOS based scheduling then it will be mandatory to achieve the automatic scheduling for military application. It was operated automatically by having the inbuilt path assigned for the robot. Metal detecting sensor was sending the alert message using GSM module whenever if it detects any metal in its path.LDR sensor used is to adjust the lighting system by comparing the light intensity values read by the sensor. If the robot was subjected to fall down then the accelerometer sensor will intimate by using the LCD display as well it also sends the message using GSM module.
Fig 7: Implemented proposed system

Fig 8: Output of metal detector

CONCLUSION

This technique is used to reduce the damages to the human and gives the information about mine in the border section. Any sound will come due to mine exploded will detected by the sensor and through mobile communication it will send information to military section.

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