Security System for Smart Home using RFID Reminder System

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Abstract- *The success of RFID in supply chain management is leading many to consider more personal and pervasive deployments of this technology. Unlike industrial settings, however, deployments that involve humans raise new and critical problems related to privacy, security, uncertainty, and a more diverse and evolving set of applications. Some people tend to forget things when they leave home for work or school. It is desired that there would be a reminder system to automatically remind people what they might have forgotten to bring along just when they step outside their home. In this paper, present a reminder system that uses the RFID technology to detect the objects that a user brings along. The system then provide a reminder object list to the user based on the history data collected from the same user and the events in the user's calendar on that day. The list is to remind the user objects he/she might have forgotten at home. A feedback mechanism is also designed to lower the possibility of unnecessary reminding. The user can mark the objects that are not needed from the reminder object list such that these objects will not appear in the list again in the same situation. A prototype system is introduced in this paper. When the room temperature is high the buzzer will be ringing and if the door is not closed at that time an unknown person enter into the room the buzzer will be ringing. So in this project that uses security purpose.*

Keywords- ARM, RF, Sensors module, Buzzer, 9V battery, serial communication.

I. INTRODUCTION

In the last few years, Radio Frequency Identification (RFID) technology has gained increasing attention as a flexible and relatively fast solution for tagging and wireless identification. Early successes in the asset tracking and supply-chain domains coupled with the falling cost of tags have lead researchers to consider pervasive, public RFID deployments that support more user-oriented ser-vices. A number of investigations into personnel tracking and task automation using RFID have shown the technology's potential to facilitate everyday life by seamlessly integrating the virtual and physical worlds. Unfortunately, the majority of such studies have been limited to technology and user evaluations over a short time in restricted scenarios (often in a laboratory). Furthermore, the publicity surrounding this work has revealed an intense public concern with RFID privacy and policy issues that have gone largely unaddressed.

We believe that a more holistic approach is required to effectively design and evaluate RFID-based pervasive computing systems. To this end, we are deploying a long-term, building-wide RFID-based test-bed in our department's building that will involve hundreds of RFID readers and antennas and thousands of tags. Our intent with this "RFID Ecosystem" is to explore the benefits of pervasive RFID infrastructures while identifying and addressing their challenges before such systems are adopted widely in other public settings, where problems may have more serious implications.

Several properties distinguish RFID infrastructures for pervasive computing from those for supply-chain applications. First, pervasive RFID applications are likely to evolve and grow over time. We already see RFID in elder care and object finding applications, each of which requires a flexible infrastructure that facilitates provisioning. Supply-chain applications are typically less dynamic and apply the technology in a narrower capacity (mostly for inventory tracking). Second, because a pervasive application will typically track people and belongings rather than items in inventory, privacy issues must be considered much more care-fully. Finally, people are less predictable than goods moving through established distribution patterns in a supply-chain. As such, we must develop fundamentally new ways to deal with the variable-rate, partial, and noisy data likely to be generated by human activity.

Block diagram:

Object Section:

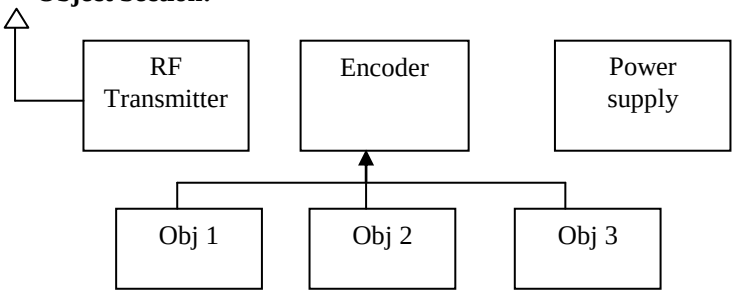


Figure 1: Object Detection

Kit Section:

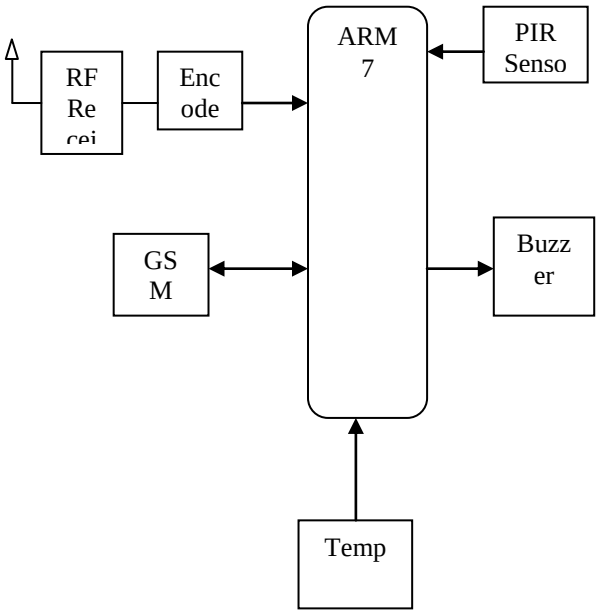


Figure 2: Kit Section

II. LPC2148 MICROCONTROLLER

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core. Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.

The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM set.
- A 16-bit Thumb set.

The Thumb set's 16-bit instruction length allows it to approach twice the density of standard ARM code while retaining most of the ARM's performance advantage over a traditional 16-bit processor using 16-bit registers. This is possible because Thumb code operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65% of the code size of ARM, and 160% of the performance of an equivalent ARM processor connected to a 16-bit memory system

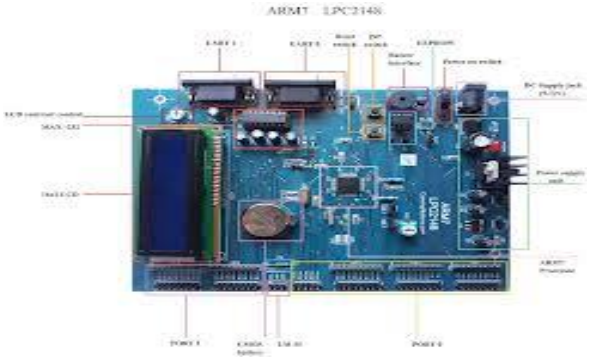


Figure 4: ARM7TDMI PCB board

III. WIRELESS COMMUNICATION

GSM Overview: Global System for Mobile Communications or GSM (originally from Group Special Mobile) is the world's most popular standard for mobile telephone systems. The GSM Association estimate that 80% of the global mobile market uses the standard.GSM is used by over 1.5 billion people across more than 212 countries and territories. This ubiquity means that subscribers can use their phones throughout the world, enabled by international roaming arrangements between mobile network operators. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. The GSM standard has been an advantage to both consumers, who may benefit from the ability to roam and switch carriers without replacing phones, and also to network operators, who can choose equipment from many GSM equipment vendors.

Figure 5: GSM Modules

SMS Commands:

¬AT+CIMI
Note: scan IMSI
¬AT+CMGS="+919652063528"
¬AT+CMGR=1
¬AT+CMGD=1,4
Note: Delete it Note: Message

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular Communication.GSM is the name of standardization Group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT means Attention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon. The AT commands are given to the GSM modem with the help of PC or controller. The GSM modem is serially interfaced with the controller with the help of MAX 232.

IV. RF MODULE

RF Module: Radio Frequency: The 10 kHz to 300 GHz frequency range that can be used for wireless communication. Also used generally to refer to the radio signal generated by the system transmitter, or to energy present from other sources that may be picked up by a wireless receiver.

- Wireless mouse, keyboard
- Wireless data communication
- Alarm and security systems
- Home Automation, Remote control
- Automotive Telemetry
- Intelligent sports equipment
- Handheld terminals, Data loggers
- Industrial telemetry and tele-communications
- In-building environmental monitoring and control
- High-end security and fire alarms

a) TRANSMITTER

The TWS-434 extremely small, and are excellent for applications requiring short-range RF remote controls. The transmitter module is only 1/3 the size of a standard postage stamp, and can easily be placed inside a small plastic enclosure. TWS-434: The transmitter output is up to 8mW at 433.92MHz with a range of approximately 400 foot (open area) outdoors. Indoors, the range is approximately 200 foot, and will go through most walls.

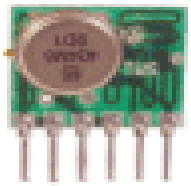


Figure 6: Transmitter

The TWS-434 transmitter accepts both linear and digital inputs can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy. The TWS-434 is approximately 1/3 the size of a standard postage stamp.

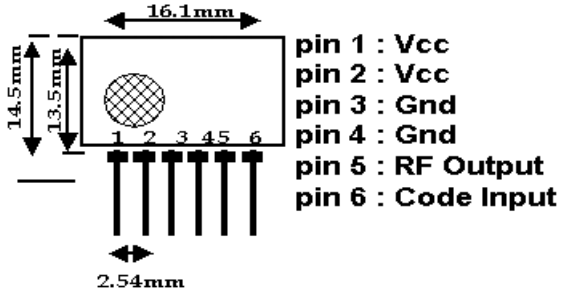


Figure 7: Pin Diagram of transmitter

a) RECEIVER

RWS-434: The receiver also operates at 433.92MHz, and has a sensitivity of 3uV. The WS-434 receiver operates from 4.5 to 5.5 volts-DC, and has both linear and digital outputs.

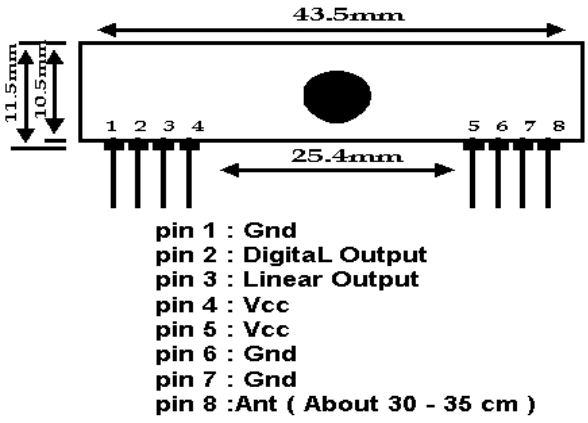


Figure 9: Pin out Diagram of receiver

V. GENERATING DATA

The TWS-434 modules do not incorporate internal encoding. If you want to send simple control or status signals such as button presses or switch closures, consider using an encoder and decoder IC set that takes care of all encoding, error checking, and decoding functions. Motorola and Holtek make these chips. They are an excellent way to implement basic wireless transmission control.

VI. RECEIVER DATA OUTPUT

A 0 volt to Vcc data output is available on pins. This output is normally used to drive a digital decoder IC or a microprocessor which is performing the data decoding. The receiver's output will only transition when valid data is present. In instances, when no carrier is present the output will remain low.

PIR sensor

- ✓ **Passive Infrareds sensors** (PIRs) are electronic devices which are used in some security alarm systems to detect motion of an infrared emitting source, usually a human body.
- ✓ The pyroelectric sensor is made of a crystalline material that generates a surface electric charge when exposed to heat in the form of infrared radiation.
- ✓ When the amount of radiation striking the crystal changes, the amount of charge also changes and can then be measured with a sensitive FET device built into the sensor.
- ✓ This radiation (energy) is invisible to the human eye but can be detected by electronic devices designed for such a purpose
- ✓ The actual sensor on the chip is made from natural or artificial pyroelectric materials
- ✓ usually in the form of a thin film, out of gallium nitride
  - ✓ gallium nitride (GaN)
  - ✓ caesium nitrate ($CsNO_3$)
  - ✓ polyvinyl fluorides
  - ✓ derivatives of phenylpyrazine
  - ✓ cobalt phthalocyanine
  - ✓ Lithium tantalate ($LiTaO_3$) is a crystal exhibiting both piezoelectric and pyroelectric properties

Block process:

- ✓ The PIR325 sensor has two sensing elements connected in a voltage bucking configuration.
- ✓ This arrangement cancels signals caused by vibration, temperature changes and sunlight.
- ✓ A body passing in front of the sensor will activate first one and then the other element whereas other sources will affect both elements simultaneously and be cancelled.
- ✓ The radiation source must pass across the sensor in a horizontal direction when sensor pins 1 and 2 are on a horizontal plane so that the elements are sequentially exposed to the IR source.
- ✓ A focusing device is usually used in front of the sensor

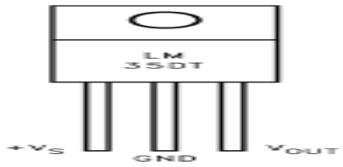
VII. TEMPERATURE SENSOR LM 35

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a −55° to +150°C temperature range, while the LM35C is rated for a −40° to +110°C range (−10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

Features

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guaranteeable (at +25°C)
- Rated for full −55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 µA current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only ±1⁄4°C typical

- Low impedance output, 0.1 □□for 1 mA load



VIII. CONCLUSION

People forget things when they go out for work or school in the morning. In this paper, we present a prototype reminder system based on RFID and wireless technologies. The RFID makes it easy to detect and record the objects that the user takes out. Through the analysis on these records, the system would know what the user should bring along every day and what objects the system should put in the reminder list. Furthermore, the event calendar of the user is another source of information for constructing the reminder list. This system can be used for security system also. It detects the high temperature of the home and unknown persons. I think with some improvements the system can be used in real life.

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Biography

M. Uma Rani was born in Warangal district, A.P, India. She received B.Tech in Electronics and Communication Engineering from Vaagdevi College of Engineering, Warangal (dist), A.P, India. Pursuing M.Tech in Embedded Systems at SR Engineering College, Warangal, A.P, India.

Mr. A. Pradeep Kumar (Assist. Prof.) completed B.Tech (ECE) and M.Tech (Embedded systems) from JNTU University (A.P.). He has 4 years of teaching experience in reputed engineering colleges and he is presently working as Assist. Prof. (ECE), SR Engineering college, Warangal, A.P. He has various publications in National & International Journal/Conferences.