

A Dynamic Secret Based Encryption Scheme for Smart Grid Wireless Communication

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Abstract:

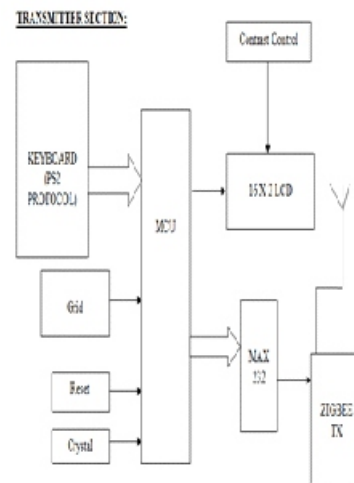
In this project, the data can be transmitted to and received from remote Zigbee communication device. Data Security is primary concern for every communication system. There are many ways to provide security data that is being communicated. However, what if the security is assured irrespective of the hackers are from the noise. This Project describes a design of effective security for data communication by designing standard algorithm for encryption and decryption. The source information is generated by PS2 Keyboard and this will be encrypted and is sent to destination through Zigbee modules. The receiving system will check the data according to a specific algorithm and displays on the LCD.

I.INTRODUCTION:

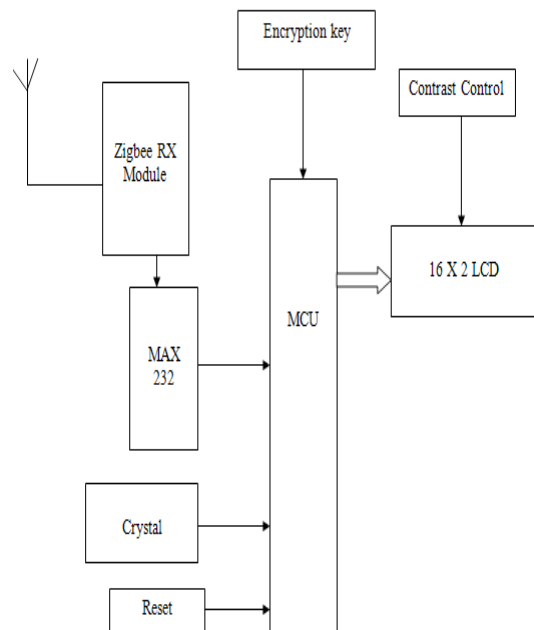
The project is built around the controller in the transmitter and receiver section. This controller provides all the functionality of the display and wireless control. It also takes care of creating different display effects for given text. Alphanumerical keyboard is interfaced to the transmitter to type the data and transmit. The message can be transmitted to multi point receivers. After entering the text, the user can disconnect the keyboard. At any time the user can add or remove or alter the text according to his requirement. When ever the message is transmitted to the receiver section the garbage or junk message will be displayed on the receiver section 16X2 LCD. In order to read the original message the user should press the encryption key which is connected in the receiver section. Here we can also have the knowledge about the consuming units of the loads connected through the same wireless network. For example if 2 loads (fan, light) are connected and it has consumed 5 units that will be displayed in LCD at the receiver section. So that we can not only have the data with security but also we can have the knowledge about the loads connected.

Keywords:

ARM7-LPC2148, Zigbee, Smart Grid, data encryption.



RECEIVER SECTION:

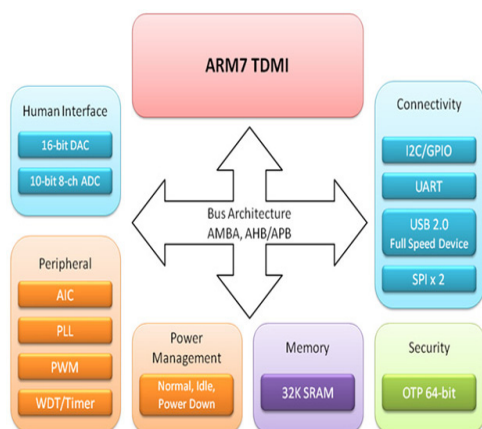


II.HARDWARE MODULES:

The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate.

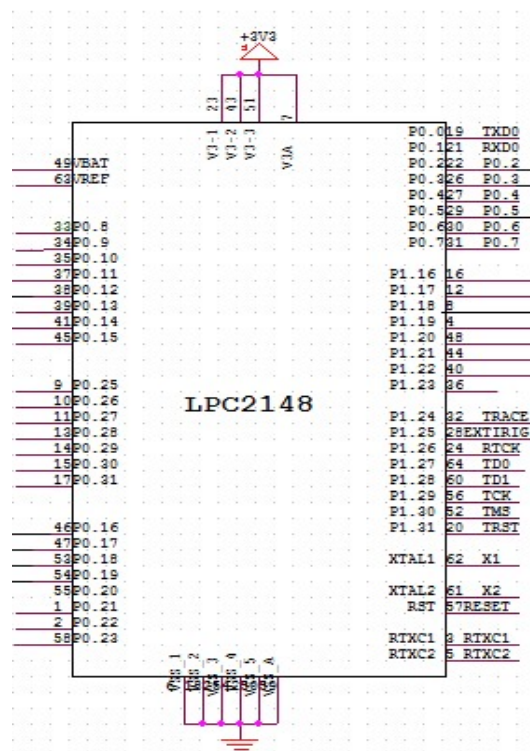
For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.



This project uses regulated 3.3V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

PIN DIAGRAM:



ARM7TDMI Processor Core:

- Current low-end ARM core for applications like digital mobile phones
- TDMI
- oT: Thumb, 16-bit compressed instruction set
- oD: on-chip Debug support, enabling the processor to halt in response to a debug request
- oM: enhanced Multiplier, yield a full 64-bit result, high performance
- oI: Embedded ICE hardware
- Von Neumann architecture

Zigbee:

It is the wireless device for transmitting and receiving purpose or simply it called as Transceiver. Zigbee is based on the IEEE802.15.4 protocol. The range of the Zigbee is covered as 100m. It range is 10 times better than bluetooth device so it can be more preferable one in wireless device. The data rate is very low for transmission while using this device.



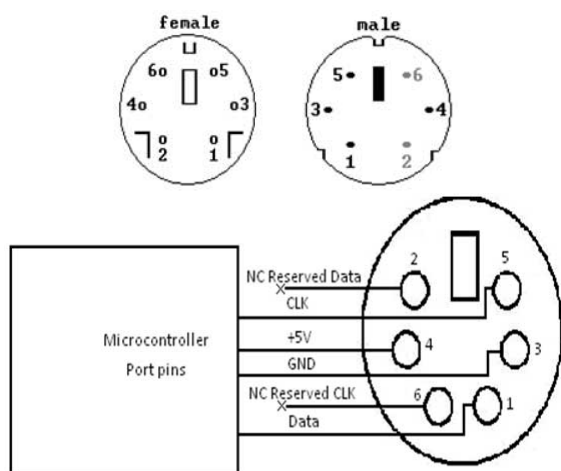
Zigbee is a PAN technology based on the IEEE 802.15.4 standard. Unlike Bluetooth or wireless USB devices, ZigBee devices have the ability to form a mesh network between nodes. Meshing is a type of daisy chaining from one device to another. This technique allows the short range of an individual node to be expanded and multiplied, covering a much larger area.

Technical Specifications of Zigbee

- Frequency band 2.400 — 2.483 GHz
- Number of channels 16
- Data rate 250 kbps
- Supply voltage 1.8 – 3.6 V
- Flash memory 128 kB
- RAM 8 kB
- EEPROM 4 kB Operating
- Temperature -40 — +85 °C

PS/2 (Play Station 2)

The PS/2 connector is a round shape of 6-pin Mini-DIN connector used for connecting some keyboards and mice to a PC compatible computer system.

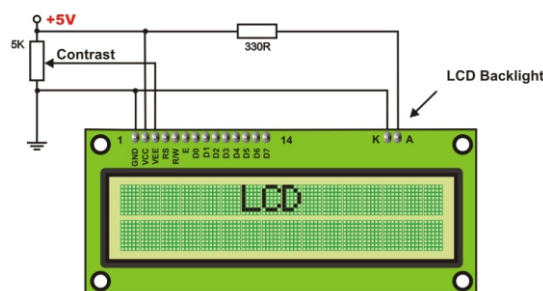


Interfacing PS/2 to Microcontroller

LIQUID CRYSTAL DISPLAY: LCD stands for Liquid Crystal Display.

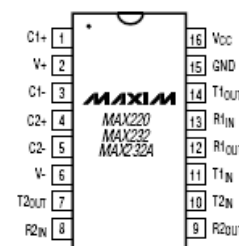
LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

1. The declining prices of LCDs.
2. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.



MAX 232:

Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers. To ensure data transfer between PC and microcontroller, the baud rate and voltage levels of Microcontroller and PC should be the same. The voltage levels of microcontroller are logic 1 and logic 0 i.e., logic 1 is +5V and logic 0 is 0V. But for PC, RS232 voltage levels are considered and they are: logic 1 is taken as -3V to -25V and logic 0 as +3V to +25V. So, in order to equal these voltage levels, MAX232 IC is used. Thus this IC converts RS232 voltage levels to microcontroller voltage levels and vice versa.



III. SOFTWARE DETAILS:

A. Keil compiler

Keil compiler is a software used where the machine language code is written and compiled.

After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

B.Proload:

Proload is a software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller placed in the programmer kit and this is done by the Proload. Programmer kit contains a microcontroller on it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the keil compiler and dumps this hex file into the microcontroller which is to be programmed.

IV.APPLICATIONS:

Offices
Educational institutions
Bus stations
Railway stations

V.WORKING PROCEDURE:

The data can be sent to other place with full security

- Data need to be given using keyboard and sent using zigbee to other place.
- The used power (number of units) will also be sent to the receiver.
- Garbage value is received at other place first
- If the encryption key is given then it will be known that the person is authorized.
- So that the entered data at the other end will be given displayed here

VI.FUTURE SCOPE:

This can also be performed on much more advanced processor BCM2835 (ARM11) with more ease. The data encryption can also be done more efficiently by PLC (power line communication).

VII.REFERENCES:

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