

A Dynamic Secret Based Encryption Scheme for Smart Grid Wireless Communication

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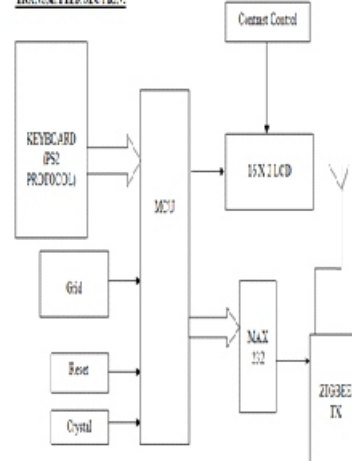
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Abstract:

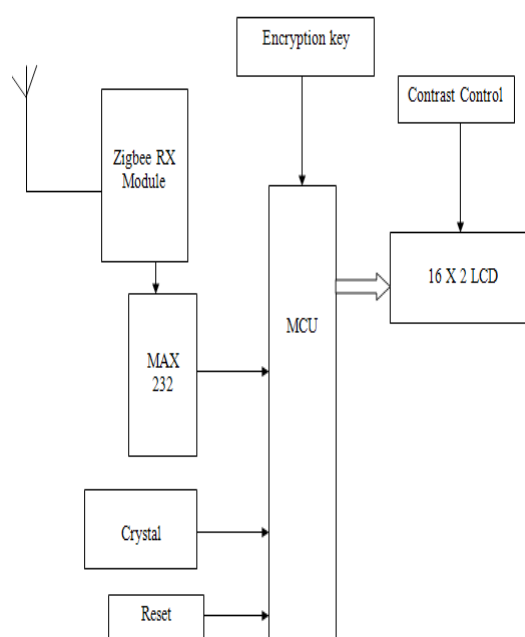
In this project, the data can be transmitted to and received from remote Zigbee communication device. Data Security is primary concern for every communication system. There are many ways to provide security data that is being communicated. However, what if the security is assured irrespective of the 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. 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.

TRANSMITTER SECTION:



RECEIVER SECTION:

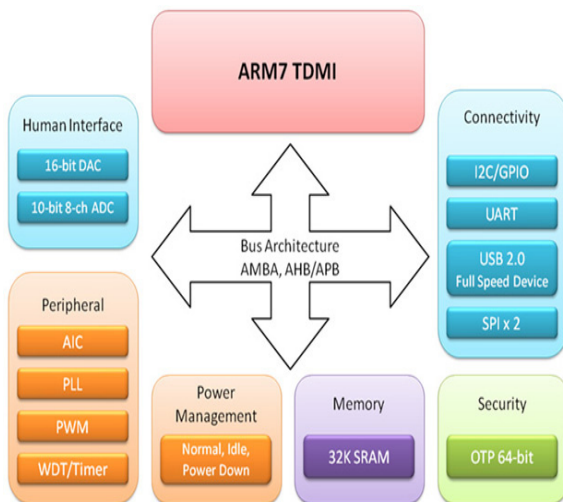


The LPC2148 are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

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.

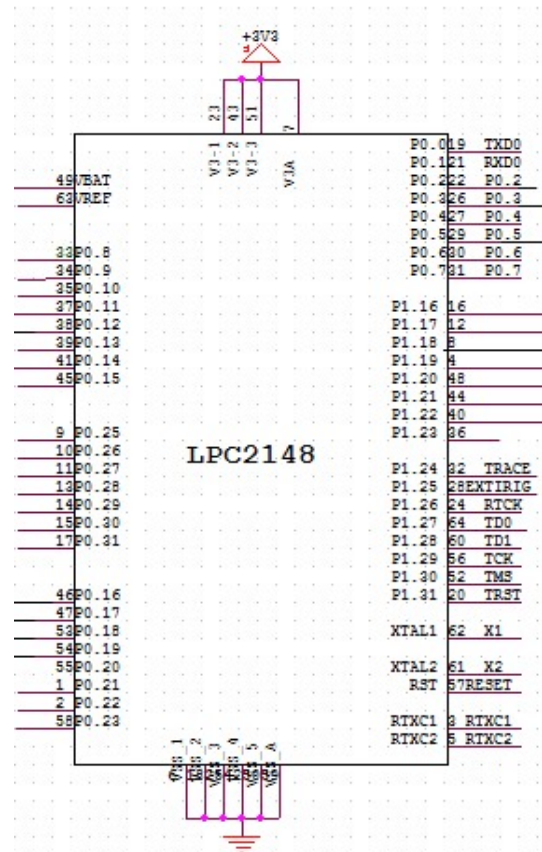
With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

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:



- 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

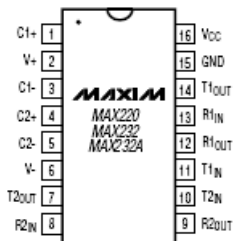
- Von Neumann architecture

MAX 232:

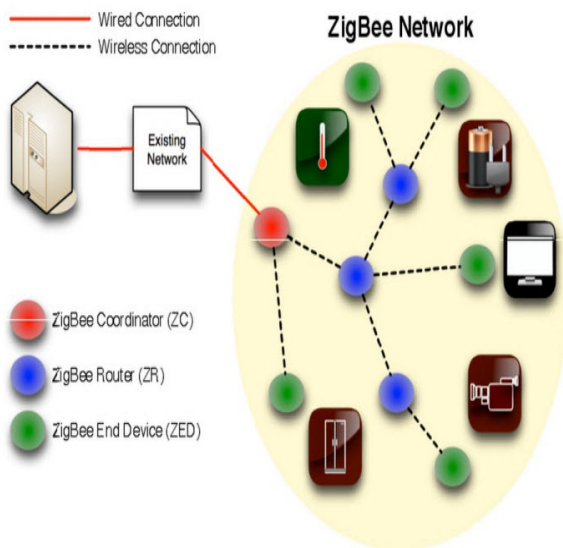
Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers.

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.



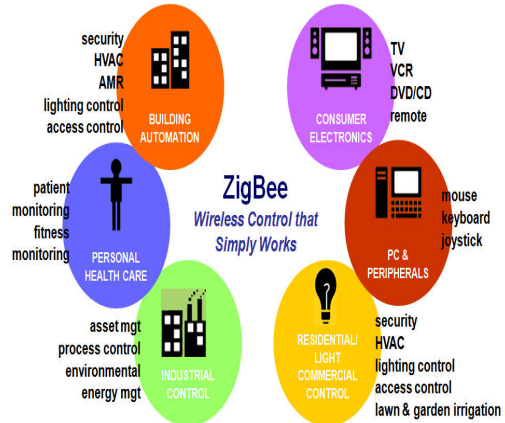
Zigbee:



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.

Its 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.

Applications of Zigbee:



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.



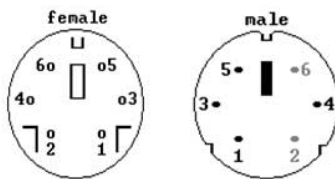
Technical Specifications of Zigbee

- 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)

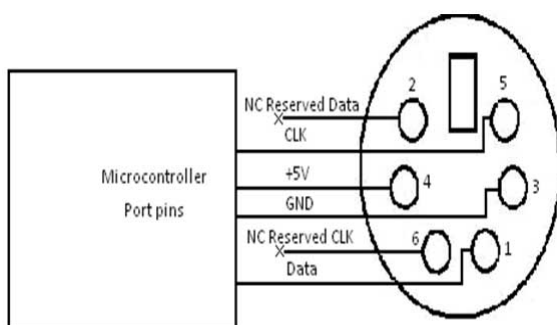
The PS/2 connector is a round shape of 6-pin Mini-DIN connector used for connecting some keyboards and mice to a PC compatible computer system.



Interfacing PS/2

Fig. 1 shows how to interface PS/2 port to microcontroller. The PS/2 bus includes both clock and data. Both a mouse and keyboard drive the bus with identical signal timings and both use 11-bit words that include a start, stop and odd parity bit.

However, the data packets are organized differently for a mouse and keyboard. Furthermore, the keyboard interface allows bidirectional data transfers so the host device can illuminate state LEDs on the Keyboard.



Interfacing PS/2 to Microcontroller

Grid:

The term grid usually refers to a network, and should not be taken to imply a particular physical layout or breadth. Grid may also be used to refer to an entire electrical network, a regional transmission network or may be used to describe a sub network such as a local utility's transmission grid or distribution grid.

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.

These components are “specialized” for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

Applications:

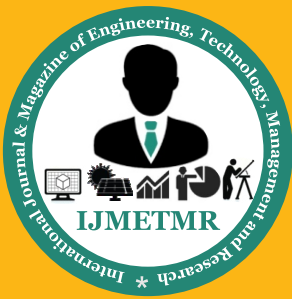
- Offices
- Educational institutions
- Bus stations
- Railway stations

Future scope:

This can also be performed on much more advanced processor ARM9 with more ease. The data encryption can also be done more efficiently by PLC (power line communication).

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

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