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## ZIGBEE Based Secured Data Transmission and Reception

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### ABSTRACT

Data security is primary concern for every communication system. There are many ways to provide security data that is being communicated. However, what if security is assured irrespective of the hackers are from the noise. One of the popular methods is to protect the data in a more secure way and to encrypt the data while sending and when received, decrypt the data to retrieve the original data. Before transmitting the data a password code is set and will be sent. At the receiving end the reverse of encryption carries on to get back the original message. The most efficient and reliable wireless communication is Zigbee. In this system data can be entered using pc or keypad. This data is then sent to the microcontroller at the Zigbee transmitter. Transmitter encrypts the data and transmits it into the air. At the receiver side the data is received by the Zigbee receiver module, receiver decrypts the data by entering the correct code, which means now the data has been converted into the form suitable for the users to read. This data is displayed on the LCD. This way the is secured between the two different paths.

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Keywords: Encryption (E), Security (S), Personal Computer (PC), Liquid Crystal Diode (LCD), Xbee (Zigbee).

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### 1. Introduction

The main purpose of this project is to generate and transmit data wireless and secured manner. When it comes to the safety and security of tasks in many multinational companies, military and army the situation becomes more complicated. Even for the common man the data security is of much importance. One of the popular methods to protect the data in more secure way is to encrypt the data while sending and when received should be decrypted to get original message. Before transmitting the data it is converted into unreadable format by using some password code and then transmitted and at the receiver end the data is retrieved by entering the correct password codes so that it becomes user friendly. The most efficient and reliable wireless communication is Zigbee.

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### 2. Literature Survey

After the<sup>[1]</sup> introduction of wireless LAN and Bluetooth, another new international standard technology is Zigbee which is rapidly spreading all over and into our lives.<sup>[2]</sup> The main advantage of zigbee is that it can be designed as simple as that, cost effective, robust and less power consumption.<sup>[3]</sup> Zigbee is one of the most secured communication system that find application in many areas such as in an industrial control, an embedded sensor and in a building and home automation system. XBee is one of the zigbee module. The advantages of using XBee is that it has a user friendly interface, minimal power

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consumption, and thereliability of data transfer between the two modules. Anotheradvantage of using zigbee is that it can be used as transceiver. So, it can be used as transmitter as well as transceiver.

### 3. Proposed Work

Fig 1 shows the transmitter side of the system. It consists of keypad which is used to enter data and LCD is present where data is displayed and then sent to Arduino uno microcontroller for encryption. The microcontroller encrypts the data according to the logic implemented in the microcontroller. The encrypted data is then displayed on 16x4 LCD. LCD is used to display both original and encrypted message. Then the encrypted data is transmitted in the air.

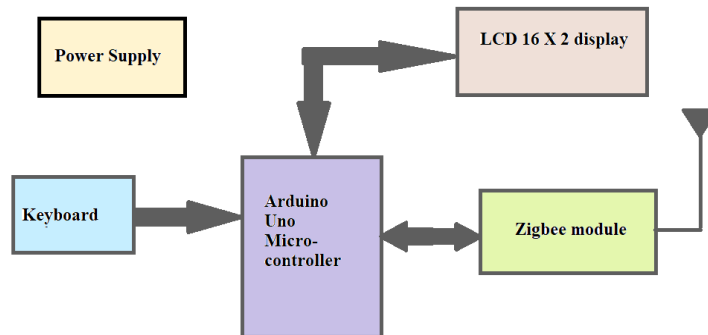


Figure 1 Transmitter

Fig 2 shows the different inputs and outputs used in the receiver side. At receiver end zigbee receives the data from the air and it is send to the Arduino uno microcontroller. Then the microcontroller decrypts the encrypted data with the opposite logic with that of encryption. Finally encrypted data is converted into original data so that user can easily read it as it is displayed on the LCD attached to the receiver unit. Thus the data is protected at both transmitting and receiving end and makes this system one of the most secured data communication system. LCD displays both decrypted and received data. And so we have very secured communication for many government and private organisations.

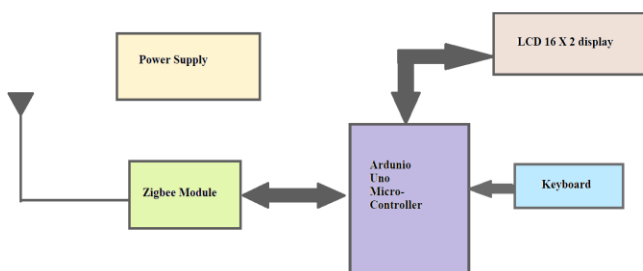


Figure 2. Receiver

Arduino Uno is a microcontroller board based on the ATMEGA328P. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions. You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE.

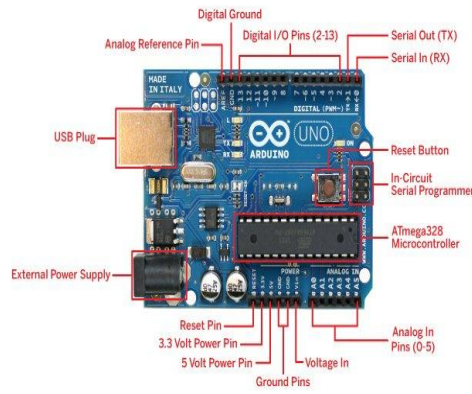


Figure 3. Structure of Arduino Uno

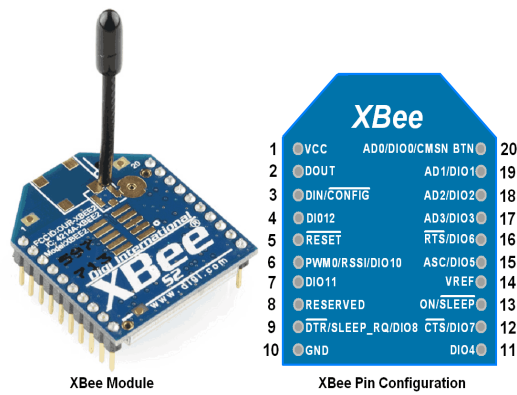


Figure 4. Structure of Zigbee

Table 1. Specifications of Zigbee

Wireless protocol	ZigBee
Data rate	250 Kbps
Module interface	Serial
Supply voltage range	2.1 V to 3.6 V
Working frequency	2.4 GHz ISM
TX current	40 mA @ 3.3 V
RX current	40 mA @ 3.3 V
Range	120 m
TX power	2 mW (+3 dBm)
RX sensitivity	-95 dBm
Network topology	Mesh, Star, Cluster Tree

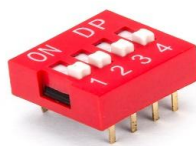


Figure 5. DIP Switch

## 4. Results and Implementation

In this paper we have used two Arduino Uno boards one for encryption of data and other for decryption of data and also two zigbee modules which acts as transmitter and receiver . When we enter the correct key or passcode using the dip switch then we can able to get the decrypted data that is original data.

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## 5. Conclusion

6. The method of encryption and decryption of data in a communication is very effective in sending secret data.It also provides a secured system for secret messages communication over long and short distances. The capacity of hiding the content is also very high in the proposed work. ZigBee have a long life time along with low power consumption as compared to Bluetooth and WIFI. Also, by connecting ZigBee in mesh network we can increase the range of communication. The proposal of the project is to provide security to the data which we are sending. Here we are sending data with encryption so that none can see the data except the authorized ones.

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## REFERENCES

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