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Zigbee based Wireless Communication Assistant

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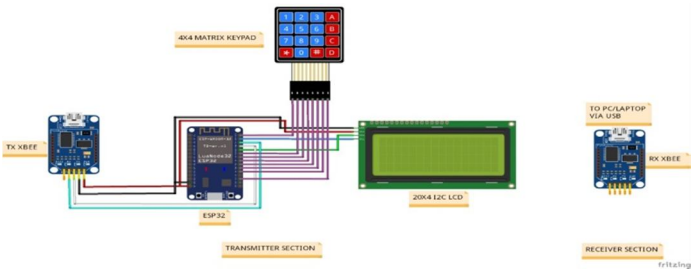
Abstract: ***Zigbee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power wireless IoT networks. The Zigbee standard operates on the IEEE 802.15.4 physical radio specification and operates in unlicensed bands including 2.4 GHz, 900 MHz and 868 MHz. Zigbee enables broad-based deployment of wireless networks with low-cost, low-power solutions. It provides the ability to run for years on inexpensive batteries for a host of monitoring and control applications. Smart energy/smart grid, AMR (Automatic Meter Reading), lighting controls, building automation systems, tank monitoring, HVAC control, medical devices and fleet applications are just some of the many spaces where Zigbee technology is making significant advancements. The main aim of this project is to construct a user-friendly ZigBee based wireless communication system for people traveling by Airlines. In this project, we are building a device that helps people in expressing their needs with other people (Airhostess) i.e., request them if they need anything in the flight like coffee, tea, drinks etc. A Python based GUI collects the requests and after the requests are addressed, they can be marked completed.***
Keywords: Zigbee, Arduino IDE Online, minimal resources.

I. INTRODUCTION

In this project we use various technologies and modules to make it easy, which indicates the needs. This even reduces the difficulty to air hostesses and other crew members in serving the customers. Here for wireless communication purpose, we have used Zigbee technology. ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. Zigbee is the set of specs built around the IEEE 802.15.4 wireless protocol. As Zigbee is the upcoming technology in wireless field, we had tried to demonstrate its way of functionality and various aspects like kinds, advantages and disadvantages using a small application of controlling the any kind of electronic devices and machines. The Zigbee technology is broadly adopted for bulk and fast data transmission over a dedicated channel. This project consists of Zigbee based system that transmits the wireless signals according to the input given by the user, using 4x4 Keypad and LCD. At the receiver end the information will be displayed on GUI based system. The user selects the appropriate option from the list of options displayed in the menu and then this data is transmitted to receiver end. A request for the same is created in the Python based GUI developed specifically for this application.

II. DESIGN



A. Transmitter Section

1) The project uses ESP32 as the microcontroller
2) There are multiple GPIO Pins on the breakout board of ESP32 Microcontroller which can be used for various purposes.
3) A 4x4 Matrix Keypad is used for selecting items in the menu.
4) The menu is displayed on an I2C enabled 20x4 LCD Display.
5) Arduino IDE is used to develop code and upload it to ESP32 Microcontroller. The code is written in Embedded C language.
6) XBEE S2C Module along with an explorer board is used for Zigbee based communication.
7) The menu item selected is transmitted by the XBEE to the receiver side.

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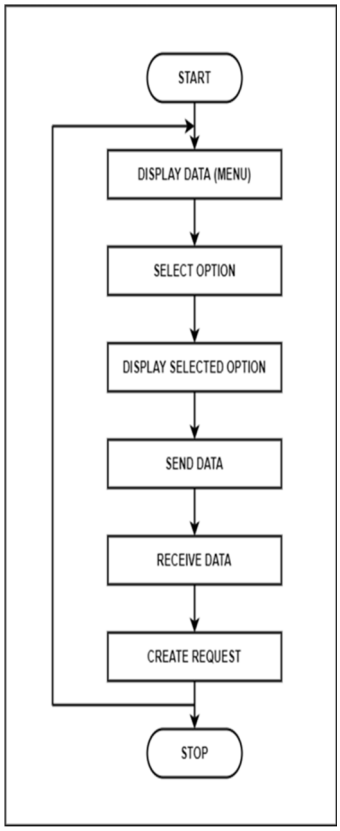
B. Receiver Section

1) The receiver section consists of XBEE S2C Module along with an explorer board which is connected to a PC / Laptop.
2) The data received from transmitter side is captured by receiver XBEE and displayed on the GUI developed using Python Language.
3) GUI is designed and developed using TKINTER library of Python.
4) Whenever any value is received a request is created on the GUI of receiver.

III. FLOWCHART

The following flow-chart shows the step-by-step working.



A. Setup 1

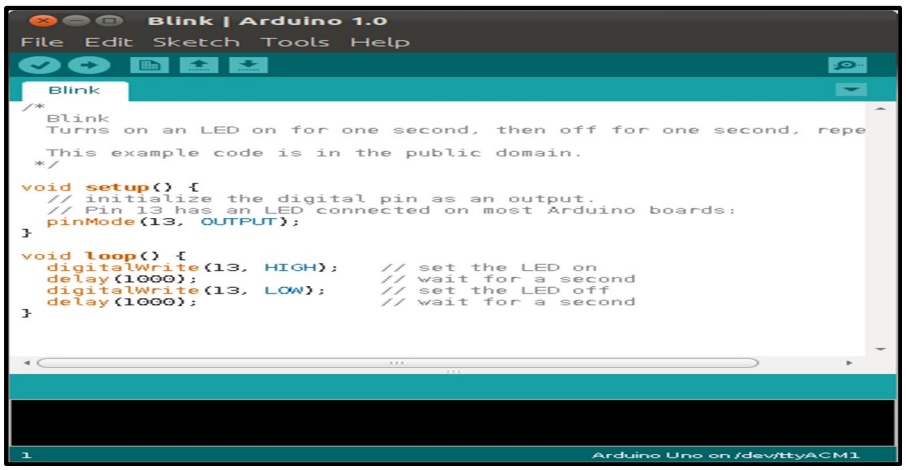


Figure 1: Arduino IDE Online window

B. Setup II

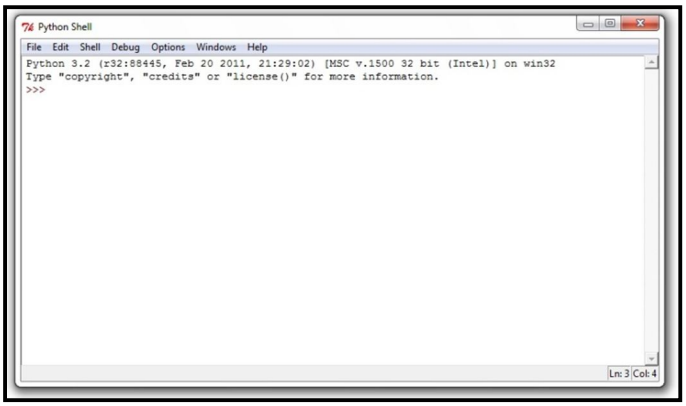


Figure 2: Python GUI

IV. RESULTS

A. Project is Divided into the Two Sections

Hardware implementation

Development of touch screen,GLCD, Zigbee

B. Software Implementation

Programming of the Microcontroller

V. CONCLUSIONS

Thus,This project consists of Zigbee based system that transmits the wireless signals according to the input given by the user using the matrix keypad. At the receiver end the information will be displayed in GUI. Here when user sends his need through keypad, then micro controller transmits that information through Zigbee transmitter. The information received by the Zigbee receiver will be displayed.

VI. ACKNOWLEDGMENT

We would like to thank our project guide Prof. Gauri Vaidya for her precious guidance in these difficult times of the global pandemic. We would also like to thank our college for their constant support and the folks at Arduino IDE online for helping us save time but also enabled us to work remotely from our homes.

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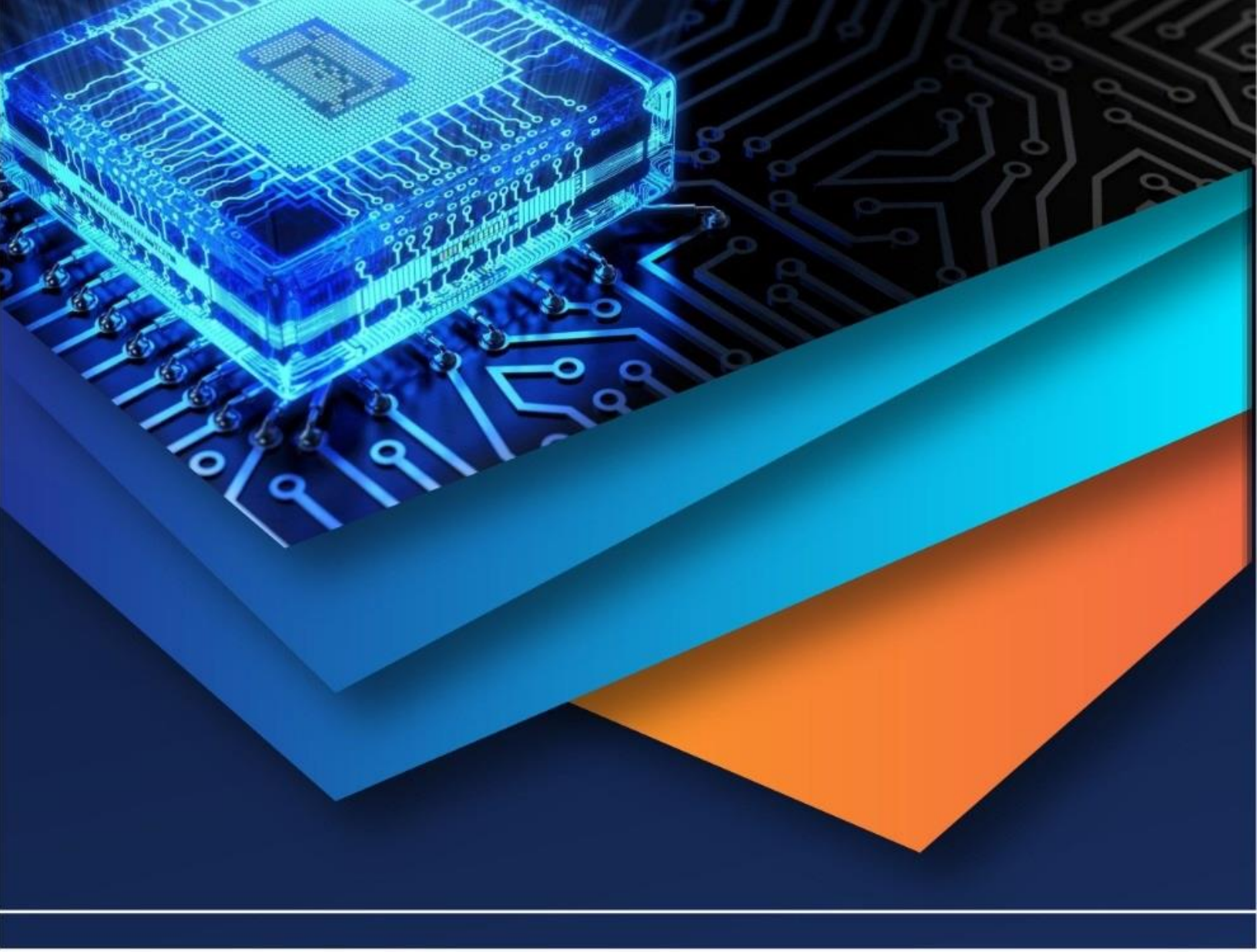

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