Microcontroller Based Aeronautical Crash Prevention System through RF Communication

Deepika P
Assistant Professor, Department of Electronics & Communication Engineering,
Sri Sairam college of Engineering, Anekal, Bengaluru, India
deepikap.ece@sairamce.edu.in

Boddukuru Amrita, Yadunandan Yadav, Prabudh Sagar,
Student, Department of Electronics & Communication Engineering,
Sri Sairam college of Engineering, Anekal, Bengaluru
sce19ec009@sairamtap.edu.in. sce19ec059@sairamtap.edu.in
sce18ec035@sairamtap.edu.in

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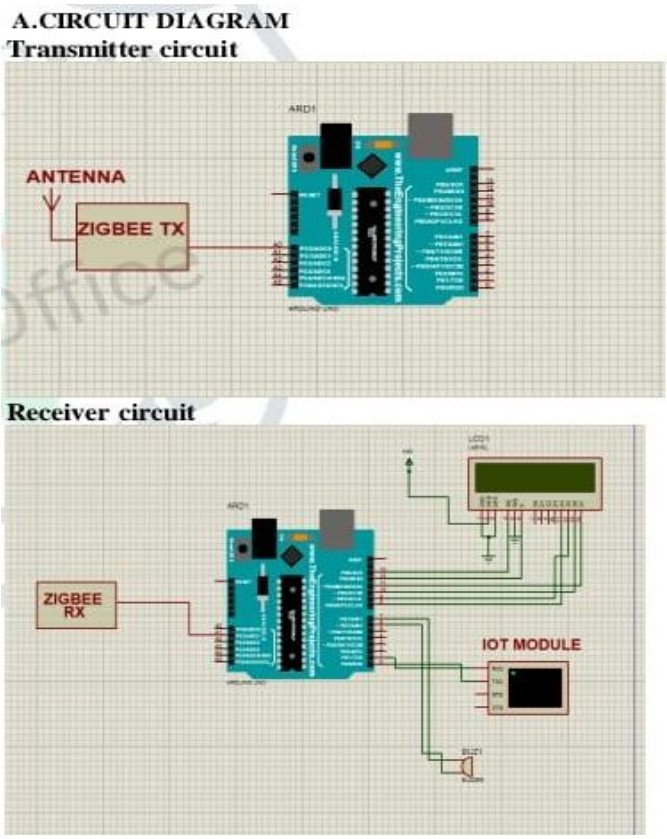
Abstract: Embedded system is a special-purpose computer, designed to perform a dedicated function. Embedded system is quickly growing in various fields like industrial automation, home appliances, automobiles, aeronautics etc. The main aim of this project is to prevent the collision among air flights. Many methods are available to prevent the collision between the flights, but here RF technology and Microcontroller is used which provides some additional features for future enhancement. The system uses a microcontroller to collect data from sensors on the aircraft and process it to determine the distance and velocity of other aircraft in its vicinity. The system then sends signals to other aircraft in its range through RF communication to alert them about the potential danger. In addition performance evaluation of the system, which includes the detection accuracy, response time, and communication reliability, is monitored.
Keywords: RF technology, sensors

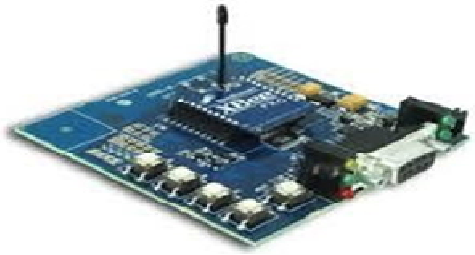
I. INTRODUCTION

The main aim of this project is to prevent the collision among air flights. Many methods have to be followed to prevent the collision between the flights, but here RF technology is used. The microcontroller provides some additional features for future enhancement. This project consists of two major units 1) Transmitter Unit and 2) Receiver Unit. The sensors placed in the transmitter unit gives data to the Microcontroller, which is heart of the project. Then the controller sends the digital data to the RF transmitter according to the data available from output of all the sensors. In the receiver unit, the RF signal can be detected by the RF receiver. Then the data can be processed by the controller presented in the Receiver unit, and drives the LCD display. All the status about transmitter end is displayed in LCD. The controller also initiates the Buzzer. This unit is place in the Flight

II. PROPOSED SYSTEM

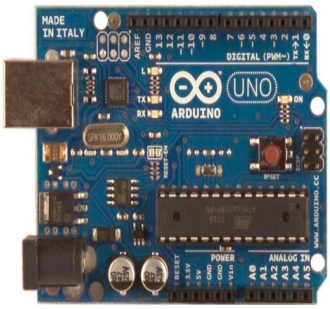
The proposed system is designed to detect and prevent aeronautical crashes by transmitting data from one aircraft to another in real-time through RF communication. The system uses a microcontroller to collect data from sensors on the aircraft and process it to determine the distance and velocity of other aircraft in its vicinity. The system then sends signals to other aircraft in its range through RF communication to alert them of the potential danger. The proposed Microcontroller-Based Aeronautical Crash Prevention System through RF Communication is designed to prevent aeronautical crashes by transmitting real-time data from one aircraft to another using RF communication. The system uses a microcontroller to collect data from sensors placed on the aircraft and processes it to detect the distance and velocity of other aircraft in its vicinity. The system then sends signals to other aircraft in its range through RF communication to alert them of the potential danger. In this paper, we present a performance evaluation of the system, which includes the detection accuracy, response time, and communication reliability.





fig(a): Zigbee technology

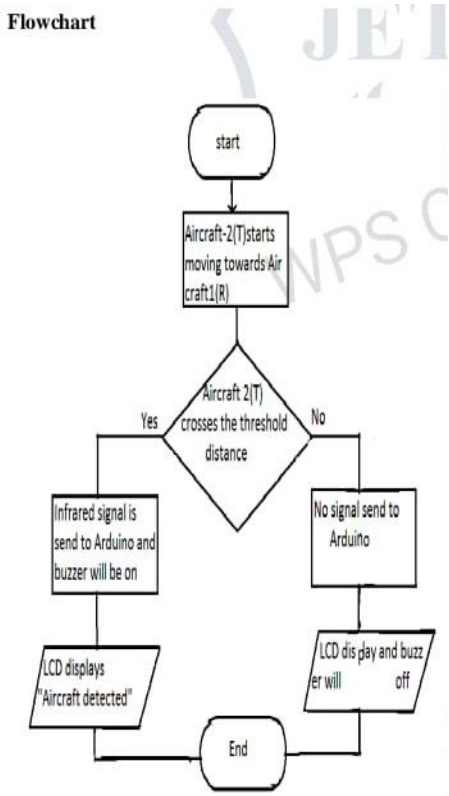
ZigBee standard consists of a whole suite of specifications designed specifically for wireless networked sensors and controllers. The physical (PHY) and medium access control (MAC) layers are standardized by the IEEE 802.15 wireless personal area network (WPAN) working group under the designation of 802.15.4. The standard mainly aims at low cost, low data rate and low power wireless network. Compared to other wireless communication technologies, Zigbee is designed specifically for providing wireless networking capability for battery-powered, low-cost, low capability sensor and controller nodes, typically powered only by an eight-bit microcontroller. The Zigbee technology is designed to provide a simple and low-cost wireless communication and networking solution for low-data rate and low power consumption applications, such as home monitoring and automation, environmental monitoring, industry controls, and emerging low-rate wireless sensor applications [1]



fig(b):Arduino UNO

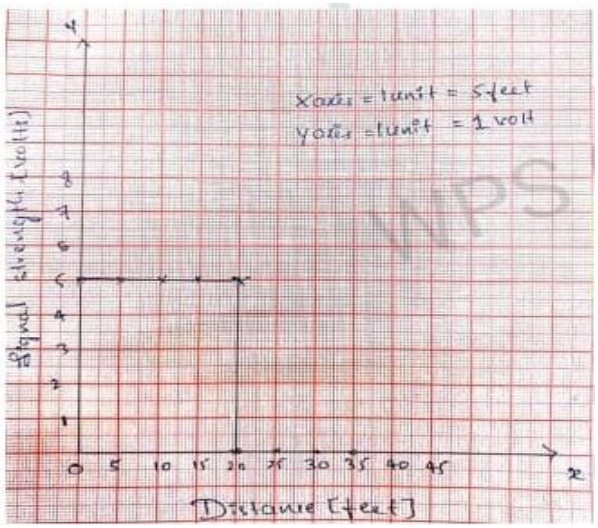
III. METHODOLOGY

The proposed system is based on the principle of RF communication. The system consists of a microcontroller, sensors, and an RF transmitter and receiver. The sensors are placed on the aircraft to detect the distance and velocity of other aircraft in its vicinity. The microcontroller processes the data from the sensors and sends signals to other aircraft in its range through RF communication. The signals contain information on the aircraft's position, altitude, and velocity, which are used to calculate the potential danger of a collision. The performance evaluation of the proposed system was carried out by conducting experiments in a controlled environment. The experiments were designed to test the detection accuracy, response time, and communication reliability of the system. The detection accuracy was tested by measuring the distance between the system and the target aircraft and comparing it with the actual distance. The response time was tested by measuring the time taken by the system to detect a potential collision and send signals to the target aircraft. The communication reliability was tested by measuring the percentage of successful transmissions and receptions.



IV. RESULTS

The proposed system has been tested using a prototype system. The results show that the system is capable of detecting other aircraft in its vicinity and sending signals to prevent a collision. The system has a detection range of up to 3 kilometers and is accurate up to 5 meters.



CONCLUSION:

The microcontroller-based aeronautical crash prevention system through RF communication is an effective way to prevent aeronautical crashes and reduce the risks associated with flying. The system is capable of detecting other aircraft in its vicinity and sending signals to prevent a collision. The proposed system can be implemented in commercial aircraft to ensure the safety of passengers and crew members. The proposed Microcontroller-Based Aeronautical Crash Prevention System through RF Communication is an effective approach to enhance the safety of air travel. The performance evaluation of the system shows that it is capable of detecting other aircraft in its vicinity with high accuracy, responding quickly to potential collisions, and communicating reliably with other aircraft. The results of this evaluation provide insights for future improvements to the system.

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