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RC PLANE USING ARDUINO NANO

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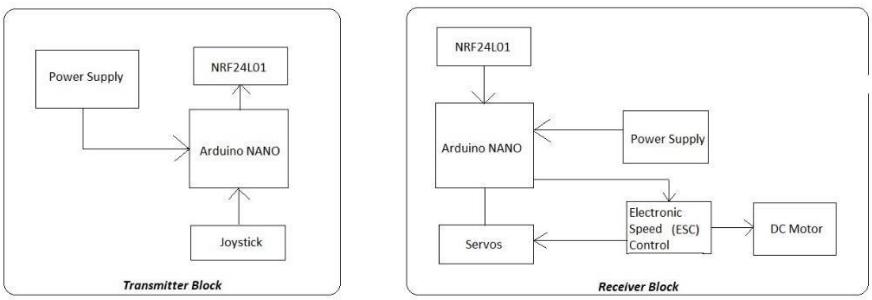
Abstract- This abstract presents the design and implementation of a remote-controlled plane utilizing Arduino Nano, an open-source microcontroller platform, to achieve precise control and manoeuvrability. The project aims to provide hobbyists and enthusiasts with a cost-effective solution for building and flying their own remote-controlled planes. The system consists of two primary components: the ground control station (GCS) and the airborne unit.

Keywords: Arduino Nano, nrf24l01, Arduino joystick, esc, dc motor, power supply, Arduino programming.

I. INTRODUCTION

Remote-controlled planes, also known as RC planes, have been a popular hobby for aviation enthusiasts and hobbyists for many years. These miniature aircraft offer the thrill of flying without the need for piloting skills or being inside the cockpit. With advancements in technology, remote-controlled planes have become more sophisticated, offering enhanced control, stability, and manoeuvrability. Traditionally, remote-controlled planes were controlled using simple radio frequency (RF) transmitters and receivers. However, with the advent of microcontroller platforms such as Arduino, the possibilities for designing and implementing remote-controlled planes have expanded significantly. The Arduino Nano is a compact, versatile, and cost-effective microcontroller board that offers numerous inputs and outputs, making it an ideal choice for controlling RC planes. Its small form factor allows for easy integration into the airborne unit, while its programming environment provides flexibility and customization options. The main objective of designing a remotecontrolled plane using Arduino Nano is to provide hobbyists and enthusiasts with a platform to explore the principles of flight dynamics, electronics, and programming.

II. BLOCK DIAGRAM



III. BLOCK DIAGRAM DESCRIPTION

3.1 POWER SUPPLY: The power supply in RC plane project is responsible for providing electrical power to all the components, the main functions and descriptions of the power supply is:

- Voltage Regulation
- Current Capacity

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3.2 ARDUINO NANO:

Arduino Nano acts as the brain and control unit of this project. It processes inputs from the joystick, communicates wirelessly with the NRF24L01 module, generates control signals, and manages the overall operation and behavior of the RC plane during flight by Control Center.

3.3 NRF24L01:

The NRF24L01 module acts as the wireless communication link between the remote control and the RC plane. (This module can be used for both transmitter and receiver) It facilitates the transmission and reception of control signals, telemetry, and other data, ensuring reliable and efficient communication.

3.4 JOYSTICK:

The joystick in RC plane project serves as the user input device for controlling the plane's movement. It provides analog output signals based on its position, which are then read and interpreted by the Arduino Nano.

3.5 SERVOS:

A servo is a type of electromechanical device commonly used in RC planes for controlling various mechanical components, such as control surfaces or other movable parts.

3.6 DC MOTOR:

A DC motor is commonly used as a propeller motor in RC planes to generate thrust for propulsion. It provides the following important functions for the RC plane

- Propulsion:
- Speed Control:
- Brushed or Brushless:

3.7 ELECTRONIC SPEED CONTROL (ESC):

An Electronic Speed Controller (ESC) is a crucial component in an RC plane project that controls the speed and direction of a brushless DC motor. (ESC) plays a crucial role in your RC plane project by controlling the speed and direction of the brushless DC motor.

IV. CIRCUIT DIAGRAM

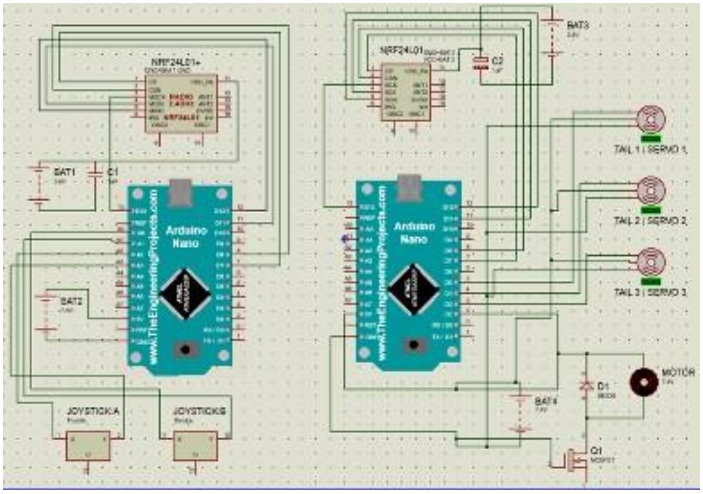

Fig.2.circuit diagram

3.3.1 Arduino NANO: The Arduino Nano is a compact and powerful microcontroller board that serves as the brain of your RC plane project. It is based on the ATmega328P microcontroller and offers a wide range of capabilities and features.

3.3.2 NRF24L01: The NRF24L01 module is a key component in the RC plane project, providing wireless communication capabilities between the remote control and the receiver on the plane. It utilizes the 2.4GHz radio frequency band and employs the Enhanced Shock Burst™ protocol for efficient data transmission.

3.3.3 JOYSTICK: The joystick is an essential input device in the RC plane project, allowing the pilot to control the movements and maneuvers of the aircraft. It consists of two potentiometers and a button, which provide analog position and digital input signals, respectively.

3.3.4 ELECTRONIC SPEED CONTROL (ESC): The Electronic Speed Controller (ESC) is a vital component in the RC plane project, responsible for controlling the speed and direction of the DC motor that drives the propeller. It acts as a

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bridge between the flight controller (Arduino Nano) and the motor, providing precise control over the motor's rotational speed.

3.3.5 SERVOS: The servo consists of three main components: a DC motor, a control circuit, and a position feedback mechanism. The DC motor generates rotational motion, while the control circuit and position feedback mechanism work together to accurately position the servo's output shaft. The servo is typically connected to the flight controller (Arduino Nano) using three wires: power, ground, and control signal. The power wire, often colored red or brown, is connected to a stable power supply, typically 4.8V to 6V, capable of providing enough current to operate the servo.

3.3.6 DC MOTOR: The DC motor serves as the propulsion system for your RC plane, driving the propeller to generate thrust and propel the aircraft through the air. It converts electrical energy into mechanical rotational motion, providing the necessary power to achieve flight.

The DC motor is typically connected to the Electronic Speed Controller (ESC), which acts as the intermediary between the flight controller (Arduino Nano) and the motor. The ESC controls the speed and direction of the DC motor based on the signals received from the flight controller

V. APPLICATIONS

1. Recreation and Hobby
2. Aerial Photography and Videography
3. Research and Development
4. Education and Training

VI. ANALYSIS

Analysis of remote-controlled planes involves examining various aspects such as design, performance, applications, and market trends. Here's an analysis of remote-controlled planes**:**

- Design and Construction
- Flight Performance
- Control System
- Power System

VII. FUTURE SCOPE

The future scope of remote-controlled planes is quite promising, with several exciting possibilities on the horizon. Here are some potential advancements and developments we might expect to see:

- Enhanced Connectivity
- Autonomous Capabilities

VIII. CONCLUSION

The future scope of remote-controlled planes holds significant potential for advancements and developments. With the continuous progress in technology, we can expect to see several exciting possibilities in the coming years

REFERENCES

[1]. Deepak Rasaily, Maitreyee Dutta Comparative theory on image inpainting: A descriptive review2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS)

[2]. Ashya Chettri, Shristhi Shrestha, Kiran Tamang, Bandana Sharma, Phur Tshering Sherpa, Jus Bahadur Kami, Nitesh Kumar, Deepak Rasaily Design and Development of Semi-Automatic Electrical Incinerator Using Arduino" 2019 2nd International Conference on Intelligent Communication and Computational Techniques (ICCT)

[3]. Suman Poudyal, Rajena Pradhan, Deepak Rasaily, Sabina Sharma, Tenzing Sherpa, Mukesh Kumar Sharma, Abishek Pradhan "Wi-Fi Based Scrolling Digital Display With RTC using Arduino" 2019 2nd International Conference on Intelligent Communication and Computational Techniques (ICCT)2019

DOI: 10.17148/IARJSET.2023.10636

[4]. Donald Rai, Nitesh Kumar, Deepak Rasaily, Pravin Gurung, Tenzing Wangmu Tamang, Chandan Chettri, Palman Kami, Ganden Bhutia "Arduino-GSM Interfaced Secure and Smart Cabin for Smart Office" 2019 2nd International Conference on Intelligent Communication and Computational Techniques (ICCT) 201

[5]. Ashis Rai, Manjil Rai, Nisha Jogi, Bikash Rai, Shahil Rai, Deepak Rasaily "Low Cost Laser Light Security System in Smart Home" 2019 International Conference on Innovative Sustainable Computational Technologies (CISCT) Year: 2019

[6]. Yashal Dorzee Lepcha, Deepak Rasaily, Jigmee Sherpa "Design of Electronic Voting Machine using Microcontroller" International Journal of Engineering Trends and Technology (IJETT) – Volume 32Number5-February 2016

[7]. Deepak Rasaily, Uday Kumar Rai, Nitesh Kumar, Prerna Rana Manger, Bhim Prakash Sharma Fm Transmitter Using Phase Locked Loop For Broadcast, International Journal of Research and Analytical Reviews (IJRAR), Volume 6, Issue 1 March 2019

[8]. Deepak Rasaily, Arun Pradhan, Nitesh Kumar, Donald Rai, Bhim Prakash Sharma, "SMART HOUSES FOR SMART CITIES BASED ON ARDUINO AND ANROID APP" International Journal of Research and Analytical Reviews (IJRAR), Volume 6, Issue 1, March 2019

[9]. Bindhiya Manger, Deepak Rasaily, Tashi Rapden Bhutia, Mingma Lepcha, Reepika Gurung "Design of Inverter with Solar Charge", International Journal of Engineering Trends and Technology (IJETT) – Volume 33 Number 8- March 2016

[10]. Uday Kumar Rai, Deepak Rasaily, Deepesh Rai, Somal Lepcha, Chadni Rai, Amrita Mangar, Arjun Rai, Voice Navigation Helping Blind People, International Advanced Research Journal in Science, Engineering and Technology, Vol.9,Issue 5,pp 127-130, 2022

[11]. Deepak Rasaily Prasant Rai, Meena Khatiwara, Amit Nirola, Reepmit Lepcha, Nagen Sunuwar, Anisha Rai, Cherryla Tobden, Bluetooth Shared Information Display Board Using Arduino UNO, International Advanced Research Journal in Science, Engineering and Technology (IARJSET),Vol.9, Issue.5 pp 117122, 2022.

[12]. Deepak Rasaily, Arpan Sherpa, Anikesh Sharma, Muskan Rai, Pravesh Subba, Seema Mahato, Anjali Chhetri, Uday Kumar Rai, COMPUTER NUMERICAL ROUTER MACHINE FOR 2D AND 3D DESIGINING BASED ON ARDUINO COMPUTING SYSTEM, International Advanced Research Journal in Science, Engineering and Technology (IARJSET), Vol.9, Issue.5 pp.123-126, 2022.

[13]. Deepak Rasaily, Bishal Gurung, Anush Gurung, Arpan Pokhrel, Deepa Limboo, Sudan Dahal, Anu Manger, Arduino Driven Sensor Networked Smart Farming System, International Advanced Research Journal in Science, Engineering and Technology (IARJSET), Vol.9, Issue.5 pp.136-142, 2022.

[14]. Deepak Rasaily, Sonam Sherpa, Pema Lachen Sherpa, Krishna Rai , Dil Rupa Rai , Pranay Thapa , Shyam Chhinal, AUTOMATIC WATER, LIQUID SOAP & SANITIZER DISPENSER WITH AN ALERT SMS, Journal of Emerging Technologies and Innovative Research (JETIR), Vol.8,Issue.8, 2021

[15]. Shreyas S Hegde, Sandeep Nayak, Kishan R, Narayan Chavan, "A Systematic Approach for Designing, Analyzing and Building a Model RC Plane", International Journal of Engineering Research & Technology (IJERT), Vol. 3 Issue 12, December-2014

[16]. Abhijeet Singh, Yogesh Rathore, Yatendra Kumar, "DESIGN & FABRICATION OF A TRAINEE RC PLANE" Rajasthan Technical University Kota, Vol 8 Issue 3 May 2019

DOI: 10.17148/IARJSET.2023.10636

[17]. Naresh.K, "Design, Development and Demonstration an of RC Airplane", Department of Aeronautical Sciences, Vol 6 Issue 2 2012

[18]. Jonathan A. Dixon, Caleb Weatherly, Satyam Mistry, Killian Samuels, Ethan Cerrito, Caleb Morgan, Sanghyeok Park, Sam Pankratz, and Jamison Murphree, "Design, Construction, and Flight of a Remote-Controlled Aircraft", Tennessee Research and creative Exchange (TRACE), Vol 7 Issue 3 2021

[19]. Krutik Patel, Yash Parmar, Vihang Parmar, Harsh Mistry, Meet Tandel, "Design and Development of Radio-Controlled Airplane", International Journal of Advances in Engineering and Management (IJAEM), Volume 2, Issue 7, sep 2020

[20]. Harish M, Sankara Narayanan, Aswin Kumar, Subramani J, "Design, Fabrication and Aerodynamic Analysis of RC Powered Aircraft Wing", International Research Journal of Engineering and Technology (IRJET), Volume: 09 Issue: 07 | July 2022

[21]. Raj Hareshwar Patil, Hrushikesh Vijay Dingore, Suresh Rama Fasale, Somnath Dharma Harne, Prof. Anand Kumar, "RC plane a systematic approach for designing, analyzing and building a model RC plane", International Engineering Journal for Research & Development, Vol 6 Issue 3 May 2021

[22]. N. Logu, V.David, J.Daffodil Carmel, G.Vinodha, S.Manibharathi, "Design And Fabrication Of RC Plane With Flexible Wings" International Journal of Creative Research Thoughts (IJCRT), | Volume 6, Issue 2 April 2018

[23]. Abid Abdul Azeez, Mohamed Gadala, Nasr Al Khudhiri, Sharul Sham Dol, "Aerodynamics Optimization of RC Plane Winglet", International Conference on Modeling, Simulation and Applied Optimization (ICMSAO), Vol 6 Issue 4 2019

[24]. Abhimanue surendran, Mento thomas, Midhun venugopal, Deepak sabu, Deepak kumar. "Design and Fabrication of Glow Engine RC Plane", International Journal of Mechanical Engineering (IJME), Special Issue ICIETEM April 2019

