R.c air plane

Business

DESIGN AND FABRICATION OF RADIO CONTROLLED AIRPLANE Group Members: ADEEL AHMAD(080304) BABUR MANSOOR(080316) BILAL IFTIKHAR(080319) HAFIZ FAIZAN SHABBIR USMANI(080332) BE MECHATRONICS (7-A) Project Supervisor Group Captain (R) Muzaffar Ali Assistant Professor DEPARTMENT OF MECHATRONICS ENGINEERING FACULTY OF ENGINEERING AIR UNIVERSITY, ISLAMABAD DESIGN AND FABRICATION OF RADIO CONTROLLED AIRPLANE Final Year Project Report (Fall) DEPARTMENT OF MECHATRONICS ENGINEERING DESIGN AND FABRICATION OF RADIO CONTROLLED AIRPLANE Submitted By: ADEEL AHMAD(080304)

BABUR MANSOOR(080316) BILAL IFTIKHAR(080319) HAFIZ FAIZAN SHABBIR USMANI(080332) Project Supervisor _____ Assistant Professor, Group Captain (R) Muzaffar Ali Head of Department _____ Professor/Dean/Chair Department, Engr. Dr. Zafar-ullah-Koreshi Page IAcknowledgement.

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14 4. 1 BooksPage No. 15 4. 2 WebsitesPage No. 15 Acknowledgements Apart from the efforts from us, the success of this project depends largely on the encouragement and guidelines of many others. We take this opportunity to express our gratitude to the people who have been instrumental in the successful completion of this project.

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We would also like to thank all the Faculty Members for all their valuable assistance in the project work.

Finally, yet importantly, We would like to express our heartfelt thanks to our beloved parents for their blessings, our friends/classmates for their help and wishes for the successful completion of this project. Chapter # 1 Introduction 1. 1: Basic Introduction Radio Controlled (RC) plane is basically a smaller prototype of an actual aircraft and its dynamics are relatively difficult to understand. For RC Plane there is 3-degree of freedom. Important parameters are: roll, pitch and yaw.

To achieve control of these parameters, there are three control surfaces ailerons, elevators and rudder. 1. : Transmitter/Receiver • A Transmitter is an electronic device that generates and amplifies a carrier wave, modulates

it with a meaningful signal derived from speech or other sources, and radiates the resulting signal from an antenna. The transmitter used for project has 6 channels and is programmable for both airplanes and helicopters. It has a 3-way flap switch, aileron and elevator dual rate switches, rudder mix switch, gear and aux2 switch. A preset memory makes it possible to set up several different models on the same radio.

• A Receiver converts signals from a radio antenna to a usable form.

It uses electronic filters to separate a wanted radio frequency signal from all other signals, the electronic amplifier increases the level suitable for further processing, and finally recovers the desired information through demodulation and decoding. Information carried on a radio signal may represent sound, images or data. We are using a 6 channel tiny 4 grams receiver with signal path diversity. 1.

3: Microcontroller We will be using Arduino AT-Mega 328 Microcontroller and it has a dedicated PWM pin. It has built in ADC therefore no external ADC is required and it is very much faster than Atmel Microcontrollers . 4: Digital Gyroscope How Gyroscopes Work: Gyroscope can balance on almost on any surface with single contact: It can be a finger or even a string. They can resist motion about the spin axis in very odd ways; but the most interesting effect is that gravity-defying part which is called Precession. We will be using Eclectic Gyroscope in our RC Plane to provide it with stable Flight.

We are using Gyro ITG 3200. Chapter # 2 Literature Review 2. 1: History The earliest examples of electronically guided model aircraft were hydrogen-filled model airships of the late 19th century.

They were flown as a music hall act around theater auditoriums using a basic form of spark-emitted radio signal. In 1920s, the Royal Aircraft Establishment of Britain built and tested the Larynx, a monoplane with a 100-mile (160 km) range powered by a Lynx engine. It was not until the 1930s that the British came up with the Queen Bee, a modified de Havilland Tiger Moth, and similar target aircraft.

Radio control technology has been in use since 1893, when NikolaTeslacreated a boat that was controlled by transmitted radio waves. In 1917, the first radio controlled airplane was successful.

During World War II, Germany tried a variety of weapons that were operated by radio control. Radio controlled model airplanes have evolved over the years and seen improvements since that first flight in 1917.

Chapter # 3 Modeling & Design 3. 1 Modeling of DC Servo Motrors 3. 2: Design of RC Plane 3. 3: Major Parts Of RC Plane Rudder Flex the rudder back and forth to loosen up the foam hinge. The less force needed to move the rudder the less stress is put on the servo during flight.

Alternatively cut them off and use clear packing tape to re-attach them, one slice on each side. [pic] Elevator

Adjust the travel adjust value to the maximum allowed before the servo begins to bind. [pic] Wings Helps the Plane in gliding and to increase the surface area of the plane. [pic] Aileron For maximum throw, the aileron wing servo has to be swapped around vertically. The servo head should be pointing toward the back instead of the leading wing edge 4.

Mechanical Analysis All dimensions of the Plane are From National Advisory Committee for Aeronautics (NACA) , we selected the NACA series of 0015 as it was cheaper to fabricate. The Analysis of the Aerofoil was performed on Gambit & Fluent as these software are used for fluid analysis.

We calculated the Coefficient of Drag & Lift using these software to determine whether the plane will fly or not. The coordinates of the NACA series 0015 was taken from the NACA site. Theoretical Calculations • Length of Aerofoil (chord)= 19 cm • Max Thickness of Aerofoil= 2. 85 cm (2.

85/19)*100= 15 We Know that our Aerofoil is Symmetrical, therefore the The NACA Series number of our Foil is 0015 • The NACA 0015 airfoil is symmetrical, the 00 indicating that it has no camber. The 15 indicates that the airfoil has a 15% thickness to chord length ratio: it is 15% as thick as it is long.

NACA 0015 1. 000000, 0. 001580 0.

950000, 0. 010080 0. 900000, 0. 018100 0. 800000, 0. 032790 0.

700000, 0. 045800 0. 600000, 0. 057040 0. 500000, 0.

066170 0. 400000, 0. 072540 0. 300000, 0. 075020 0.

250000, 0. 074270 0. 200000, 0. 071720 0. 150000, 0. 066820 0.

100000, 0. 058530 0. 075000, 0. 052500 0. 050000, 0.

044430 0. 025000, 0. 032680 0. 012500, 0. 023670 0.

000000, 0. 000000 0. 012500, -0. 023670 0. 025000, -0. 032680 0.

050000, -0. 044430 0. 075000, -0. 052500 0. 100000, -0.

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800000, -0. 032790 0. 900000, -0. 018100 0. 950000, -0.

010080 1. 000000, -0. 001580 Chapter # 4 References 6. 1: Reference Books 6. 2: References Web-Sites file:///G:/GBx%20Brushless%20Motor %20Calculator.

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