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Landing aerodynamics and adequate power plant using LPWT for airport lighting scheme

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ABSTRACT

A renewable energy source is more crucial for our country because renewable energy produces an endless power supply. In this project, we use input as wind energy. The wind which is produced in the aircraft while takeoff and launching the plane. The aircraft which produce high pressure while takeoff and launching. Using the wind turbine which is placed near the airport which produces power. The turbines start rotating with the help of high-pressure air is produced from the aircraft. The LPWT which can be used on both sides of the airport where it needs some energy to rotate. While dealing with wind energy we are connected with the surface wind. The aircraft which travels nearly around 400 nautical miles per hour. During the aircraft launching or take off which produce high rotates the turbines which produce energy. During this process, a proposed controller is used to display the landing and takeoff process in the monitor. The power produced from the turbines is used for lighting in the airport.

Keywords— GPWS, Piezoelectric pads, LPWT, Renewable energy

1. INTRODUCTION

The demand for power is more increasing in this generation. Nowadays harvesting energy by various methods is more essential in our developing countries. By various alternating methods, energy can be produced such as solar, tidal and wind but it is difficult to produce to generate. Power Quality is the main disadvantage of producing power in all different methods. To overcome these problems the concept of producing electricity in the airport is founded. In our project, we turbines are used to produce electricity. Turbines are fixed with wings. The aircraft which produce high velocity which is used for

rotating the turbines. By this process, turbines start rotating which produce electricity it is used for lights inside the airport. In alternating production methods, it causes many disadvantages in production and in the distribution process. But in our concept production and distribution of electricity which takes place in the same place which reduces the loss of energy. By using the piezoelectric pads the position of the aircraft can be watched in the system. This system has long-term reliability and at an efficient cost.

2. RUNWAY EXCURSION

A runway excursion which occurs during the takeoff and launching process of the aircraft. Approximately 25% of incidents and accidents in air transport, and 96% of all runway accidents. The excursion may be national and international it has three types. One is departing the aircraft fails to become airborne or successfully reject the takeoff before reaching the end of the designated runway. The second one is landing aircraft is unable to stop before the end of the designated runway is reached. The third one is an aircraft taking off or rejecting take-off or landing departs the side other designated runway. An aeroplane departs from or lands on a runway other than that designated or a taxiway either of which may obstruct and/or shorter and /or narrow than the intended runway. In exceptional cases, the landing case may involve the use of the wrong airport. A departing aircraft fails to get airborne before the end of the runway due to inappropriate aircraft handling technique or aircraft weight exceeds the maximum for prevailing condition or craft malfunction engine failure.

3. TOUCHDOWN METHODS HIDE C

Highly Integrated Digital Electronics Control (HIDE C) is used to improve aircraft performance. The double-ended UC resonant half-bridge controller and a multi-mode power-factor

correction(PFC) controller, managed by digital core running best in class control algorithms those are combined bySTNRG011. Non-volatile memory is also provided on the chip, for storing application specific parameter. To increase the optimize efficiency and performance throughout the load range and load top maximize efficiency by the use of STNRGOLL digital controller. A 2-pin UART/I²C port enables a host system to monitor and manage the power supply.

- Additional integrated features include LLC & PFC gate drives, high-voltage (800 V) startup circuitry, and line sensing to further simplify design, increase reliability & ruggedness, and reduce solution size and BOM.
- The compliance with the new IEC 62368-1 safety standard for audiovisual and ICT equipment, which is called the X-capacitor discharge circuit which is taking over from 60950 and 60065 standards in the US and EU.

3.1 PCA-Propulsion Controlled Aircraft

This Propulsion Controlled Aircraft (PCA) was developed and tested at NASA Dryden commercial and military aircraft. Aircraft propulsion system generally consists of an aircraft engine to generate thrusts, such as a propeller or a propulsive nozzle. An aircraft propulsion system must achieve two things. The thrust from the propulsion system must balance the drag of the airplane when the aircraft is cruising.

3.2 Dutch roll method

The Dutch roll occurrence is a moment of yawing motion which can be caused by any number of factors. As swept-wing aircraft yaws. The left wing becomes less swept than the right wing in reference to the relative wind.

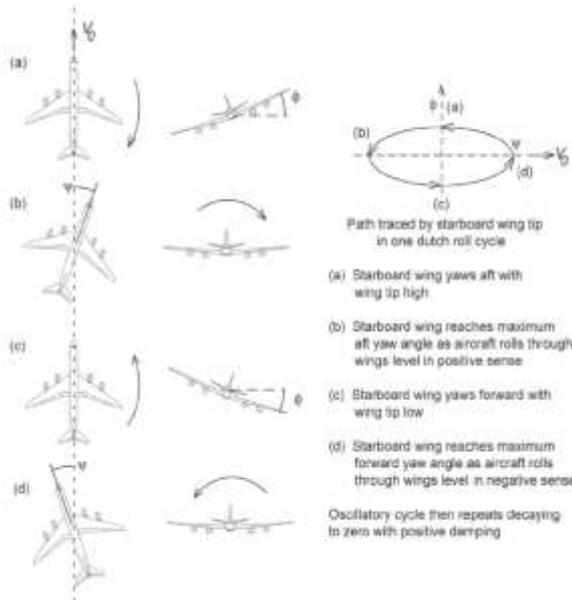


Fig. 1: Dutch Roll Diagram

4. PROTECT

4.1. Protect-propulsive technique for emergency control

This scheme is implemented for future aircraft design for replacing the flight control system. The uncontrollable situation, the above concept is used with PCA. When the aircraft is reached near the touchdown point then the information is passed to the pilot which helps them to land the aircraft safely.



Fig. 2: Protect touchdown

5. GPWS (GROUND PROXIMITY WARNING SYSTEM)

A pilot was alerted by GPWS system if their aircraft is in immediate danger of flying into the ground or an obstacle. The aircraft's height above ground as determined by a radar altimeter. This is monitor by the GPWS system. A computer then keeps track of these readings calculates trends, and will warn the flight crew with visual and audio messages. GPWS can only gather data from directly below the aircraft, it must predict future terrain features.

6. PIEZOELECTRIC SENSORS

In our concept, we are using piezoelectric pads for sensing the changes in the device. The sensor is used in the piezoelectric pads. They are versatile tools for the measurement of various processes. This sensor used for quality assurance, process control and for research and development in many industries. It is insensitive to electromagnetic fields and radiation, enabling measurements under harsh condition.



Fig. 3: Piezoelectric Pads

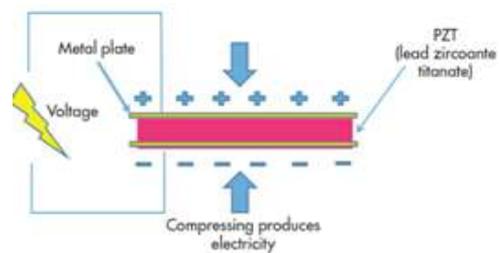


Fig. 4: Piezoelectric effect

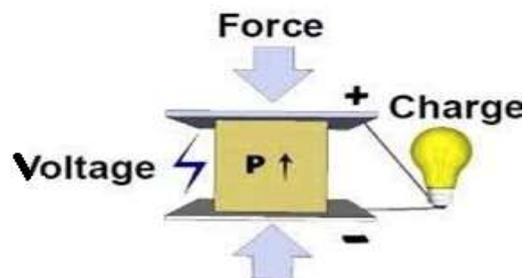


Fig. 5: Electrical representation of piezoelectric effect

6.1 Applications

- It is used in various applications such as in medical, aerospace and used in tilt sensor.
- It is used in diffused applications for micro-robotics and course-changing bullets.
- It is also used for developing internal combustion engines.

7. WIND TURBINE

A wind turbine which converts mechanical energy into electrical energy. Vertical and horizontal wind turbines are

manufactured in large numbers. The battery used in boats or caravans or traffic signals were using small turbines. If we are using large turbines which produce power for domestic uses. If large numbers of turbines were in the same place it is known as wind farm. Wind energy is more increasing production of electricity nowadays.



Fig. 6: Wind turbine

8. MICROCONTROLLER

This microcontroller consists of the 8-bit microcontroller which is CMOS FLASH-based packs microchip’s powerful PIC architecture into a 40 package and is upward compatible with the PIC16C5X, PIC12XXX and PIC16C7X devices. This Microcontroller consists of 256 bytes of EEPROM data memory, self programming, an ICD, 2 comparator, 8 channels of 10-bit analogue-digital converter, 2capture/compare/PWM functions, the synchronous serial peripheral interface or a universal asynchronous receiver transmitter(USART), 2-wire inter-integrated circuit.

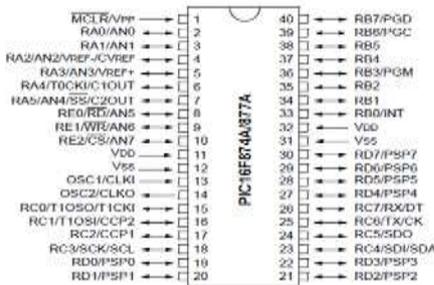


Fig. 7: Pin Diagram of PIC16F877

9. BLOCK DIAGRAM FOR AIRPORT LIGHTING SCHEME

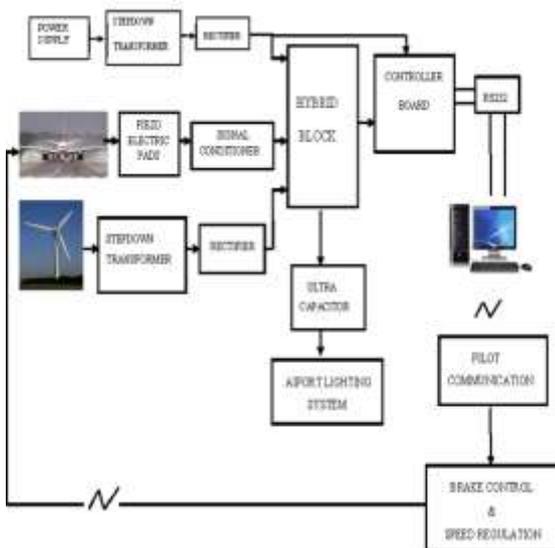


Fig. 8: Block Diagram of LPWT

While the aircraft landing and lift off if we can install the LPET on both sides of the ramp to get or a mass power. If we need the aircraft will be in balance around 400 nautical miles per hour. While shifting the very great air velocity will occur on the ramp and at the same time, it will be enough to drive small micro wind turbines to carry out or arrive power.

This power is also generated for the ramp and also it will be used in the taxiway or another purpose. While we say another concept, during landing plane this is the first point for the aircraft to touch the ramp and also it will be very difficult to achieve the ramp because it can't be communicating between the pilots and supervising or otherwise it is not an automatic process which leads to some angle deviation from that point. If it is incorrect supervising it will lead to destruction aircraft on the ramp. While we using the EMC it will be covered all the future needs of ATC and ATM.

9. CIRCUIT DIAGRAM

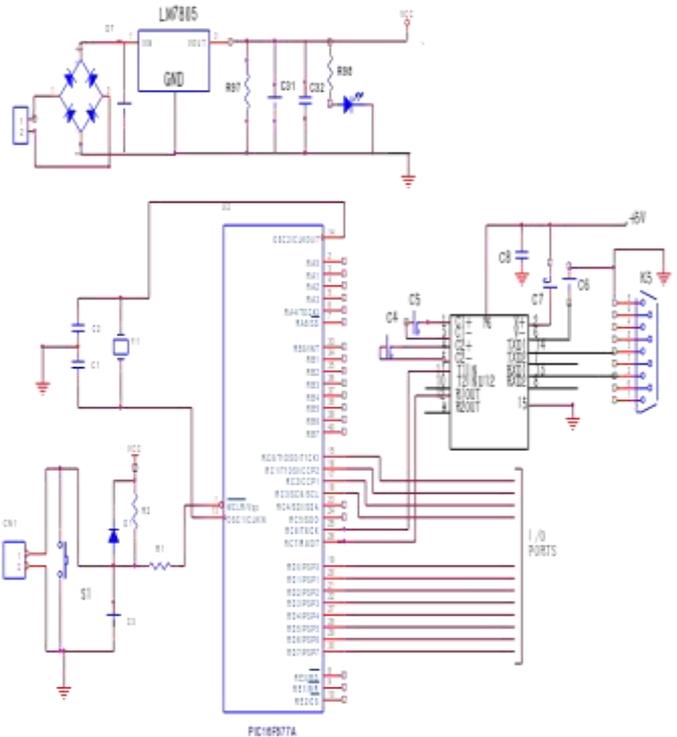


Fig. 9: Circuit diagram

10. FRONT END

10.1 Visual basic

The graphical user interface programmed by visual basic which means programming environment from Microsoft. Visual Basic was derived from BASIC and enables rapid application development of graphical user interface application, access to databases using RDO or ADO creation of active X controls and objects. BASIC is high-level programming languages who design emphasizes ease of use.

11. BACK END

11.1 Embedded C

Embedded c is an adjunct to a c programming language that provides support for embedded devices. Embedded c is used for micro-controlled based applications. The limited resources that are used in embedded c are RAM, ROM, I/Os on an embedded processor. Embedded requires compilers to create a file to be downloaded to the microcontrollers/ microprocessor where it needs to run. Embedded c contains functions, structures and macros which are could use to access different functionalities of the microcontroller.



Fig. 10: Hardware model of the LPWT



Fig. 11: Output of the of LPWT

12. CONCLUSION

The concept can be appraised and thoroughly analyzed with the given software. The main idea of the project to possess a renewable energy source with efficient cost. In this project, we are using energy as a renewable resource, the source is used to provide to supply the electricity in the runway. This alternative source of power generation can be used for all another commercial purpose in the airport for generating power. This

project has a great solution for power. The non-renewable resources, providing a large amount of electricity with less cost, improved efficiency, automation for the social welfare of the country and the environment.

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