International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE) ISSN: 0976-1353 Volume 24 Issue 5 – APRIL 2017.

TOUCHDOWN AVIATION ANALYSIS

K.BANUMATHI1, E.BALAJI2, R.PRAKASH3, P.SARVESHWARAN4

Assistant Professor [1,] *Final Year U.G Student* [2,3 4]
Department of ECE, Panimalar Institute of Technology, Chennai..

***Abstract*---Energy harvesting by means of any source of energy became necessary for developing countries. Natural and renewable energy provide clean environment to some areas like airstrip (Run way). Most of the energy harvesting is done through wind source has become seasonal and will have huge uncertainty in power quality. To overcome and for power production without uncertainty with enhanced power quality, we like to show a existing concept for a newer area with minimization. A low power and lower size wind turbine can be installed on both sides of the runway to acquire power. The piezoelectric sensors are placed in the runways (airstrip) as layers to provide a perfect touchdown as it can be analysed through visual basic6.0 where piezoelectric sensors produce small voltage when an impact weight is given to it and also during the touchdown a pressure of air that blows wind turbine which produces energy which can be used for further use.**

***Keywords*--- Piezoelectric sensors, visual basic6.0, wind turbine.**

I. INTRODUCTION

The LPWT can be installed on both sides of runway to acquire power during aircraft landing and take-off. Generally on runway, aircrafts movement will be around 400 nautical miles per hour. During the movement very great air velocity will occur on the runway and the same will be enough to drive small micro wind turbines to produce power. This power generated for the runway can also be used in the taxi-way and other purposes.

The second concept is the touchdown point- which is the first point for the aircraft to touch the runway during landing. In the existing system the touchdown point is analysed manually and communication between the pilot and monitoring room is very difficult to achieve on the runway which leads to angle deviation from the point. Improper monitoring of the touchdown point can lead to collision of aircraft on the runway. Existing communication system Aeronautical Mobile Airport communication System (AeroMACS) are done with the high rate and safety enhancing communication system in C- Band without getting accurate touchdown points. The proposed communication system that have covered all the future needs of Air Traffic Control (ATC) and Air Traffic Management (ATM) are controlled using the Embedded Micro Controller (EMC) and automated for achieving the exact point of touch down.

The power generation can also be done with the touchdown point. If the accurate point of the touchdown zone is analysed then with the help of vibrations created during the landing and take-off the power can be generated which is a unique step for energy conservation system. This type of power generation is done by using the piezoelectric material which uses a piezoelectric crystal to produce voltage for the runway and taxi-way. Large amount of pressure is exerted on the runways during touchdown and aviation. If the piezoelectric layers are placed here then this mechanical energy is converted to electrical energy. The system efficiency can be improved by placing the stacked structures which contains several layers of piezoelectric clusters and have the capacity to handle very huge amount of pressure. The maximum aviation weight for the airbus aircraft (A380) is 560 tones, which can produce 224 KV, so if one consider a total number of touchdowns in the runway a large amount of energy could be produced. Nearly 8138 kWh energy is produced which can provide power for up to 12207-16276 homes.

II. RUNWAY MARKINGS

The Runway **Thresholds** are markings across the runway (airstrip) that denotes the beginning and end of the designated space for touchdown and aviation under non- emergency conditions.

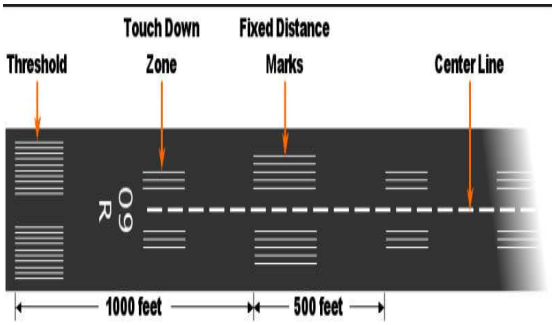


Fig.1.

Displaced thresholds may be used for taxiing, aviation and landing rollout, but not for touchdown. A displaced threshold exists because of the obstacles just before the runway, runway strength, or restrictions of noise may make the starting sections of the runway unsuitable for touchdown. It is marked with white paint arrows that lead up the beginning of the landing portion of the runway.

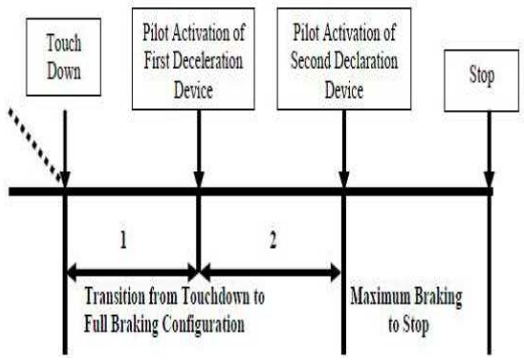


Fig.2.

The foremost point for the aircraft should touch the airstrip surface during touchdown is called as **touchdown zone**.

Segment 1: This segment represents the flight test measured average time from touchdown to pilot activation of the first deceleration device. For AFM (Aircraft Flight Manual) expansion of data, use the almost of 1 second or the test time.

Segment 2: This segment represents the flight test measured average test time from pilot activation of the speed reduction device to pilot activation of the speed reduction device. For AFM data expansion, use the longer of 1 second. Second segment is repeated until pilot activation of all deceleration devices has been completed and the airplane is in the full braking configuration.

III. TOUCHDOWN METHODS

A. HIDEC

Highly Integrated Digital Electronic Control (HIDEC) is the integration of aircraft engine operations with air data and flight control systems to improve aircraft performance .Testing efforts led to the development of several control modes that demonstrated extended engine life, increased engine thrust, and lower fuel taken .Most of the elements of HIDEC were a Digital Electronic Flight Control System (DEFCS), the ascended engine DEECs, an on-board general purpose computer, and an united architecture allowing all components to "talk to each other."

Digital systems developed on the HIDEC F-15 were the adaptive engine control system (ADECS) and performance seeking control (PSC).It became the first aircraft to demonstrate the self-repairing flight control system (SRFCS) and the propulsion-only flight control system (PCS).The integration of digital propulsion and flight control systems on general purpose and in factory use, aircraft could lead to very significant savings in common purpose and production costs. The advantages of idle engine life and enhanced engine and flight performance also give the aircraft a greater safety margin, a factor that can be appreciated by aircrews as well as passengers.

B. DUTCH ROLL METHOD

Dutch Roll is a method which uses damped oscillation in yaw of an aircraft that occupies into roll. Frequency similar to longitudinal short period mode, not as well damped (Less effective than Horizontal Tail). It is a type of Motion consisting of an out-of-phase combination of “Tail- Winging” and rocking from side to side which resembles a snake slithering.

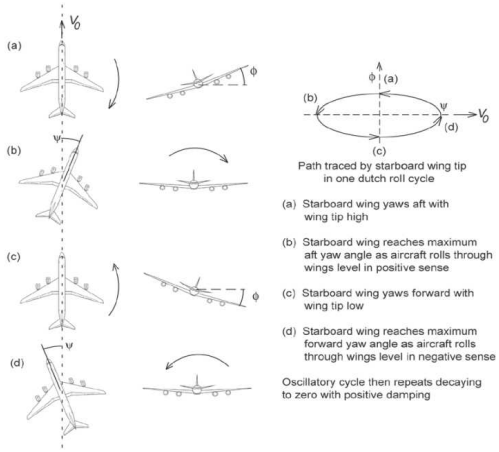


Fig.3.

C. PROTECT (Propulsive Technique for Emergency Control)

This method is developed for the future aircraft design for emergency control using augment or replaces the flight control system. During the worst case situations this method is used along with PCA. The Airborne is the where the aircraft is carried through air which is near the ground surface and nearing the touchdown point. A correct monitoring is required for the aircraft manually to place the wheel is the point of Touchdown point. At this point the communication with the pilot should be very strong so that the aircraft can be landed safely.

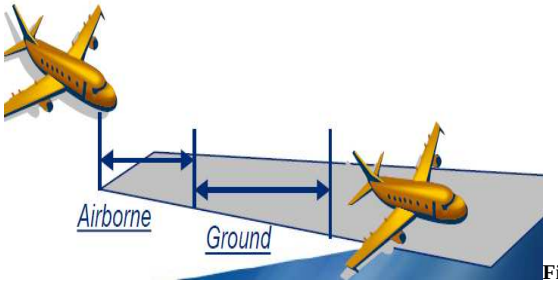


Fig.4.

D. GPWS (Ground Proximity Warning System)

A Ground Proximity Warning System (GPWS) is a type of equipment carried by aircraft to warn pilots if they are at a dangerously low altitude and has disadvantage of crashing. It has the decrease in altitude warning system before 20 second of touchdown .The main purpose of these systems is to prevent what is called a **C**ontrolled **F**light **I**nto **T**errain (CFIT) is an accident in which an aircraft crashes in the land, or into the sea and ocean, or an compound material such as a mountain or building.

E. PIEZO ELECTRIC SENSOR

A piezoelectric sensor is a device that manipulates the piezoelectric effect, to measure the change in pressure, hastening, temperature, strain, and force by converting it to an electrical charge. The prefix piezo- is Greek for 'squeeze' or 'press'.

Fig.5.

IV. FRONT END

A. VISUAL BASIC 6.0V

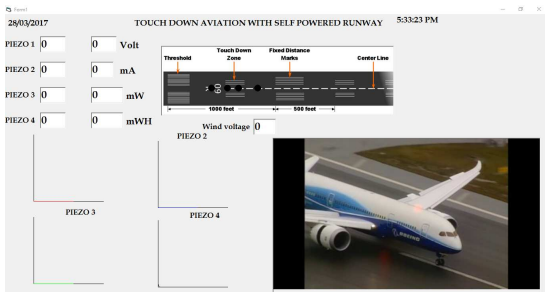
In Visual Basic 6.0, the Visual part refers to the method used to create the Graphical User Interface (GUI). As an substitute in writing numerous lines of code to describe the appearance and location of interface elements, we simply add Pre built Objects in the required place on the screen. The Basic part refers to the BASIC (Beginners All- purpose Symbolic Instruction Code) language, used by many users than any other language in the History of Computing.

V. BACK END

B. EMBEDDED

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality affairs that extant between C extensions for different embedded systems. Historically, embedded C programming stand in need of nonstandard extensions to the C language in order to support tropical features such as basic input output operations, fixed-point arithmetic, multiple distinct memory banks.

VI. OUTPUT



VII. CONCLUSION

The concept can be evaluated and completely analysed with the software used and also can be implemented in metro airports to achieve green and clean energy harvesting system with the self-powered runway with the automated touchdown zone. It uses touchdown sensors to automate the aircraft landing and power is generated with the pressure and impact from the vibration during landing. The efficient way of using the alternative source of power generation and which can be made with centralized distribution to all the other commercial and residential purpose from the power generated in airport.

This project could have a complete solution for the existing system with the improved efficiency and automation for the social and safety welfare of the country.

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