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Design of flight data transmitter for black-box detection at airplane crash

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ABSTRACT

With any airplane crash, there may be many problems arise related to the crash. The only answer is found in the black box which is the combination of Flight Data Recorder and Cockpit Voice Recorder. Instead of waiting for a long period for scanning the black box the valuable information can be recovered instantly via RF transmitter and receiver using GPS is an existing system. The direction sensor, vibration sensor, accelerometer & temperature sensor are used to analysis and detect the fault in the aircraft. If there are any changes in any of the data of four sensors, it will send the CSV/EXCEL format data to the pc through RF transmitter & receiver with the help of GPS. The reason for the crash is pointed and analyzed for the future aircraft designed model. In proposed

system, the CSV/EXCEL formatted Flight data information can be directly send to the highest authority persons via mobile or website within 40 seconds. This Concept give low power consumption using lower signal network to easily and quickly send to Authority persons. In this work an effort has been made to design and develop embedded for a modern aircraft.

Keywords: Arduino controller, sensor Modules, GPS & GPRS, Excel transmitter and receiver.

Abbreviations: GPS - Global Positioning System

1. INTRODUCTION

The black box in the aircraft was first discovered and launched by Dr.David Warren, who is a great scientist in Australia in his period. He caught up with the accident when he was working in Melbourne at Aeronautical research laboratory in 1950's. A flight data recorder is another one Central Processing Unit and the unit employed in aircraft. It's all sensor Logics are always recording pilots inputs, electronic inputs, sensor positions and instructions sent to any electronic systems on the aircraft. It is called to as a "Recorded box".

The first jet powered commercial aircraft is the world's first crash of plane. To acknowledge the flight crash reason after the accident, it is used to find the actual queries for that incident. That Australia was the first country to construct a black box and made is as compulsory in all flights but it was not explained until 1960 even though it first demonstration unit is produced. Usually the black-box is the combination of CVR (Cockpit Voice Recorder) and FDR (Flight Data Recorder). Mainly it operates with the GPS. Both are used to find what happen in the air crash. For example 182 Sikh terrorists over Atlantic Ocean where bombed Air India flight in 1985, when a plane crash in the sea.

The CVR is unsurprisingly used to monitor any sounds occur within the cockpit. While researches find out the different sounds such as emergency pings and pops. Investigators are well expert that they workout crucial flight investigation like speed the plane was travelling and the engine rpm and the cause of the crash is essential for determining the timing of event and the information it contains such as communication among the ground control under other Air craft. It is most abundantly in the tail of the plane. Flight data transmitter is designed to be small and thoroughly integrated to withstand the influence of high stable and high speed impacts and extreme high temperatures.

By reports of DGCA, In India there may be number of civil aviation the most deadly aviation Disaster in India was remarked as three accidents. The first one held in 1978 at Air India flight and this destroys the life of 213. The second is held in 1996 at charkha Dadri mid-air collision due to this 349 of them had lost their lives. The Air India express flight 812 is the third crash where 158 of in them were lost their lives on 22 may 2010 at Mangalore. At May 23rd the CVR in the flight may be recovered and later by two days of 24th May the FDR (Flight Data Recorder) was founded. The DGCA sent the recorders to New Delhi for analysis of crash and Data acquisition (DAQ) and consequently send the data to the US NTSB (National Transportation Safety Board) for a further investigation. For the past sixteen years (2000-2015) there were 258 flights which lead to a crash from all over the world, with most of unknown reasons. The reason for the plane had been suggested by the experts. But the exact reason for the crash is not found. The paper is co-ordinate by the following section. The methodology in the section [4] briefs the techniques and system in airplane. In section [5] architecture of the airplane section and receiver section is of explained. Finally in the conclusion section [6] will define and give a complete answer for an airplane crash and the black box detector.

The FDR system is used to collect and record the data from various airplane sensors. The medium is designed to survive an accident. The analog or a digital flight data actuation unit and a digital recorder in the FDR system will vary depending on the age of airplane. It helps the investigators to collect the data in the FDR system. Then the cause of an accident was determined whether by a pilot or an external event or by an airplane system. The FDR records five parameters that are acceleration, air speed, compass heading, time and altitude in the first generation. Recording tape is used in the second generation of digital FDR. For a period of 25 hours the DFDRs can record and store up to 18 operational parameters.

In 1990 the solid state technologies for recording the data had been introduced in the third generation FDR. For a period of 25 hours these recorders can record up to 256 operational parameters. In From 1970, the density of RAM has greatly increased and the ability to record thousands of parameters for hundreds of flight time and hours in flight data recorders or quick access recorders is now possible. Manufactures use compression algorithms and may become even more knowledge with the introduction of video recorders.

That the new video compression version has a relevant compression factor which is usually a hundreds of times. The compressed file will be less than that of 1% of the size of original file. Even the memory capacity is much larger the compression is still useful. The flash memory developers can utilize the results, as well as the work has been done relevantly to the hard disk of FDR. A difficult value is that flight audio, video and data value recorders run out of space on Extreme hard disks.

The concern of encountering this difficulty leads one to act cautiously, constantly attempting to reduce the used data space. A systematic FDR is 16 cm (6.3 in) in height, 12.7 cm (5.0 in) in width and 50 cm (19.6 in) in depth. It weighs 4.8 kg (10.6 lbs).

2. LITERATURE SURVEY

The mid-air disaster in flight will never know immediately. The reason for the crash is found only when the black-box is recovered under the difficult condition, the dispatched team at a Considerable cost. Sometimes the black-box may not be found for a years. For Ex: In June 1 2009 at an Atlantic ocean the Air France Flight 447 crashed. The reason and cause of the crash is unknown due to this missing of black-box.

Two years later it was found in May 2011. The main thing to be noted is that delay in finding the black-box will leads to risk for the future flights. If there is a defect in the manufacturing model of the plane it tends to serious hazards. In 22nd December 1997 an aircraft ER-ACF with 5 members were missing while reaching their destination Namibia. In the aircraft type of Antonov an-72 for an unknown reason. It is a cargo type flight. In 25th May 2003 an aircraft N844AA with 1 member was missing while reaching their destination Luanda, for an unknown reason.

In first November 2008 an aircraft N87V with 3 members were missing while reaching their destination Guyana. In the aircraft type of Beech craft king air 65-A90 for an unknown reason. It is an aerial survey type flight. In 2nd Jan 2011 an aircraft LV-ZY0 with 1 member was missing while reaching their destination Argentina, with the aircraft type of Robinson R44 for an unknown reason. It is a positioning type flight for police patrolling in Santa Teresina.

Beech craft 1900C fight with notable person Jerry Krause (missionary) for unknown reason. It is an administrating type flight. In 8th March 2014, Malaysia airlines flight 370 with 239 members was missing while reaching their destination from Kuala Lumpur to China. From the evidence the higher authority legal person suggested that the plane went down in the Indian Ocean west of Australia.

3. METHODOLOGY

Taking into account, direction, accelerometer, vibration, temperature sensors are the current System parameters which are installed in aircraft and obtained by means of GPS (Global Positioning System). Due to signal fault take parameters are recorded and the parameters Lakes behind, so we are developing an embedded system which is independent of GPS. Arduino gathers the data from all sensors and process the data from all sensors and process it as per the program. EEPROM used to store the data and flash it on PC with the help of Zigbee module over 2.4 ISM bands the data are received in base station.

4. PROPOSED SYSTEM

We have proposed a new system using Arduino controller which is send information of Excel formatted flight data within 40 seconds of before to after airplane crash without network. In future, we implement high efficiency system for avoiding to airplane crash.

5. ARCHITECTURE

a. System architecture

In this proposed system consists of Temperature sensor, Vibration sensor, Directional sensor, Personal computer, EEPROM, Arduino board and *Accelerometer*.

b. Operation

The architecture in this consist of various sensor which are sensing various parameters constantly and gives an input to translate analog into digital data and send the data to receiving part. PC is used to display the data constantly.

c. Arduino

Arduino is a software or IDE (Integrated Development Environment) and Physical programmable circuit board that run on the computer. The computer codes are writing and upload to the physical board. IDE is the simplified version of C++. Separate hardware is not needed for Arduino. For new coding simply use USB cable.

Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins, 6 analog inputs and 6 PWM digital input/output pins, 16MHZ, quartz crystal, a power jack, an ICSP header and a reset button. The input voltage limit was 6-20volt and recommended input voltage is 7-12 volt where as operating voltage is 5volt and the DC current per i/o pin is 20mA.the flash memory ATmega328P is 32KB and which 0.5KB used by boat loader. 2KB for SRAM, 1KB for EEPROM and16MHZclock speed. The length, width, weight of the arduino 68.6mm*53.4mm*25g Arduino programs are written in C or C++. It is an open source platform and it needs external clock. An external interface to a PC is needed to execute any programs. ATmega328P has run on low voltage. It uses less power in sleep state or standby state.

d. EEPROM

Electrically Erasable Programmable Read Only Memory (EEPROM) is a non-volatile memory. It does not need to be removing from the computer and to be modified. It can be reprogram entirely not a particular part is modified. In an EEPROM it is programmed frequently. The EEPROM has a special flash memory and it uses Personal computer voltages for reprogramming.

e. Accelerometer (ADXL345)

The ADXL345 is a 3-axis MEMS accelerometer module. It is a small and low power module. It have 3.3v voltage regulation and level shifting which makes them simple to interface with 5v microcontrollers such as the Arduino. It has a four sensitivity ranges from + and -2G to + and -16G. The output data rate ranging from 10Hz to 3200Hz. Accelerometers are used in flight data recorder. It is used to measure and record acceleration force. These forces may be dynamic or static caused by changes of the direction of the movement and the speed.

f. Temperature sensor

This is the JR TLS2-TMP DMSS temperature sensor. Designed for the latest telemetry enables JRXG6, XG8 and XG11 radio system. These easy to fit sensors provide valuable real-time in flight data form critical parts of your model. The light weight sensor you choose connect directly to the main DMSS receiver through Y-harness or in series via the DMSS telemetry adaptor (TLS1-ADP).TLS2-TMP sensor is ideal where higher temperature are found between 30°-230°c. Sensor of Ring type connector allows for direct connection to engine head bolt or motor mount. The operating voltage is 4v-8.5v and it has high visibility LED for operation conformation.

g. Vibration sensor

Vibration sensors are used for measuring proximity and displacement or acceleration, analyzing linear velocity and displaying. Current or voltage is the output of vibration sensor. To increase the efficiency vibration measurement is needed. Applications of vibration sensors are determination of equipment condition and specific location, type of problems. A more complex output is transmitted by vibration transmitter.

h. Direction sensor (GY-273 HMC5883L)

Gyroscope have a spinning propeller, it is inserted in front of airplane. The Gyroscope is in fixed position in the plane. If the rotor has greater mass and speed the stability increases. For the attitude indicator 15,000 rpm and for the heading indicator 10,000 rpm are needed. An acoustic vector sensor is capable to determine the direction of arrival of sound waves of various signatures. It is used for detection and localization of air craft, gun shots. AVS vector sensor have a compact size 1cm and low weight 100g and low power less than 1watt and the heading indicator is used in the flight to detect the moving direction of a flight.

6. GPS (GLOBAL POSITIONING SYSTEM)

The global positioning system (GPS) is a space-based navigation system. The GPS provides location and time information in all weather conditions.GPS tracking system was designed and utilized by the military and aircraft. At least three satellites are used to provide accurate location. The GPS tracker can trace and monitor the black box by message or internet The GPS signal are transmitted at a power equivalent to the 50watt domestic light bulb. The satellite gives radio signals to the GPS around the earth. At once 6-12 satellites give signals to the GPS unit. GPS receiver has their own power and display.

7. ZIGBEE MODULE

Zigbee is a technological standard designed for control and sensor networks. Based on the IEEE 802.15.4 Standard Created by the Zigbee Alliance. It Operates in Personal Area Networks (PAN's) and device-to-device networks Connectivity between small packet devices Control of lights, switches, thermostats, appliances, etc. Development started 1998, when many engineer's realized that Wi-Fi and Bluetooth were going to be unsuitable for many applications. IEEE 802.15.4 standard was completed in May 2003. Organization defining global standards for reliable, cost-effective, low power wireless applications. A consortium of end users and solution providers, primarily responsible for the development of the 802.15.4 standard. Developing applications and network capability utilizing the 802.15.4 packet delivery mechanism.

8. PERSONAL COMPUTER

PC is designed based on the concept of microprocessor technology that enables manufacture to put an entire data in one chip. In the system the plane transmits the data to the pc at the time of fault occurs in any of the one of the sensor. The text file is created at the particular time and the entire data is send to the pc will be store and view. After the Successful completion of the data received in the file format will give detail information for the Crash. Then it is displayed in the screen for analyzing and rectifying the problem

for future development. The storage capacity is very high and it can be connected to the LAN and WWW through internet with quick access.

9. GPS VISUALIZER

GPS visualizer is software that creates maps from GPS data. Output can be in SVG,JPEG,PNG,GOOGLE MAP or GOOGLE earth format.GPS is used to transmit a data from the flight every seconds or every meter and convert it to GPX format upload that file in GPS visualizer that file containing comma-separated date should generally end in ".csv" or GPX files should end in ".gpx". Within the map editor the collection of data can be displayed as little dots or thin lines. These lines or dots can be used to map the location. The GPS visualizer software is used to map the image with the use of longitude and latitude which the GPS is pointed.

10. WIFI EXCEL TRANSMITTER

The Excel transmitter read the required parameters from the enter source on everyday durations. The on the spot information at give up of transmission c program language period will be dispatched to exact email addresses (most three e-mail addresses) in .CSV layout, we can examine the statistics either in MS-Excel layout or text layout & optionally the statistics may be uploaded to the receiver server through FTP switch. It additionally gives remote SMS alarm facility to predefined SIM numbers. It's a green & cost powerful solution for records monitoring packages. It consumes low power with low signal network.

11. POWER SUPPLY

The electrical energy is supplied to an electric load is known as power supply. Power supply found in consumer electronic devices and desktop computer depending on its design a power supply may obtain energy from various types of energy sources. The energy storage devices such as batteries, fuel cell, generator, solar power convertors. The power supplies have input and output power. The input power receives energy from the energy source and the output power delivers energy to the load.

12. GPS TRANSMITTER AND RECEIVER CIRCUIT DESIGN MODULE

The Figure 4 & 5 is explained how transmits the data to receiver. In this module, GPS receiver find out the longitude and latitude value, when detect Vibration signal or temperature signal or accelerometer signal from the Arduino controller. GPS value is The Conversion is Generated the plain text (GPX) and used for reads the track log data. This format most required for generate the Google map, location and GML file for Google earth with file addresses which is added postal codes ,zip codes ,and direction of cities & villages. Flight Data transmitted through via Zigbee transmitter.

If the Data receiver module got the Sequence digital code from Data transmitter module, automatically it sends the value of Altitude and longitude to PC through RS232 cable connection. Real-time value of Altitude and longitude has been display in HyperTerminal window in continuously.

13. EXCEL TRANSMITTER CIRCUIT DESIGN MODULE

The Raspberry pi controller connected GPS module and GPRS module for wireless data transmission. In the Excel wireless transmitter module-2, Controller controls the signals of GPS and rectify original signal without noise. This controller easily finds out emergency in before airplane crash using vibration sensor, temperature sensor and accelerometer. Automatically, it sends the Excel formatted of GPS value through wireless GPRS module to nearest station and receives to authorize persons for detecting black-box in airplane. As we can used Excel Black-box which attached with Excel wireless transmitter module-2 for quick data transmission. In Received Excel file, web link is given for finding exact location airplane.

14. CONCLUSION

This paper describes two data transmitter modules for choosing best one. Module-2 provides easily handling and flexible weight for fitting to black-box or Cockpit recorder system which is mounted itself. Generated Excel file size is maximum 1kb. So it has to send easily to saved email and websites in Arduino controller or Raspberry pi controller.

As we implemented that the real time flight tracker system is designed to circumvent the need to find the black box after a flight accident by developing an embedded system. Before the flight crashing, Immediately CSV or Excel formatted data can be auto-generated and transmitted from aircraft to nearby base station using long range RF transmitter with the help of GPS and the Arduino or Raspberry pi microcontroller without network.

If network is possible in circumstance, Audio and video data can be send to nearby base station in automatically. The temperature of fire, vibration, direction, and accelerometer of Flight Information's are data logged to memory device for the flight investigation. This parameter are stored and broadcast digitally in real time. We have implemented that data retrieved from black box and CSV or Excel formatted file sent to email and mobile of Highest Authority persons before 40 seconds of Flight crashing.

SUMMARY OF RESEARCH

The Detection of Cockpit or Flight Data recorder have RF transmitter or Wifi for sending Excel formatted flight data. The FDR records flight parameters. The information recorded differs broadly, contingent on the age and size of the airplane. The base necessity, notwithstanding, is to record a fundamental gathering of five parameters: »pressure altitude, »indicated airspeed, »magnetic heading, » normal acceleration, »microphone keying. Mouthpiece keying (the time radio transmissions were made by the group) is recorded to correspond FDR information with CVR data. This fundamental prerequisite has existed following the 1960s. Today, cutting edge plane air ship far surpass this, and are fitted with FDRs that can record a great many parameters covering all parts of the air ship operation. The FDR holds the most recent 25 hours of air ship operation and, similar to the CVR, works on the perpetual circle rule. As FDRs have a more extended recording length than CVRs, they are exceptionally valuable for examining episodes and mishaps. A regular FDR is 16 cm (6.3 in) in tallness, 12.7 cm (5.0 in) in width and 50 cm (19.6 in) top to bottom. It weighs 4.8 kg (10.6 lbs). The FDR regularly tells mischance examiners what happened amid a mishap arrangement and the occasions paving the way to it.

FUTURE ISSUES

Wifi network cover nearby networked station for flight data transmission. When high range of wifi or Lifi will use in without network, suddenly the system communicate to the Airport station in future.

DISCLOSURE STATEMENT

The research project is mainly focused on Data Disclosure. A project proposal forwarded to high valuable funding agencies. The Data Disclosure stated about Our VB in ORACLE application spills delicate data with respect to SQL database names by means of the die() capacity and existent client names by means of AJAX solicitations. Reinforcement source code records are likewise left available, and way revelation vulnerabilities are likewise present. It demonstrates this was one of two weakness classes where the scanners as a gathering played out the best. A greater part of scanners distinguished the majority of the reinforcement document divulgences and in addition the way exposure vulnerabilities. Then the most exceedingly terrible performing scanner for false positives likewise reported false document incorporation, SQL Injection, IP revelation, way divulgence, and structures tolerating POST parameters structure GET asks. This scanner likewise classifies concealed structure values as vulnerabilities, repudiating set up practices for CSRF aversion utilizing covered up structure confirmation tokens. Among every single other scanner, the just other bogus positives of note are a CSRF weakness reported in spite of the nearness of a validation token and auto-complete being accounted for a secret word field where it was really killed. In future, the modified Technology will implement in Database for clarification and to overcome avoidance of flight data transmission.

AKNOWLEDGMENT

	Dr.R.Maguteeswaran is Principal of Jayshriram Group of Institutions, Tirupur. He is done doctorate in Anna university, Chennai. Dr.R.Maguteeswaran M.E, Ph.D has rich industry and academic experience. He has about 18 years of experience and published more than 25 papers in Indian and International journals. He has completed his Research work on Composite Materials. His Ph.D thesis was rated by both Indian and foreign examines as outstanding thesis. He has organized various National and International Conferences. He motivated students for project work in UG and PG level. He is Guided and Helped about the new Technologies of GPS- remote sensing system in this project. He gave innovative ideas to students.
	Dr.S.Rajalakshmi Ph.D is working as a Professor and HOD of CSE in Jayshriram Group of Institutions, Tirupur. She is done doctorate in Anna university, Chennai She has above 10-years Experienced and researched in Computer science engineering Field. She has published totally 24- papers in IEEE journals and attended Conferences. She is Guided and Helped about the Visual basic Programming and Oracle Commands to this project. She gave innovative ideas for implementation of block box Detection in various places.

Mr.S.Meivel M.E(EST) is working as a Professor and research Scholar in Jayshriram Group of Institutions, Tirupur. He is the incharge of Technological business incubation cell for business development of students. He have 4-years experienced in Industrial, 3-years Experienced in Industrial and 8-years Experienced in Teaching Field. He is pursuing a Ph.D. He has published totally 15-papers in IEEE journals and attended International Conferences. He is guided to students for handling facial recognition system and helped for Arduino Controller Programming. He explained and gave valuable ideas about project to students. He gave innovative and technical ideas to students and He solved technical problem of hardware and software in this project.

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GPS TERMINOLOGY

1. **Acquisition Time:** The time it takes for your GPS unit to procure a lock onto enough satellites (three for 2D and four for 3D) position fix.
2. **Active from waypoint:** The client's beginning stage or the collector's last put away waypoint.
3. Chronological registry Data: Group of stars data (counting area and soundness of satellites) transmitted by every satellite and gathered by a GPS recipient. Chronicle information permits a recipient to gain satellite signs when it is turned on.
4. **Accessibility:** The rate of time that the administrations of NAVSTAR GPS can be utilized inside a specific scope range at a specific time.
5. **Azimuth:** The edge of estimation between one point and another point. Precise level heading, measured in degrees clockwise around a circle, where the worth shows 1/360th of a circle (degrees) where 0° is North, 90° is East, 180° is South, and 270° is West, and 360° is likewise North. An azimuth is included two beams, one which stretches out to genuine north from point one, and the other from point one to point two. The azimuth from pt. 2 back to pt. 1 is known as a "back azimuth." A direction is not an azimuth, despite the fact that GPS recipients generally allude to an azimuth as a heading. On the off chance that you're GPS gives you a direction of 3300, this is an azimuth. The bearing would really be expressed as N300W. See Bearing.

6. **Bearing (BRG):** The compass bearing, as a fluctuation of north or south, from your position to a destination, measured to the closest degree. An orientation is a rakish flat bearing, measured either clockwise or counter clockwise around one-fourth of a circle, where the quality is in degrees with respect to either north or south. Composed N30° E (Azimuth = 30°), S25° E (Azimuth = 165°), and so forth. Bearing is generally abused set up of azimuth. In a GPS beneficiary bearing alludes to the course to a waypoint. See Azimuth and Heading.
7. **C/A Code (Course Acquisition Code):** The standard non military personnel GPS code which is liable to corruption by Selective Availability. The code is utilized by recipients to perform harsh route counts. The course/procurement or clear/securing code balanced onto the GPS L1 signal. This code is a succession of 1023 pseudorandom paired biphase adjustments on the GPS transporter at a chipping rate of 1.023 MHz, hence having a code reiteration time of 1 millisecond. The code was chosen to give great obtaining properties. Otherwise called the "non military personnel code."
8. **Carrier:** A radio wave having no less than one trademark, for example, recurrence, adequacy or stage that might be differed from known reference esteem by adjustment.
9. **Bearer helped following:** A sign handling procedure that uses the GPS bearer sign to accomplish a definite lock on the pseudorandom code.
10. **Global Positioning System (GPS):** The U.S. Department of Defense Global Positioning System: A constellation of more than 24 satellites orbiting the earth at a very high altitude. GPS satellites transmit signals that allow a GPS receiver to determine, with great accuracy, their. The receivers can be fixed on the Earth, in moving vehicles, aircraft, or in low-earth orbiting satellites. GPS is used in air, land and sea navigation, mapping, surveying and other applications where precise positioning is necessary. See NAVSTAR GPS.
11. **Latitude:** A point's distance north or south of the equator measured by degrees from 0 to 90. A line of latitude is a parallel.
12. **Latitude and longitude:** A global coordinate system using angular measurements to determine positions on the earth. See latitude.
13. **Longitude:** A point's distance east or west of the prime meridian (measured in degrees) this runs from the North Pole to the South Pole through Greenwich, England. A line of longitude is called a meridian.
14. **Map:** A map is a two-dimensional representation of the earth's sphere. Projecting the earth's three-dimensional surface onto sheets of paper subjects all planar maps to some spatial distortion. The type and extent of distortion depends on the projection and scale used to produce the map.
15. **Map Projections:** The formulas that convert one coordinate system to another (for example, lat/long to UTM).
16. **Navigation:** The act of determining the course or heading of movement.
17. **Navigation message:** The 1500-bit navigation message broadcast by each GPS satellite at 50 bps on the L1 and/or L2 signals. This message contains system time, clock correction parameters, ionospheric delay model parameters, and the space vehicle's ephemeris and health. The information is used to process GPS signals to give the GPS user time, position, and velocity information.
18. **Track (TRK):** Your current direction of travel relative to a ground position (same as COG). Also the projection on the surface of the earth of the present path of a vehicle, the direction of which at any point is expressed in degrees from North (true, magnetic, or grid).
19. **World Geodetic System (WGS):** A consistent set of parameters describing the size and shape of the Earth, the positions of a network of points with respect to the center of mass of the Earth, transformations from major geodetic datum's, and the potential of the Earth (usually in terms of harmonic coefficients). WGS84 is the default datum used by NAVSTAR GPS. All positions and waypoints within a GPS receiver are calculated using WGS84. A receiver converts coordinates to the datum selected by the user.

Table 1
Result analysis of Two Design Modules

s.no	Zigbee Data transmitter Module	Excel Data transmitter Module
1	Short distance transmission (10meter)	Short distance transmission (1000meter)
2	Easily programmable	Very Easily programmable
3	Signal not controllable	Signal controllable
4	Arduino used	raspberry pi used
5	Delay transmission	Quick transmission (10 seconds)
6	Data is not reachable in without network.	Data is sent only 1kb of Excel data to nearest sender
7	Not reused	reused

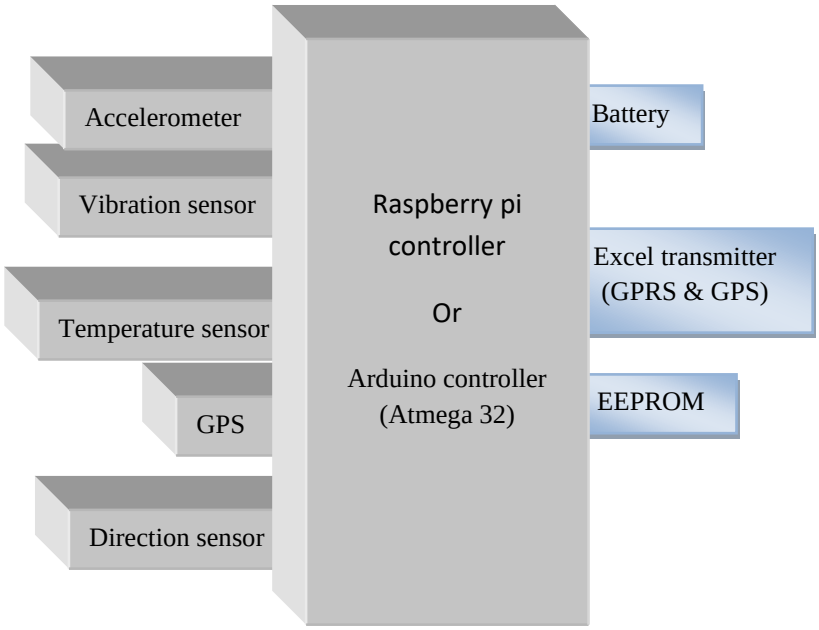

Figure 1 Air plane section

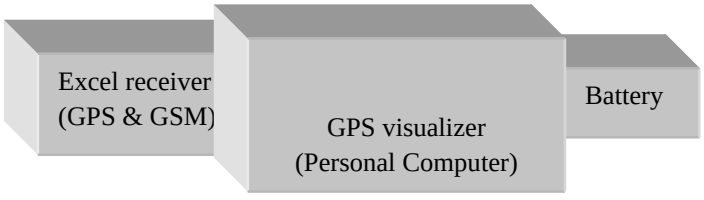

Figure 2 Receiver section

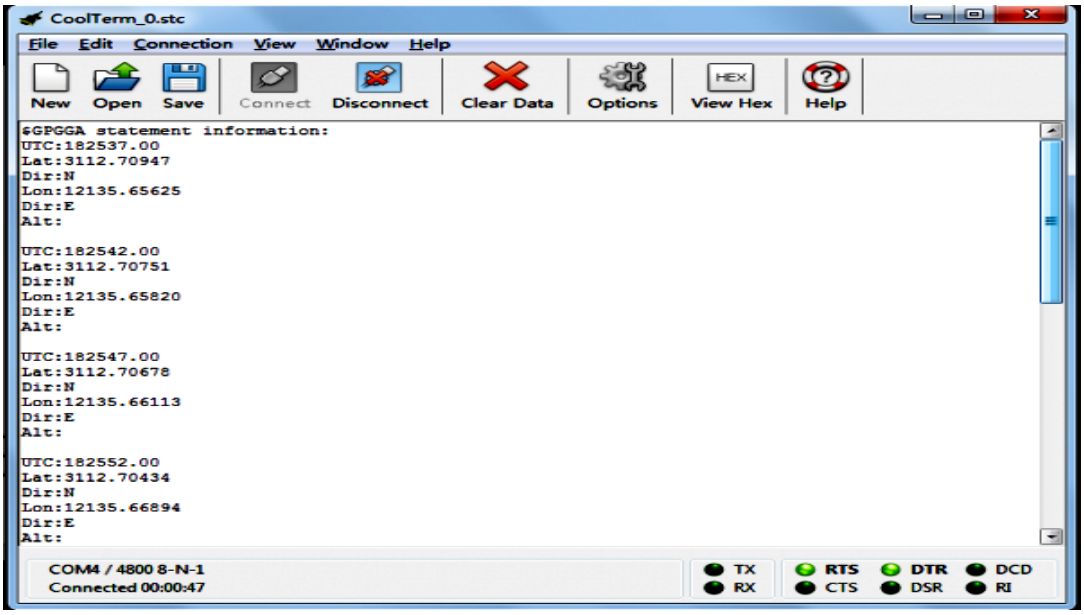

Figure 3 Test result

Spreadsheet Formulas	
Cell	Formula
J4	J4=(G4+H4/60+I4/3600) * IF(F4="South",-1,1)
O4	O4=(L4+M4/60+N4/3600) * IF(K4="West",-1,1)
Q4	=IF(OR(ISBLANK(J4), ISBLANK(O4))," ", HYPERLINK("http://maps.google.com/maps?f=d&saddr=&daddr="&J4&","&O4,"Link: Google Maps"))

Figure 4 Formula of GPS format

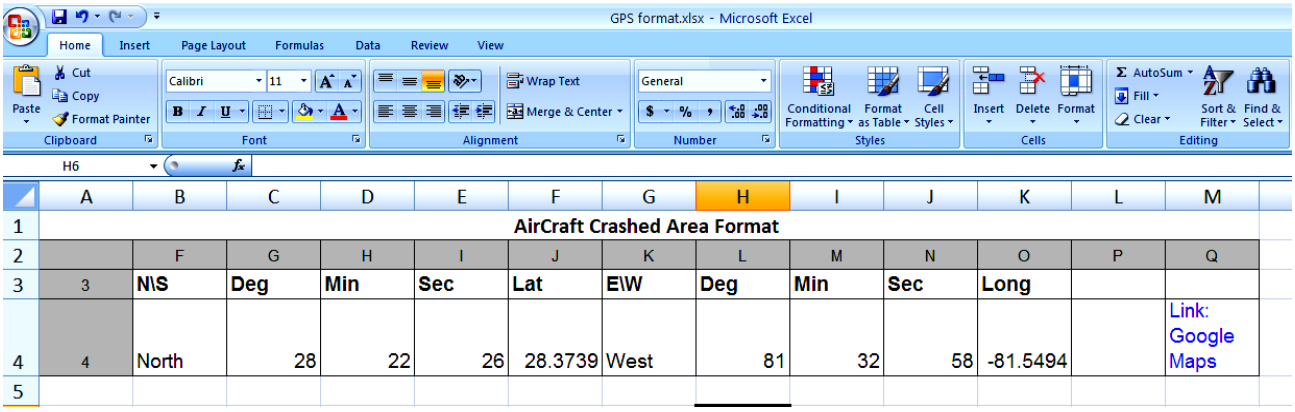

Figure 5 Excel Format of Aircraft Crashed Area

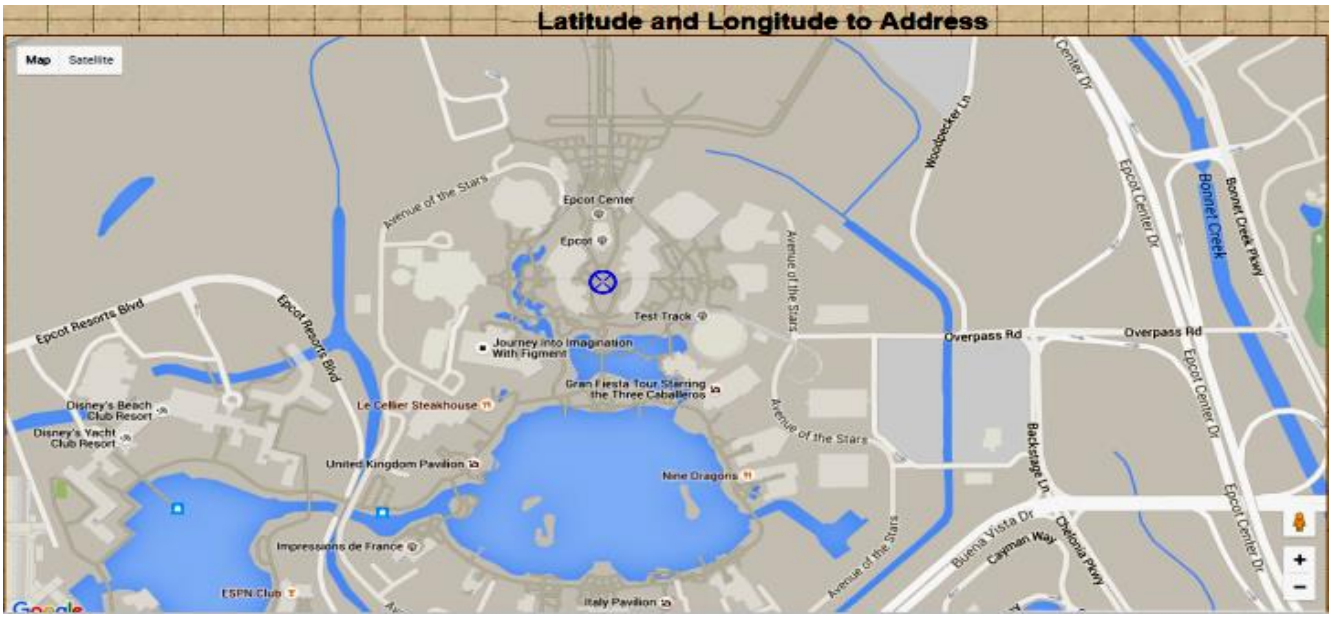

Figure 6 Google Map from web link

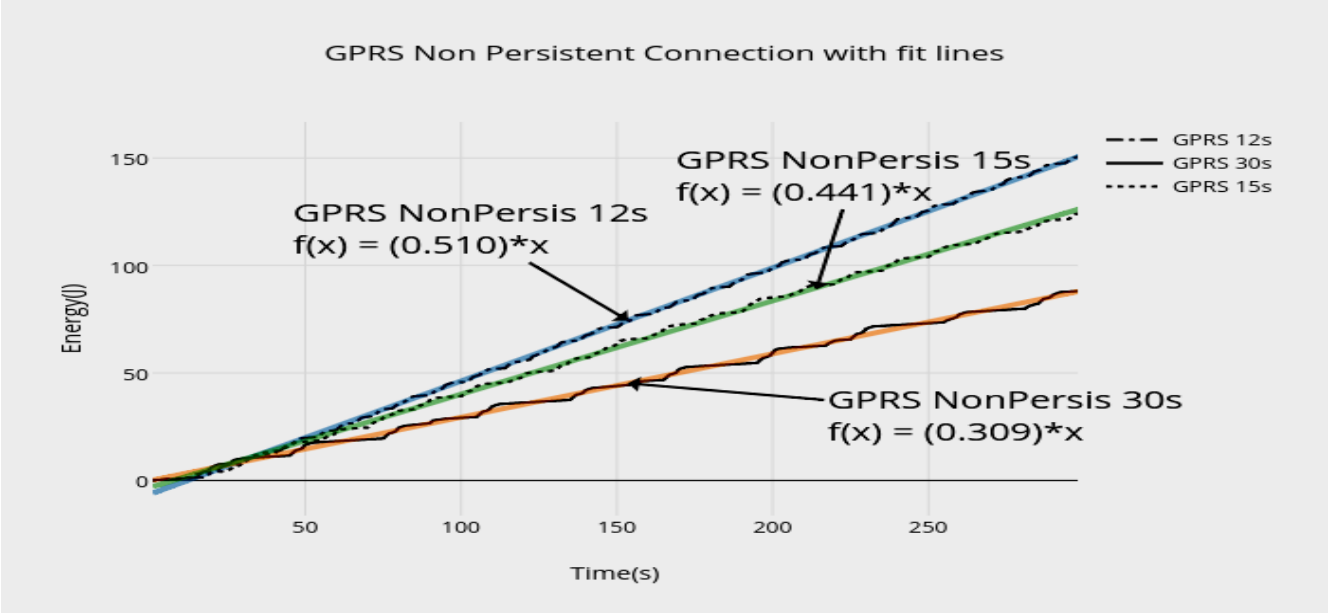

Figure 7 Graph Time Vs Energy of GPRS