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Modified cockpit door lock system

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ABSTRACT

Passenger life is more precious, the safety of aircraft dominantly depends on the cockpit security systems. It is essential to enhance the cockpit security due to increasing threats day-by-day. Implementation of advanced systems such as fingerprint scanner, an auto alarm is required to keep the cockpit as well the airplane safer from any sort of danger especially in bigger aircraft carrying 100-800 passengers. This Project intends to enrich the aircraft safety to its maximum by implementing better door lock systems using highly advanced Arduino Processor combined with a fingerprint scanner.

Keywords— *Arduino, Fingerprint, Cockpit safety*

1. INTRODUCTION

The cockpit of an aircraft contains flight instruments on an instrument panel, and the controls that enable the pilot to fly the aircraft. According to the US Federal Aviation Administration, doors should typically be though enough to withstand a grenade blast. They are usually left locked throughout the flight. The directorate general of civil aviation (DGCA) has suspended the flying license of the four pilots who allowed their or their colleagues children inside the cockpit mid-air on two flights. And the pilot of another flight who allowed passengers inside the cockpit of a plane on ground being prepared to take off has been de restored, or taken off flying duties. It is necessary to have advanced systems to develop aircraft cockpit door with high security to ensure aircraft safety.

2. MODIFICATION

The modification is achieved by Keeping the current working principle intact, an additional operation mode which is activated under conditions where "RULE OF TWO" is not been followed

2.1 Working

There are three mode of operation that are:
1-Data entry
2-Normal operation
3-Secondary operation

2.2 Data Entry

- Ground officer will access the software by fingerprint verification and password.
- Pilot will upload his fingerprint into the database and accept two set of four-digit password followed by the co-pilot with two set of four-digit password.
- Main air cabin crew also uploads their fingerprint and accepts a four-digit password.
- This set of passwords will only work during the flight hours provided.

2.3 Normal Operation

a) Pilot and co-pilot enter the cockpit by verifying the fingerprint and password provided to them.
b) Unlock
   - Unlocks the door when the switch rises above and held in this position.
   - Door must be pushed to open.
   - Unlock is an override and reset selection of any previous action.
c) Normal
   - When normal is selected it allows the door to be locked when closed,
   - It also allows the door to be opened by the flight crew after the access code is entered in case of emergency for 5 sec. in case of pilot incapacitation where authorization is not provided within 30 sec.
   - The flight crew is supposed to be able to gain access to the cockpit by using code they enter on a key pad in this situation.
   - The pilot then gets a warning in the cockpit that door is about to be unlock.
d) Lock
   - Momentarily placing the cockpit door switch to LOCK illuminates the red cockpit access panel light, rejects keypad entry request, and prevents further access code entry for 20 minutes.
   - The cockpit door switch returns to NORM when released or after 20 minutes.

2.4 Secondary Operation

2.4.1 Case 1: If one of the pilots is outside the cockpit and the door is in lock mode, the pilot can enter into the cockpit with fingerprint followed by the first set of password. **Note:** To avoid the situations like garmenting crash.

2.4.2 Case 2: If one of the pilots is outside the cockpit and faces the threat, he enters the secondary set of password for complete lockdown of cockpit which can then only be unlocked after the initially set flight hours

3. PROPOSED SYSTEM

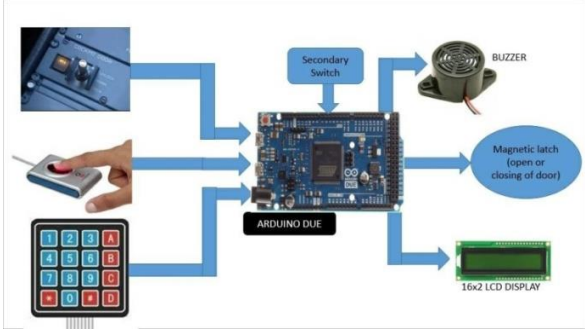

Fig. 1: Proposed System

4. DEVICES USED

4.1 Arduino due

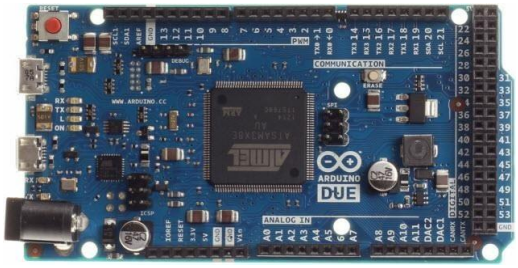

Fig. 2: Arduino due

4.2 Fingerprint Scanner

4.3 16x 2 LCD display

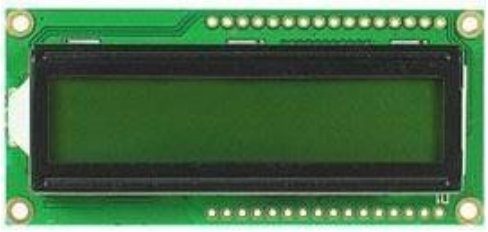

Fig. 3: 16x 2 LCD display

4.4 4x4 Keypad

4.5 Buzzer

Fig. 4: Buzzer

4.6 Magnetic Latch

Fig. 5: Magnetic Latch

5. RESULT AND DISCUSSION

Programming of Arduino due was done according to the logic and a prototype of cockpit was made to demonstrate the cockpit door logic locking as shown in below figures.

Fig. 6: Cockpit prototype

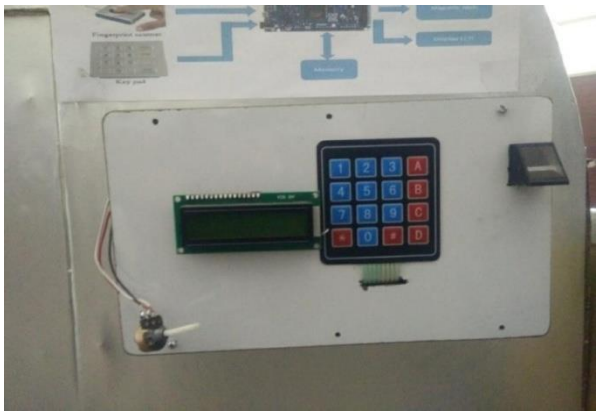

Fig. 7: Entry modules

6. CONCLUSION

Starting from the year 1903 when we had our first flight, today we stand at a position where air travel is considered the most important mode of transport. Whether it is a cargo or a commercial aircraft, the need for a safer cockpit is of great concern. But the importance of this cockpit safety reaches at its maximum when in case of passenger aircrafts. Carrying about 100-800 passengers, their life is of great importance. By the implementation of a better cockpit door lock system, accidents such as the Germanwing's crash or other such pilot suicide issues may be avoided. Thus if the project could be installed correctly, it can bring about a great improvement to the current cockpit door lock logical system which remains unchanged post-9/11 regulations.

7. REFERENCES

[1] B. Anubala, M. Rahini and T. Bavithra, "Intelligent Door Locking System"

[2] Capt. Nigel H.W, "Security Equipment: Safety Aspects of Hardened Cockpit Doors", Ironside LCAG (retd.)

[3] Eugene E G Tan, "The Germanwings Tragedy: Time for Three-Person Rule"

[4] Helen Davidson, "The safety of cockpit doors on commercial planes", Nanyang University, Singapore

[5] Lee Frat, DeWalt Enterprises, "Lock Actuator Operation"

[6] Matthew P. Simones., "Operational and flight safety implications of the installation of hardened cockpit security doors in passenger aircraft having a seating capacity of 30 seats or more."

[7] Matthew Wuillemin, "Submission to safety review", Master of Science aviation and technology.

[8] Nihad E. Daidzic, "Aircraft Decompression with Installed Cockpit Security Door", Vol. 47; Journal of aircraft

[9] Prof. Thomas McShane, "Actions to enhance flight deck security", Stanford

[10] W. Durfee, "Arduino Microcontroller Guide", University of Minnesota

