

AVIATION SAFETY CONTROL- Aircraft Hijack Intimation

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Abstract— In most of the cases, hijackers remain unrecognizable, where their true identity are lost from police or public knowledge. The proposal is all about image processing. The direct live video streaming or image transfers of criminals indulged in hijacking flight is done using VHF frequency signals, specifically air band signals. We can't assure that this idea would stop hijacking, but at least the suspects can be recognized along with the vulnerable situation onboard at the crucial time of hostage attack. RF signals can help in sending images or videos from an altitude of 44,000 feet (an average height of passenger aircraft). Thus, making the process of intimation of hijacking to its at most ease which in turn prevents hijacking.

Index Terms— aircraft, hijack, RF signals, signals, Video streaming, transmission, image processing.

1 INTRODUCTION

Since ages there have been perpetual innovations of techniques in the field of security, may it be social cyber system and etcetera. Despite of upgraded methods of security system, that would probably match the loopholes of technology, there are still no decimation of crimes that take place which will highlight the advantage of demerits. To pick up the important crime, in the field of aviation and traffic control, aircraft hi-jack is one of its own kind. In our the below cited proposal, implementation of a technique, can at least spotlight the suspect of that particular hijack.

2 AIRCRAFT HIJACKING

2.1 Problem

The airline travelling is one of the major means of transportation to the people who want to travel abroad and long distance. The airline faces the problem of hijacking unexpectedly. The hijackers remain unidentifiable since they do not leave any clue and they represent themselves in such a way that they remain unsuspected. Since the hijack mostly happens at an unreachable height, it is difficult for the controllers to send intimation of hijacking to the base station or the airlines. A hijack event is identified only after it has happened completely. There is no sufficient system to send signals of intimation of hijacking to the base station from higher altitudes. This remains the major problem during airline travel and aircraft hijacking.

2.2 Existing System

The existing system states that the would-be hijacker would be found before allowing them inside the plane and denying him the passage [1]. But this method is not efficient and remains

unsuccessful. This is because the identity of the hijacker remains unknown because he can arrive in any form of appearance and doesn't even gives a clue about the hijacking activity he is going to perform. He remains unsuspected and seems to look like the normal passenger. Thus, this existing system cannot be implemented well. Even if implemented, it cannot produce the result effectively. There is no proper existing system to intimate the happening of aircraft hijack still.

3 PROPOSED SYSTEM

3.1 Idea Overview

In this proposed system, an extreme attempt to intimate the happening of hijack is done by sending the signals from the higher altitude to the nearby base station. The air band or aircraft band is the name of a group of frequencies in the VHF (118 -137MHz) radio spectrum Fig.1 (allocated by aviation). Using this particular frequency range, video streaming can be done to the base air traffic control. Even though the existing method Auto Pilot Mode, that automatically drives the plane at the very touch of that button (inbuilt in cockpit).

3.2 Working

The button camera is confidentially taken by the airhostess onboard in case of emergency situation. On the enabling of the camera, the live video (frequency range of 400MHz) is compressed by video codec and then transmitted. This transmitted RF is received by RF av receiver. This is then connected to a monitor to view. Thus, the video is streamed continuously so that the movement of hijackers and their method of approach can be easily noted. The weapons they use to hijack is also captured and sent to the base station. Thus, making the identification of mysterious process of hijacking and hijackers to be revealed.

The airhostess takes the button camera of certain specification without the people knowing its presence. Then the live video streaming of the flight scenario is enabled by the airhostess. For the airline admins to monitor it even when it is in the high altitudes from the base station itself, the live video is instantaneously converted to air band frequencies signals by

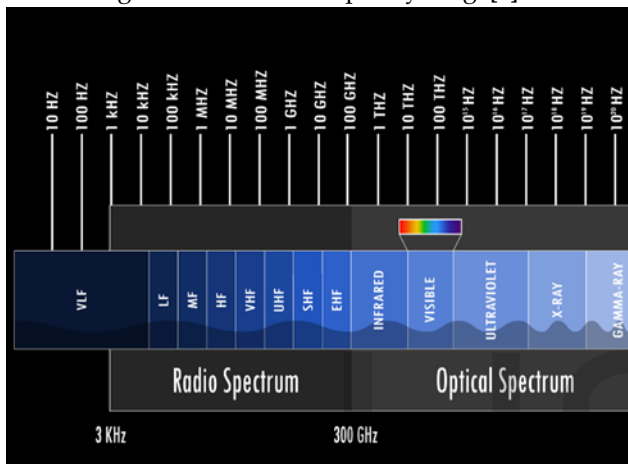
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the video codec. Then, the video codec sends the signals to the transmitter. The transmitter transmits the signal to the receiver of the nearby base station even from high altitudes. The received signal is then converted back to the video which is then monitored by the monitor.

This method is easy to implement compared to other ways and is reliable since it reveals the appearance of the hijackers and their approaches to the control administrators so that these features would be used in future to detect the hijackers before allowing their entry to the aircraft travel.

Thus, preventing the upcoming aircraft hijacking events.

Fig. 1 - VHF radio frequency range[2]



3.3 Specifications and/or requirements

The specifications for the proposed system are clearly shown and can be easily understandable and implemented. The specifications or hardware requirements are given below.

- Camera selection [3]: camera with image sensor with +/- 2MP
- Image sensor selection: CMOS (complementary metal- oxide semiconductor) [4]
- RF av Transmitter [5]: range capable to transmit even HD video
- RF av receiver [6]: range capable of receiving the image or video
- Video codec [7]: video codec, is an electronic circuit or software that compresses or decompresses digital video format or vice versa.

These specifications are specially chosen for sending signals from higher altitudes to the ground level base station.

3.4 Advantages

By using this system, the immediate intimation of hijacking is sent to the nearby base station through live video streaming. This is done by the help of a group of signals known as air band signals from VHF frequencies. Since the live video

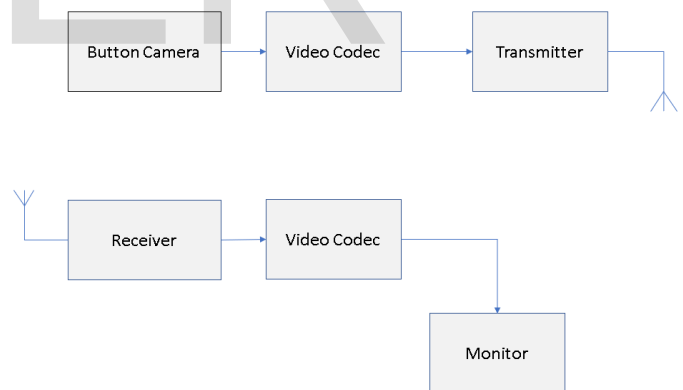
streaming is done, along with the intimation of happening of hijacking, the number of hostages along with their method of attack and weapons are identified and sent through the signals to the base station. Thus, this gives account of all the necessary information to avoid hijacking to some extent. This could be really helpful since there are no systems to identify the hijackers before the actual hijacking happens and the future aircraft hijacking events can be avoided by using the features obtained from the previous attack’s result sent through this system. Even from high altitudes, the signal of intimation from video streaming can be sent to the nearby base station, which is one major advantage.

3.5 Block diagram

The work flow of the proposed system seems to be simple. But the implementation requires much care since it involves sending signals of particular frequency named air band frequency and it involves live video streaming which is really difficult to transmit from altitudes. Despite, this system performs smooth and efficient till certain heights. The work flow is simple and it is easily understandable.

The block diagram of the working of the proposed aircraft hijack intimation system is shown below in Fig.2. It is clearly understandable from the diagram the process of implementation of the proposed system.

Fig. 2- Block diagram



The work flow goes like this. The live video streaming done by the button camera is converted by video codec to a particular signal of certain frequency and then sent to the transmitter.

As the live video streaming is done and transmitted using air band frequency to the base station, the receiver base station receives the signals from the antenna and converts the received signal to the video by the video codec. This is monitored using the monitor. This helps in identification of hijackers and their methodology so that hijackers could be revealed easily. Thus, making our system a successful implementation to intimate the hijacking event.

4 CONCLUSION

The above method is in the current usage by UAV (unmanned aerial vehicle) like Reaper, global Hawk of USA by defense to examine enemy base. This can be implemented in the passenger planes to ensure safety. The aviation security is crucial in defining that particular nation's technology and security system. On successful implementation of this system, the crisis of aircraft hijacking can be reduced and features extracted from this can be used to identify the hijackers before the happening of hijacking at ease. Thus, preventing aircraft hijack and protecting the lives of people.

Since there are no existing methods to find the process of hijacking, the number of hijackers and their weapons, many aircraft hijacking incidents occur at ease. So, the proposed system will help to reduce the hijack rate to a certain extent for sure. Thus, live video streaming of the flight scenario and the conversion of video codec to air band frequency signals to send through the transmitter to the base station which monitors the entire scenario of hijacking helps the better identification of hijackers, the type of weapon used, and their approach is clearly found and this could help in possible avoidance and prevention of upcoming aircraft hijacking events. Thus, this aircraft intimation system will be one of the best systems to intimate the hijacking before it occurs and prevention from it in future cases.

5 FUTURE WORK

Although the proposed system works in a best way to sort out the aircraft hijack problem. It uses the best way of using air band frequencies for live video streaming and it is done without the conscience of others. Even though it works well to a certain altitude, it does not cope up with the implementation when the altitude is much higher, say more than 45,000.

There are many chances that the hijacking can take place at higher altitudes since the hijackers cannot be tricked easily and they are intelligent enough to do so since the signals are hard enough to get transmitted to the base station instantly. Thus, the airlines come to know only after the complete execution of hijacking has been taken place.

This is the only major drawback which should be focused on future work. There is an idea of fusing mobile communication network signals with the air band signals since the GSM/GPRS module signals can reach higher altitudes and so when combined with air band frequency, it could help in much greater success in intimation of hijacking at the need of the hour.

Although this seems easy to hear, it is clear that it is hard to implement since the integration of air band signal frequency with the GSM/GPRS module signals. If implemented, it could be of great use to avoid and prevent aircraft hijacking.

Thus, it is expected to work in this area sooner to gain better results.

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