International Journal of Advanced Culture Technology Vol.4 No.4 1-5 (2016)
https://doi.org/10.17703/IJACT.2016.4.4.1

IJACT 16-4-1

A study on F8L10D-N LoRa RF Module for Drone Based live Broadcasting system

Joseph Mfitumukiza[1], Vinayagam Mariappan[1], Minwoo Lee[2], Juphil Cho[3] and Jaesang Cha[1†]

[1]Media IT Engineering, Seoul National Univ., 0f Science and Tech., Seoul, Korea
[2]Graduate School of Nano IT Design Fusion, Seoul National Univ., 0f Science and Tech., Seoul, Korea
[3]Dept. of Integrated IT & Communication Eng., Kunsan National Univ., Kunsan, Korea
mjosephpatient2010@gmail.com, vinayagam_m@hotmail.net, alsdnya@gmail.com, stefano@kunsan.ac.kr, †chajs@seoultech.ac.kr

Abstract

In this paper, we present the study on the proposed design of a real-time transmission of a video from the drone to broadcasting station (OBVan) by using F8L10D-N LoRa Module. Nowadays, LoRa technology is proved to be the mass of low cost, long range machine-to-machine connectivity. Particularly in the field of broadcasting and communication system, F8L10D-N LoRa RF Module spread spectrum technology with long transmission distance and strong penetrative ability that is double stronger than traditional FSK as well as PSK modulation scheme.

Key words: *F8l10D-N LoRa RF Module, Drone, OBVan, Real time Video transmission.*

1. Introduction

Mainly, this study carried out in order to contribute to the existing live broadcasting and communication system by using the drone as source of data (video or image) to be broadcasted and F8L10D-N LoRa RF Module as Medium and OBVan (broadcasting station).

Nowadays, Drone technology is constantly evolving as new innovation and big investment in different domain (Agriculture, broadcasting, education, medical) that is bringing more advanced drones to the market almost every day. The various types of the drones are differentiated in terms of the type, the degree of autonomy, the size and weight, and the power source [1]. these specifications are important for example for the drone's range, the maximum flight duration and distance and the loading capacity as well. Based on the above specification we can determine the drone that is suitable for broadcasting and communication domain especially for live event broadcasting system. In order to perform a flight, drones have a need for wireless communication with a pilot on the ground. In addition, in most cases there is a need for wireless

Manuscript Received: Sep. 25, 2016 / Revised: Oct. 9, 2016 / Accepted: Oct. 25, 2016
Corresponding Author: chajs@seoultech.ac.kr
Tel: 82-2-970-6431, Fax: +82-2-974-6123
Media IT Engineering, Seoul National Univ., 0f Science and Tech., Seoul, Korea

communication with a payload, like camera or sensor. To allow this communication to take place frequency spectrum is required. The requirements for frequency spectrum depend on the type of the drone[2].

The drone on-board camera uses the 1/2.3 inch CMOS sensor with the characteristics of up to 4096x2160p at 24 fps or 4K at up to 30 fps and 12 mega pixel stills [3].

F8L10D-N LoRa RF Module is a kind of embedded device that provides data transfer function by LoRa network. It provided ultra-long range spread spectrum communication [4].

Outside Broadcasting Van (OBVan) station refer to data collection and processing station where by the video or image from both on ground cameras and drone camera are transmitted.

1.1 Aims & Objective

This study aims to improve the live event broadcasting system by adding functionality of drone data content to live broadcasting station in order to provide various contents to receivers (end users). On the other hand the main objective of this study takes a different architecture approach to meet the challenge in live broadcasting system by providing a full package and high quality broadcasted contents.

2. Related work

The proposed new design presented in this paper is based on the existing live broadcasting system, video recording camera of the drone and LoRa module technology.

The live broadcasting system consists of wired cameras mounted on live event ground, control station stage and distribution stage as shown in figure-1.

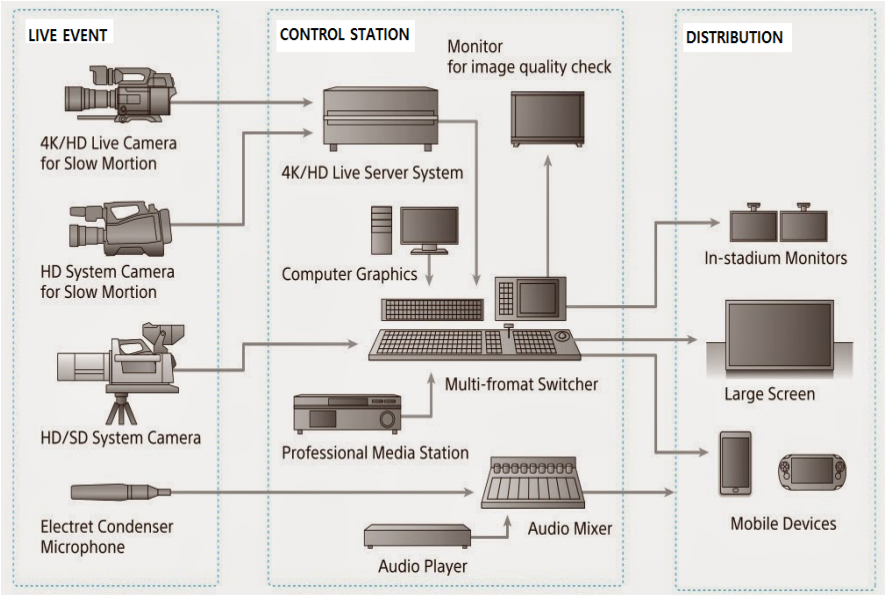

Figure 1. Existing live broadcasting system [5]

Referring to the latest camera drone technology such as DJI, Walkera and many other manufactures now can shoot film in 4k video and can take 12 mega pixel stills. it is also integrated aerial zoom camera and is optimized for still photography [3].

Figure 2. Drone camera

3. Description of proposed design

In this paper us first study and analyze the specification of the Drone camera weather it can fit to the existing live broadcasting system. Then, we analyze the communication between the Drone and the broadcasting station where by the recorded video contents can be transmitted to the main station in real time. Finally we described how the RF module is embedded to Drone system (Figure-3).

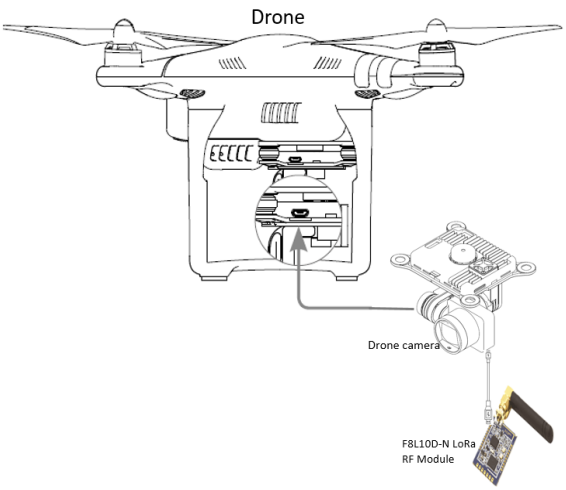

Figure 3. Real time drone camera content transfer

For F8L10D-N LoRa RF Module, uses high- performance industrial-grade LoRa solution, support transparent data transmission function; low power consumption design, the lowest working current can less than 2uA, as well as supply multi I/O channels, compatible analog inputs and pulse input counters [7]. The feasibility of real time Drone based broadcasting using F8L10D-N LoRa RF Module relies on its main key features such as:

- Strong penetration ability and long transmission distance.
- Strong anti-interference ability and reliable transmission
- Low consumption and multi-stage dormancy
- Multi-adjustable transmission power.
- Based on these specifications F8L10D-N matches to our design and the Drone camera content transmitted to broadcasting station in real time. Show in figure 4.

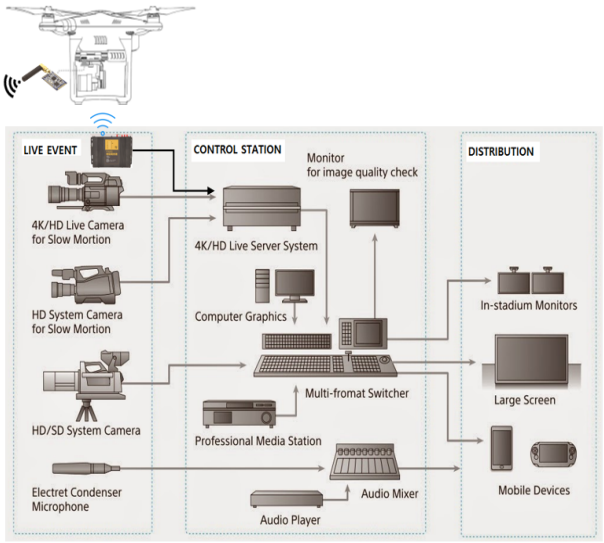

Figure 4. Overall Hybrid proposed design of live broadcasting system.

4. Experimental Results and analysis

In order to investigate and verify the real time broadcasting of the Drone camera content using F8L10D-N, this study build the layout of the overall live broadcasting of the Drone camera content using F8L10D-N LoRa RF Module, where by the content can be received and processed in Outside Broadcasting Van (Station). Shown from Figure-5

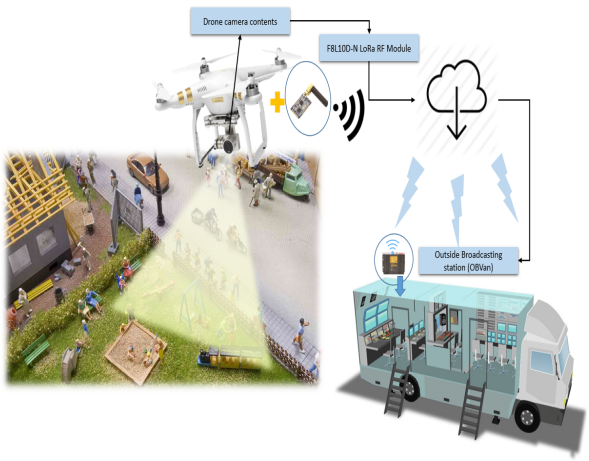

Figure 5. F8L10D-N for Drone based Live broadcasting design

5. Conclusion

This Paper describes a complete solution in improving the live video broadcasting system based on inserting Drone camera contents to the existing live broadcasting system via F8L10D-N LoRa RF Module. The main key factor for the proposed design as such support live broadcasting-the system has to support live broadcasting so that remote user can watch the various live contents. In real time processing, fully automated-Originally drone camera record and save to Micro-SD card. For the proposed design in this paper find out how the content can

be received automatically to the receiver side in real time using the LoRa RF Module introduced by this research study.

Acknowldegement

This work was supported by ICT R&D program of MSIP/IITP. [B0101-16-1344 , Development of Multi-Copter CAM System Operating on Broadcasting Vehicle]

References

[1] H.T. Kung and C.-H. Wu. Differentiated admission for peer-to-peer systems: Incentivizing peers to contribute their resource. *In 1st Workshop on Economics of Peer-to-Peer Systems,* June 2003.

[2] B. N. Levine, D. B. Lavo, and J. J. Garcia-Luna- Aceves. The case for concurrent reliable multicasting using shared ACK trees. *In Proceedings of ACMMultimedia'96*, November 1996.

[3] *https://www.dronezon.com/learn* about drones quad copters/what is drone technology or how does drone technology work/

[4] *http://en.four-faith.com/f8l10d-lora-module.html*

[5] *https://infozed.blogspot.kr/2014/11/sony hd live pro duction broadcasting.html*

[6] Bram Cohen. Incentives build robustness. *In 1st Workshop on Economics of Peer-to-Peer Systems*, June 2003.