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Design a UAV using Mongoose RTOS for human detection

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Abstract –*Maintaining communication over disaster areas is challenging. One cannot just rely upon the public communication networks first, because these may be unavailable in remote areas and, second, because even if they are available the network may be damaged or destroyed. This design accentuates the communication and network technologies that endow UAV disaster management systems by establishing emergency communication including data gathering, early warning system, search and rescue, and logistics.*

System monitoring motion of a person using a UWB sensor, if the reflected wave has lower intensity then it will recognize human presence. Losant consists of an editor with drag & drop options which allows us to trigger actions, notifications and mobile to mobile communication without using any programming.

MQTT is a protocol to communicate information between our connected devices & losant.

Key Words: remote management, early warning system, Mongoose RTOS, disaster response, ESP8266 Node MCU, Disaster response

1. INTRODUCTION

In the areas that are nearly impossible to reach, drones can deliver supplies such as water and food to those in need, eliminating the risk of placing human-operated. AWACS, or airborne warning and control systems, allow for temporary establishment of Wi-Fi and cell phone access to environments without power lines or functioning cell towers.

1.1 Background

Drones can take on roles where relief workers and manned vehicles fall short. While drones have been around for a few years, algorithms and programming are only just now starting to catch up to drone capabilities not only for the next 12 months but in the next decade. As the defense industry and the specialized drone manufacturers answer to the growing demand for drones with improved surveillance technology used in reconnaissance and other offensive operations.

1.2 Proposed System

Along with the innovations in drone technology, camera technology is also improving. This has a significant impact on the current uses of drones. An example is the ability to provide emergency response teams with an effective solution to identifying victims by outfitting an unmanned aerial vehicle (UAV) with thermal imaging cameras. This gives victims a higher chance of survival because it cuts down the time taken to locate them. When disasters happen whether a natural disaster like a flood or earthquake or a human-caused one like a mass shooting or bombing – it can be extremely dangerous to send first responders in, even though there are people who badly need help. Autonomous drones could cover more ground more quickly, but would only be more effective if they were able on their own to help rescuers identify people in need. We are working on developing systems that can help spot people or animals – especially ones who might be trapped by fallen debris. Drones may have gained a foothold in advanced nations as a weapon or tool for the battlefield, but as the technology has evolved, drones increasingly have earned a place as a tool for life-saving rescues and emergency response. Drone research demonstrates the important contributions unmanned aerial systems make to public safety.

2. SYSTEM ARCHITECTURE

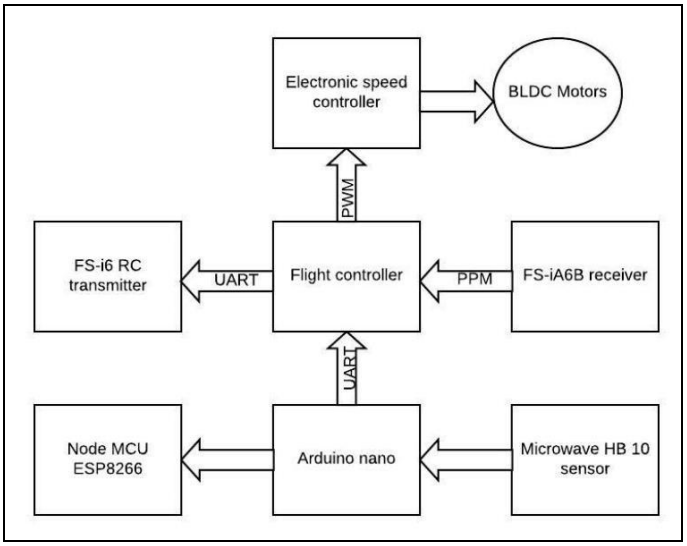

Fig -1: Block Diagram

The proposed system incorporates UAV with Mongoose RTOS based on IoT implementation comprises ESP8266, UWB sensor, Fly sky transmitter and receiver of 2.4GHz, flight controller CC3D along with Electronic speed controller, Motors of 20,000rpm with propellers. The drone firstly hovers over the disaster area UWB sensor will continuously transmit the waves in GHz. System monitoring motion of a person using a UWB sensor, if the reflected wave has lower intensity then it will recognize human presence. UWB radar tracks human and non-human targets and detects human presence by movements. When the UWB sensor shows the reading that any conscious human is detected, then the controller will generate its Wi-Fi and send the data to a cloud platform. When a human is detected an alert is sent to the phone & it can also be observed on the application log of losant Platform. Mongoose RTOS is reliable to run in a production environment & the rescue team can receive alerts even if his mobile phone is not connected to the internet. We use losant platform as it has eminent facilities like secure communication over the air updates and remote management. Losant consists of an editor with drag & drop options which allows us to trigger actions, notifications and mobile to mobile communication without using any programming. The reason we choose UAV is it has high mobility and high image resolution compared to satellite and airborne imagery. Although UAV has shorter duration time and smaller ground coverage, for a small target area it is sometimes more cost-effective than other platforms.

2.1 Hardware Description

2.1.1 Node MCU ESP8266

Fig -2: Node MCU ESP8266

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. The ESP8285 is an ESP8266 with 1 MiB of builtin flash, allowing for single-chip devices capable of connecting to Wi-Fi.

2.1.2 Microwave sensor HB100

Fig -3: Microwave sensor HB100

The HB100 module consists of a Dielectric Resonator Oscillator (DRO), microwave mixer and patch antenna. The module operates at +5 Vdc for Continuous wave (CW) operation, but the module can be powered by +5V low duty cycle pulsed trains to reduce its power consumption (sample & hold circuit at the IF output is required for pulse operation). The following indicators should be considered when using the HB100 module.

2.1.3 Electronic speed controller

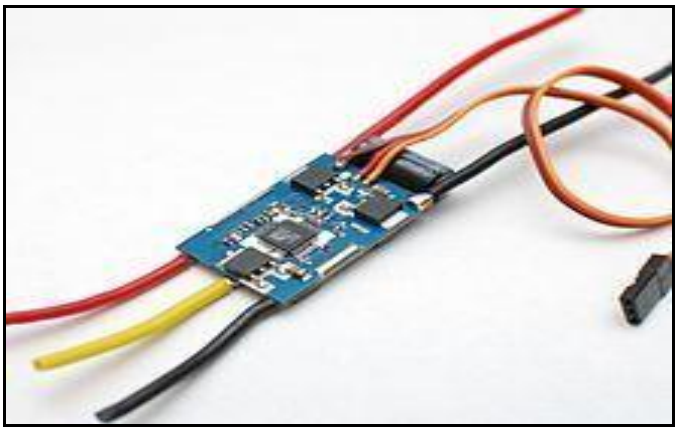

Fig -4: Electronic speed controller

An electronic speed control follows a speed reference signal (derived from a throttle lever, joystick, or other manual input) and varies the switching rate of a network of field effect transistors (FETs). By adjusting the duty cycle or switching frequency of the transistors, the speed of the motor is changed. The rapid switching of the transistors is what causes the motor itself to emit its characteristic highpitched whine, especially noticeable at lower speeds.

2.1.4 CC3D Flight Controller

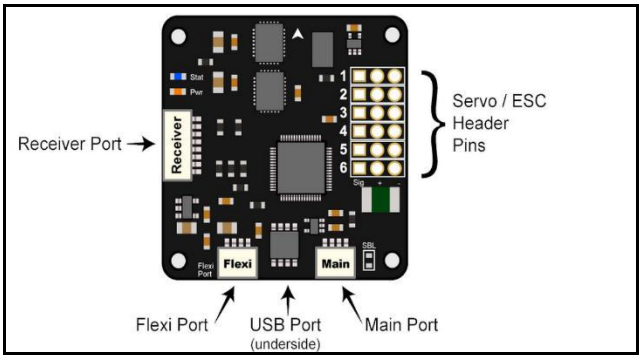

Fig -5: CC3D flight controller

The CC3D is the powerful and affordable flight controller that is very popular to use mainly on mini quadcopters due to its small form factor. It has many advanced features that you can use if you add a GPS module, even waypoint based flight. However, most users don't bother with this for mini quadcopters and just want the basic setup. This post will provide some links and comments to some of the better CC3D setup guides that we have found on the internet. If you have made one, or know of a great guide that I missed, just add a comment with the link so I can add it to the CC3D flight controller guide. **2.1.5 Battery**

Fig -6: Battery

This is General purpose 9V Original HW marked Non Rechargeable Battery for all your project and application needs. As we experienced the use of this battery in our testing lab for various purposes, we can assure you the best quality, long life and genuineness of this battery among all the options available in the market at this cost. With its Universal 9V battery size and connecting points, it can be used in many DIY projects as well as household applications and they can easily be replaced and installed, the same as you would an AA battery or a AAA battery. **2.2 Flow Chart**

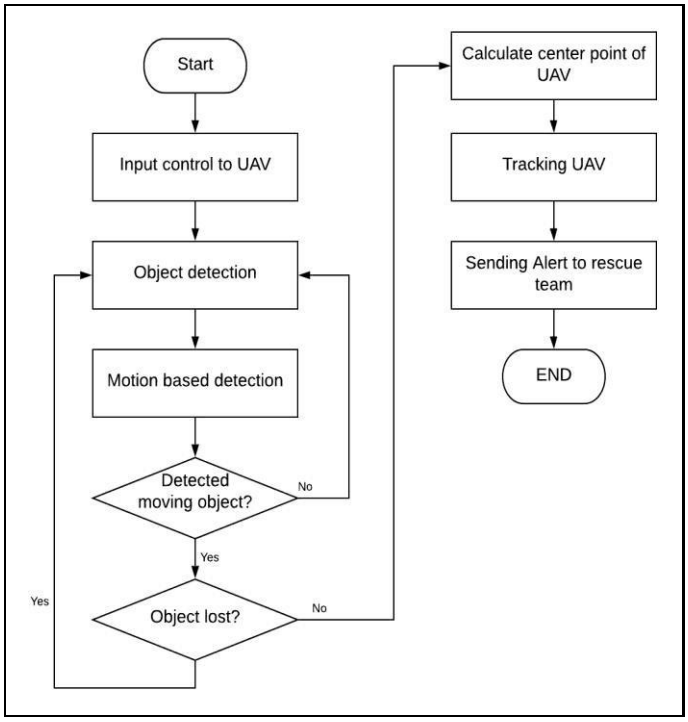

Fig -7: Flow Chart

3. RESULT

The result includes the simulation of the proposed design using Proteus 8.0 software. In this simulation process, the estimated components required for the same are selected and placed Accordingly. With the help of the datasheet and the estimated circuit diagram, the connection between the components is made. After applying the supply and ground the code which was made in Proteus 8.0 After clicking to the Arduino UNO controller the required HEX file of the program generated in the program files gets dumped into the controller. Troubleshooting of the circuit is made and the process of simulation is started. The pot gives the variable voltage and if it meets the requirement of the proposed voltage range the LCDs the message as 'living', also the motor moves in the clockwise direction

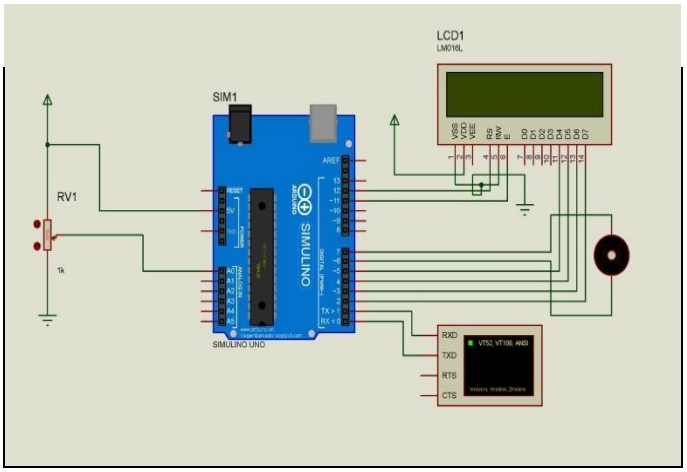

Fig- 8: Simulation result

4. CONCLUSION

The natural calamity is a large area, high-intensity, long the pattern, resulting in increased landslides and debris flow, so the UAV technology is providing applicable information and assistance in terms of mapping the victims below the rubble and send the required alerts to officials, therefore we need to build a procedure of disaster information collection. Based on this we can get effective information at appropriate times and provide the reference for the phases of disaster preparedness, response and return. This project uses the high mobility, high time-resolution and other features of unmanned vehicles to provide important reference information in planning for disaster response and return. Drones have the potential to revolutionize disaster planning, preparation, response, and reconstruction. This application gives the result as a smart drone technology.

REFERENCES

1. The Role of Unmanned Aerial Vehicles (UAVs) In Monitoring Rapidly Occurring Landslides VL - 72 DO -10.5194/nhess-2018-13 JO - Natural Hazards and Earth System Sciences Discussions, TY - JOUR AU - Yaprak, Servet, Yildirim, Omer Susam, Tekin, Inyurt, Samed, oğuz, Irfan PY - 23 Jan 2018 SP - 1 EP - 18, ER

2. Mongoose RTOS based IoT Implementation of Surveillance System
TY - BOOK AU - Kodali, Ravi, Yadavilli, Sindhuja PY - 01 Feb 2018 SP - 155 EP - 158 DO - 10.1109/IC3IoT.2018.8668137 ER

3. UAV-assisted disaster management: Applications and open issues AU - M. Erdelj and E. Natalizio, 2016 International Conference on Computing, Networking and Communications (ICNC), Kauai, HI, 2016, pp. 1-5. doi: 10.1109/ICCNC.2016.744056

4. Application of drone for landslide mapping, dimension estimation and its 3D reconstruction Journal of the Indian Society of Remote Sensing, 2018, Volume 46, Number 6, Page 903 Sharad Kumar Gupta, Dericks P. Shukla PY- 2018

5. Aerial Surveillance System using UAV Zaheer, Z., Usmani, A., Khan, E., & Qadeer, M. A. (2016). Aerial surveillance system using UAV. 2016 Thirteenth International Conference on Wireless and Optical Communications Networks (WOCN). doi:10.1109/wocn.2016.7759885

6. Detection of Breathing and Heart Rates in UWB Radar Sensor Data using FVPIEF Based Two-Layer EEMD Shyu, K.-K., Chiu, L.-J., Lee, P.L., Tung, T.-H., & Yang, S.-H. (2018). Detection of Breathing and Heart Rates in UWB Radar Sensor Data using FVPIEF Based Two-Layer EEMD. IEEE Sensors Journal, 1–1. doi:10.1109/jsen.2018.2878607