IJARSCT

ISSN (Online) 2581-9429
ISSN (Print) ABCD-PQRS

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

Volume 9, Issue 3, September 2020

Time Management Medicine Delivery Using Drones

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Abstract: *Aerial drone technology is now in use to improve medical care, especially blood delivery. The use of aerial drones is broader than just this and includes aerial photography, express shipping and delivery, disaster management, search and rescue operations, crop monitoring, weather tracking, law enforcement, and structural assessment. This wide use promises to accelerate and, ideally, reduce the cost of technological advances of drones. By doing so, drone use offers the opportunity of improving health care, particularly in remote and/or underserved environments by decreasing lab testing turnaround times, enabling just‑in‑time lifesaving medical supply/device delivery, and reducing costs of routine prescription care in rural areas. The authors recommend that when considering the drone delivery of medicines five tests need to be applied. These tests must determine the safe flight time and range, the quality of the medicine post flight, the onboard conditions experienced by the medicine, the security of the drone supply chain and the effect of drone failure on both the medicine and the environment.*

Keywords: Aerial Drone, Medicine Delivery, Healthcare.

I. Introduction

Unmanned aircraft systems were historically used exclusively by the military. Currently, the use of remotely piloted aircraft systems and small drones has expanded to perform civilian tasks such as, supporting search and rescue operations monitoring weather and traffic flows delivering goods and of course as a platform for aerial photography. Drones are being employed to effect change in the environment; a good example is in agriculture, where efficiencies may be made by employing drones to spray fields and track crop growth patterns. However, one of the most exciting areas of drone development is within the healthcare industries. Such applications include delivering medicines, vaccines, blood and other medical supplies that are urgently needed in inaccessible areas. Supply challenges are frequently caused by poor transport networks, extreme weather conditions, natural disasters or traffic congestion in urban areas. In the healthcare context, the timely delivery of medications, vaccines and blood is crucial . Drones can potentially overcome the logistic challenges as they are not subjected to traffic delays , and most importantly, they are able to reach regions that lack adequate roads faster. However, for delivery of fragile medications, blood and diagnostic clinical laboratory specimens , drones are practical only if the quality of transported products is not adversely affected. Thus, drones as a novel method for medicine transportation, must be tested to determine their impact on medicine quality.

Current unmanned aircraft systems (UAS) or drones may be generally classified into fixed-wing or rotary-wing aircraft. Fixed-wing UAS are more efficient, have longer ranges and have greater payloads; however, rotary-wing drones take off and land vertically with the ability to hover during flight. For drone delivery of medicines in urban situations, rotor-based drones are more applicable, whereas rural locations benefit from the greater range associated with the fixed-wing aircraft. Udroiu and Blaj (2016) have made a compelling case for the design of vertical take off and landing (VTOL) drones that incorporate tilting wing technology and thus combine the benefits of both rotor- and fixed-wing aircraft. For all drone configurations the same critical process parameters associated with flight will impact on the stability of medicines transported by these systems

II. LITERATURE SURVEY

Josephin Arockia Dhivya, Dr. J. Premkumar[1] on “Quacopter based technology for an emergency healthcare” in “2017,International Conference on Biosignals, images and instrumentation (ICBSII)” The mini patient monitoring system embedded with the quadcopter will reach the scenario and it measures the victim's heart rate, ECG values temperature and respiration rate. It will track the accidental location by GPS and send the data to hospitals. Several thousands of people die day to day due to the time lag taken by the Ambulance service to reach the accident spot. Judy E. Scott,Carlton H. Scot [2]on "Drone Delivery Models for Healthcare" in"2017,50th Hawaii International Conference on System Sciences" how the drone is used. In medical field and thrust and payload of the drone. The military has led the investigation of the utility of drones for patient transport. The U.S. Army Medical Research division demonstrated the possibility of using VTOL drones to extract injured soldiers while avoiding airspace collisions. However, their report concludes that there is still a lack of concrete guidelines and standards regarding the physiological impact of flight on patient health and safety. A 2017 demonstration by Kaman Aerospace in Connecticut successfully used coordinated unmanned air and ground vehicles to respond to a simulated distress call reporting a casualty in the field. Both unmanned systems were operated by a single person using an android tablet. An unmanned ground vehicle (UGV) was sent to assess the situation. Subsequently, a drone was sent to pick up a mannequin and transport it back to base

Ahmed Bitar, Aliaa Jamal, Hesham Sultan[3]on "Medical Drones System for Amusement Parks" in "2017,IEEE/ACS 14th International Conference on Computer Systems and Applications" The purpose of the project is to provide a way to enhance the medical Services in some places by using the GPS module it will track the location and deliver the medicine to accidental location

Huon [4] "Routing and Scheduling for Hybrid Truck-Drone Collaborative Parcel Delivery With Independent and Truck-Carried Drones"in "2019,IEEE International Conference of Internet of things" Because of safety and weight issues, a single drone can not carry multiple parcels. Therefore, a drone visits only one customer per time. The enabling Internet-of-Things (IoT) technology has inspired a large number of novel platforms and applications. One popular IoT platform is unmanned aerial vehicles (UAVs, also known as drone). Benefiting from the intrinsic flexibility, convenience, and low cost, UAVs have great potentials to be utilized in various civil applications, including parcel delivery. However, suffering from limited payloads and battery capacities, it is uneconomical for UAVs to perform parcel delivery tasks independently. To conquer the drawbacks of low payloads and battery capacities, people propose to employ both trucks and drones to construct truck-drone parcel delivery systems. However, previous works only leverage either independent drones or truck-carried drones to collaborate with trucks. In contrast, in this article we propose to simultaneously employ trucks, truck-carried drones, and independent drones to construct a more efficient truck-drone parcel delivery system. We claim that such a hybrid parcel delivery system can fully exploit the complementary benefits of the three platforms. We propose a novel routing and scheduling algorithm, referred to as hybrid truck-drone delivery (HTDD) algorithm, to solve the hybrid parcel delivery problem, wherein M drones carried by M trucks, together with N independent drones, cooperate to deliver parcels to customers distributed in a wide region. The experimental results show that our algorithm outperforms the existing ssolutions which employ either independent drones or truck-carried drones.

III. PROPOSED METHODOLOGY

A) Arduino as a Flight Controller

We use arduino as a flight controller for that we require gyroscope accelerometer to stabilize the drone A gyro modules will detect any movement on each of the 3 axis. Usually it gives we are going o build. We will build a quad-x shaped drone, which means that it will have 4 motors back rotation/second values to the microcontroller. Using those values we could calculate the angle of the drone in each moment. If we know the angle we can always give different power to drone in each movement

Now we defined that the front of our drone we can set the axis of it. From left to right will be the "X" axis and top to bottom the "Y" axis. We have to place the flight controller as centered it can. It will detect fast movement of the drone and adjust the PWM signal for each of the four motors in order to stabilize the drone.

We can see that each motor has a number. That number corresponds to the digital pin of the arduino. Each motor has one signal pin for these ESCs. We can also see that each motor spins in a different way in order to create a special air vortex. Both back and front pair sof motors spin toward the interior of the drone Accelerometer:

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We have interface the **GY-521** accelerometer with Arduino. The GY-521 has an InvenSense MPU6050 chip which contains a 3-axis accelerometer and a 3-axis gyro meter. This makes it a 6 DOF IMU (6 degrees of freedom inertial measurement unit). The chip also includes a 16-bit analog to digital converter on each channel and a DMP (Digital Motion Processor) unit. The accelerometer sensors measure the acceleration by measuring the change in capacitance. Its structure has a mass attached to a spring which moves along one direction and has fixed outer plates. So, when acceleration is applied in any direction, the capacitance between the plates and the mass will change. This change in capacitance is measured and corresponds to the roll values are shown on the serial monitor output screenshot given below. Whenever we move the sensor the pitch and roll values on the serial monitor will change according to the movement.

Coding:

The platform that we will use is called Multiwii. Multiwii is a flight control platform that could adapt for a big variety of flying machines. Drones, planes, helicopters and so on. The flight controller should read the accelerations and gyro data from the MPU uint. Next it should calculate the real angle of the drone and using a PID operation control the 4 motors and move the drone in the desired direction.

B) ESP 8286 WIFI Module with Arduino Uno

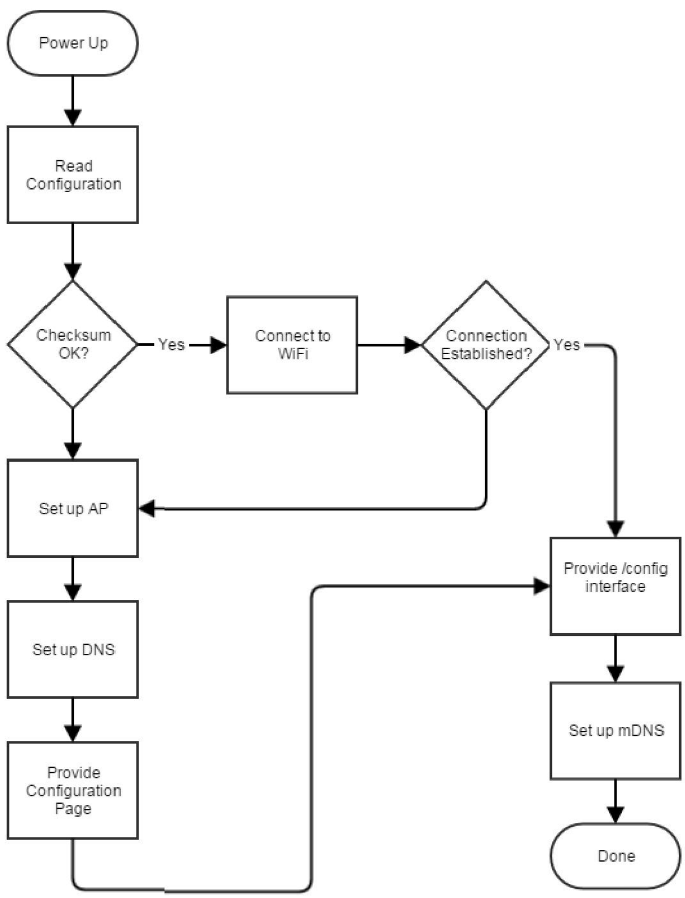

Figure: Flow chart for esp 8286 wifi module

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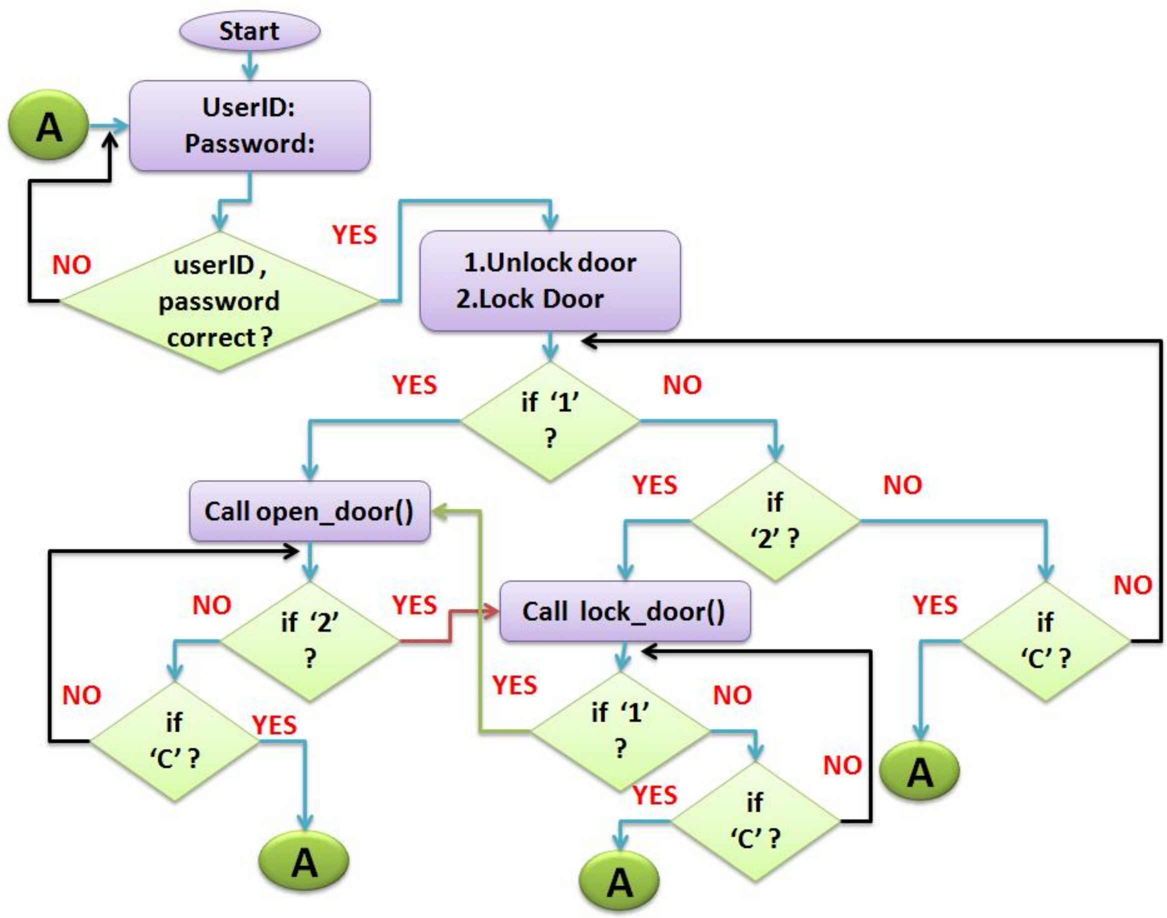
In configuration mode the device needs to act as an access point so drone that can connect to it to The flow chart explains that When the device first powers up we try and read the current cofiguration information from the EEPROM and validate it with a checksum - if it passes we assume it is correct and try to connect to the SSID provided. This is done using the standard WiFi library and we try up to three times if the connection attempt fails. If the configuration is not valid or we cannot connect to the network specified in the configuration we enter configuration access the configuration page. The access point name needs to be easily recoginizable so the user can select the appropriate one but still have some uniqueness to avoid clashing with existing network names. This project is part of a larger group of projects I've tentatively called 'IoThing' so we use that as the prefix for the network name - to help avoid clashes I then add a 2 digit number to the name. The ESP8266 conveniently provides a unique chip ID so I just use the last two digits of that number in the name.

C) Password Based Medicine Box



The flow chart explains that When we turn power supplies ON, the system will turn ON with a messaged on LCD screen – "Password Based Security System". Once the boot up process is complete, the system will ask to "Input 5 Digits". The user has to input 5 digits consecutively after this message appears on LCD screen. Once 5 digits are entered, the system will start checking password (by comparing the input 5 digits with the stored password). Before the subroutine to check password (comparison subroutine – with label – CHECK_PASSWORD) begins, a status message "Checking Password" will be displayed on LCD module. The password checking subroutine will compare each entered digit – one by one and if all the 5 digits are entered correctly (i.e each entered digit matches with the stored password in

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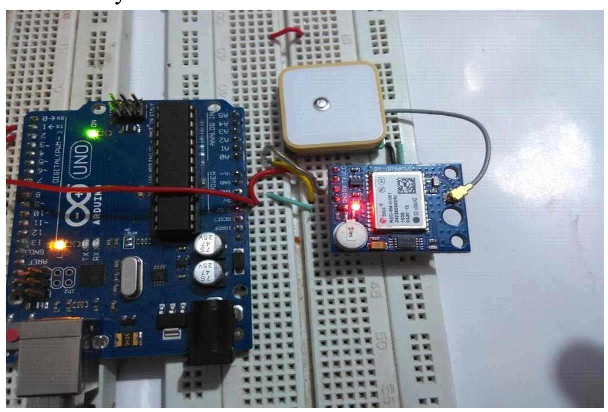
order) the system will begin the process of allowing access to the user by turning ON the relay(achieved with SETB P2.0 command in program). Two messages will be displayed on LCD screen – "Access Granted" and "Door Opens" . The relay will be turned OFF with command CLR P2.0 after a few seconds (that is in the next iteration of the MAIN Program commands) If the password entered is wrong, the system will not turn ON the relay and a message "Wrong Password" – "Access Denied" will be displayed on LCD screen.

D) Remote Tracking of Drone

GPS gives longitude and latitude output to ARDUINO UNO by using ARDUINO ide we can see the output in serial monitor by using this output we can easily track the location to move the drone to desired location in autopilot mode



1V. CONCLUSIONS AND FUTURE WORK

The Proposed Prototype drone can be used to deliver the medicine It also can also be remote controlled using T RF TX and RF RX It is easy to access and use. Set of sensors helps to navigate the drone in autonomous mode to move the drone in desired location to deliver the medicine, In Future, the camera is used in drone to sense whether the medicine is delivered to the desired location and desire person by using apache web server and also drones have their own drone stations to deliver the medicines.

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