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USE OF DRONE TECHNOLOGY FOR DELIVERY OF MEDICAL SUPPLIES

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Abstract: Unmanned aerial vehicles, also known as drones, can play a significant role in military and civil emergency medicine. The aim of study was to present the real possibilities of using them in rescue operations and to provide examples from all over the world. Unmanned aerial vehicles can be applied to transport goods on demand, provide blood in urban areas, save sinking people, analyses the scale of damages, monitor large human gatherings, perform exploration activities, deliver blood samples and other analysis material, provide automated external defibrillators, support rescue operations and air transport, and perform agricultural activities. One must, however, be aware of the existing regulations regarding drone flights as an appearance of an unreported unmanned aircraft in the controlled space is identified worldwide as affecting aviation safety.

Keywords- Drone; medical supplies; delivery.

I. INTRODUCTION

A drone, also known as unmanned aerial vehicle (UAV), is conventionally defined as an aircraft without a human pilot aboard. Drones originally were developed for military purposes and their use now is rapidly expanding into the the non-military and noncombat environments. Healthcare can be expected to be the next logical sector to embrace this technology, given it's great flexibility. UAVs have just recently been investigated for transportation of laboratory specimens between remote medical institutions and,more recently, UAVs have been studied for delivery of automated external defibrillators in out-of-hospital cardiac arrest

Medical supplies transport is a quite critical task. There is a huge variety of medical tablets, vaccines, syrups, devices and parts. There usually is an urgency of certain medical supplies at certain locations as per emergencies.To allow for instant transport of medical supplies from medical stores to hospitals and emergency centres, we here design a medical supply delivery drone. The drone will allow for instant delivery or upto 1 kg medical supplies to hospitals and emergency centres without being affected by traffic in the area.

II. LITERATURE REVIEW

A systemic literature search was performed to assess scientific work involving current medical applications of drones. The ebsco (elton b. Stephens company) discovery service was used as the search engine. An advanced search was performed to identify sources that contained the phrases "Drones," "UAV," "unmanned aerial vehicles," "UAVs," and "unmanned aerial systems" as subject terms. The sources were arranged chronologically, and their titles were screened for relevance and selected if deemed applicable.

Source types included magazines, academic journals, news articles, trade publications, and electronic resources. All sources published in the english language through april 2017 were included. Duplicate search results were excluded.

Unmanned aerial vehicles can be applied to transport goods on demand, provide blood in urban areas, save sinking people, analyses the scale of damages, monitor large human gatherings, perform exploration activities, deliver blood samples and other analysis material, provide automated external defibrillators, support rescue operations and air transport, and perform agricultural activities. One must, however, be aware of the existing regulations regarding drone flights as an appearance of an unreported unmanned aircraft in the controlled space is identified worldwide as affecting aviation safety. Unmanned aerial vehicles, also known as drones, can play a significant role in military and civil emergency medicine. The aim of study was to present the real possibilities of using them in rescue operations and to provide examples from all over the world.

The UAV hovered 0.6m above ground level and dropped the medical payload to the ground. Altitude, flight time, and route were recorded and monitored by an overflying high altitude shadow drone. This technology could be used easily on domestic soil to deliver blood products to rural areas to the injured where transport is expected to be prolonged, hospitals with limited supply of blood products, and during natural disasters in areas where supplies are extremely limited or where environments are nonpermissive.

III. SYSTEM DESIGN

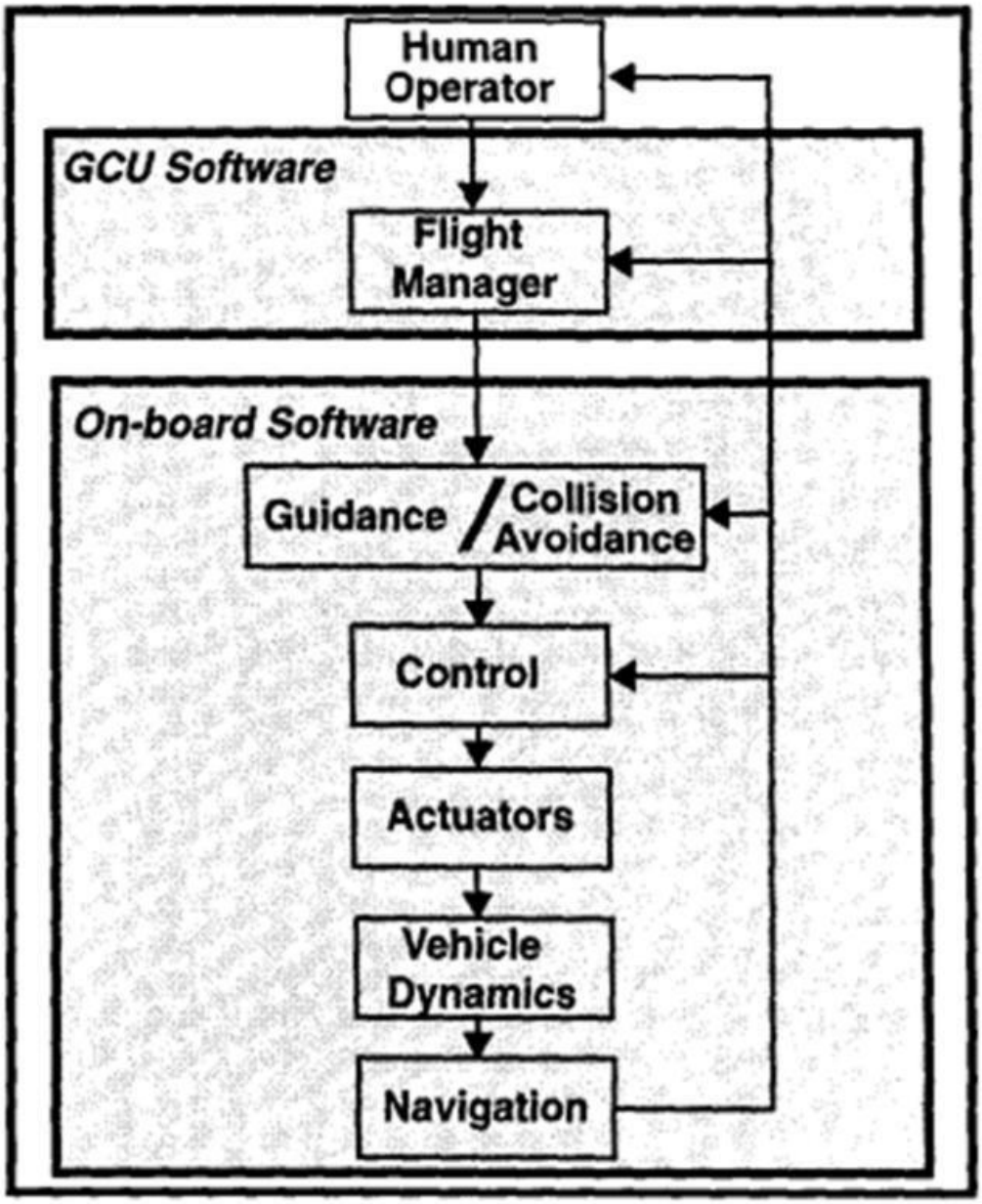

FIGURE 1. Block diagram

The Control system hierachy has an inner loop hover control system at the lowest level that acts as an autopilot.This system is commanded by a way point guidance system that can be changed or controlled by a grounded flight manager.Each level of this hierarchy, is reliant upon a navigation filter. To archive this autonomous control, on-board hardware must remain as minimal as possible to maintain capabilities.

IV. COMPONENT FUNCTIONS

Drone motors:
Brushed motors are used in the smallest drones, whereas larger drones and UAVs will used in brushless motors as they can carry the extra weight of the additional electronics. Brushless drone motors also required an electronic speed controller to operate.

RF Camera:
RF sensor works by passively listening to the radio frequency spectrums in which drones communicate with their controller.

Perforated Basket:
Basket is used for collect the medicine and transfer the medicine arban areas and rear areas.

RC remote controller:
RC transmitter and Receiver for drone. the transmitter sends a signals over a frequency to the receiver . the transmitter has a power source, that provides the power for the controls and transmission of the signal.

Propeller:

Drones propeller provide lift for the aircraft by spinning and creating an airflow, which results in a pressure difference between the top and bottom surfaces of the propeller.

V. DRONES IN HEALTHCARE

Discover How Drones can save lives by

- Delivering urgent supplies
- Transfering Medical samples between labs
- Reacting quickly during disasters.

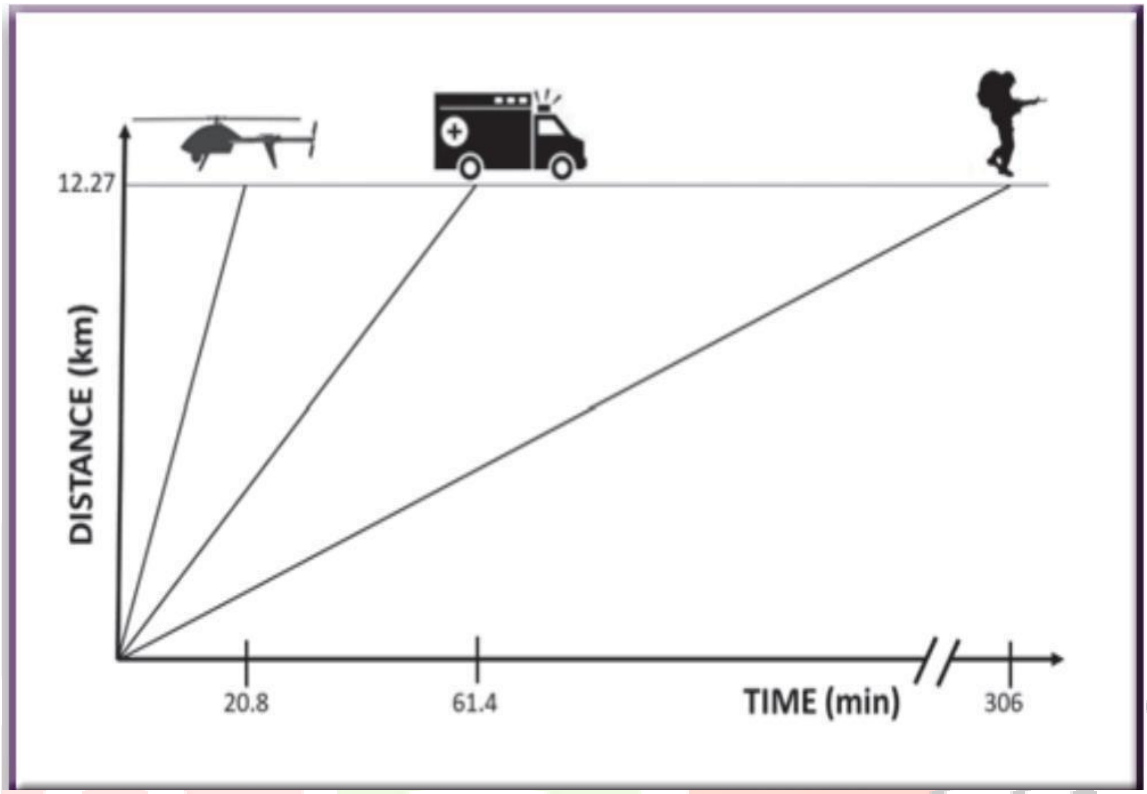

FIGURE 2. Comparison of delivery times by unmanned aerial vehicle, vehicle and foot march.

VI. METHODS

Using an unmanned, rotary-wing drone, we simulated delivery of a customizable 4.5Kg load of medical equipment, including tourniquets, dressing and blood products.

The UAV is a 25kg airframe that allows an 4.5Kg payload with full endurance, has a maximum cruise endurance with full endurance, has a maximum cruise endurance with full payload of 45 minutes. After we received institutional review board and casualty was positioned in a remote area.

The flight was pre-programmed on the basis of grid coordinates provided by the tactical medical provider positioned with the simulated casualty moments before initiation of flight.

HOW IT WORK

The drone flew on autopilot beyond visual range during daylight.The UAV hovered 0.6m above ground level and dropped the medical payload to the ground. Altitude, flight time, and route were recorded and monitored by an overflying high altitude shadow drone. While drones has a variety of purposes, such as recreational, photography, commercial and military, their two basic functions is flight and navigation.

To archiv flight, drones consist of slower source,such as battery or fual, rotors, propellers and a frame.

Drones require a controller, which is used remotely by an operator to launch, navigate and land it. Controllers communicate with the drone using radio waves, including wi-fi.

DELIVERING EMERGENCY MEDICAL AID

Depending on type of emergency

- Drones can carry necessary Tools to incident scene
- Response time to an emergency make all the difference

FIGURE 3. Unmanned aerial vehicle.

ADVANTAGES

- Carry Upto 1 kg Medical Supplies Tablets, vaccines, devices, medical tools etc
- Hexa Copter designed for stable flight with Supplies
- Perforated Medical Supply Box for Easy Filling
- On Board Live Camera for Effective ControlThey can save lives. ...
- They can support law enforcement. ...
- They can contribute to safe infrastructure maintenance and management. ...
- They can streamline agriculture management. ...
- They can give media access to hard-to-reach places.

APPLICATION

- Medical tablets, syruph, glucose bottle transport
- COVID and other Vaccine transport
- Medical tools and devices transport
- Automated drones can be used in oil & gas facilities for security, surveillance, emergency response and infrastructure inspection
- In sea ports, drones can perform applications such as mapping, surveying, operational oversight, port monitoring and traffic control.

IV. CONCLUSION

Use of unmanned drones is feasible for delivery of life-saving medical supplies in austere environments. Drones repeatedly and accurately delivered medical supplies faster than other methods without additional risk to personnel or manned airframe. This technology may have benefit for austere care of military and civilian casualties.

Expected evacuation to a medical facility with surgical capabilities has been historically considered the gold slandered of management of patients with surgically treatable injuries. Conventional ground forced do not carry blood product as a part of their standard equipment; thus, initiation of appropriate resuscitation may be delayed. Even a single causality may rapidly overwhelm resources in an austere environment. More importantly, UAVs offer an unprecedented advantage in flexibility. Drones are normally smaller than conventional, manned helicopters, far less expansive, and require significantly less manpower even when accounting for maintance and system supervision. UAVs can be used with ease to deliver blood products and additional medical consumables to the injured at the point of injury in an environment.

This technology could be used easily on domestic soil to deliver blood products to rural areas to the injured where transport is expected to be prolonged, hospitals with limited supply of blood products, and during natural disasters in areas where supplies are extremely limited or where environments are non-permissive.

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