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Transfuron

Needs Statement

Hospitals may often lack the blood supply needed to perform blood transfusions and therefore have to rely on receiving the blood from other hospitals [1]. Currently, in Qatar, blood bags are transported by using hospital vehicles; relying on vehicles means their transportation time is dependent on the traffic, and these vehicles are vulnerable to car accidents. Furthermore, in the unlikely event of a catastrophe, having a system in place to quickly and reliably transport blood may be vital to ensure the wellbeing of Qatar's population.

Solution

To make the transportation process of blood bags for blood transfusion faster, safer, and more efficient, we created Transfuron. Using an automated system of medical drones, the blood bags will be safely and reliably transported from one hospital to another based on the demand for certain blood types and their available supply at each hospital. Transfuron automates and speeds up the blood transportation process while making it more reliable as it is not affected by street traffic and unexpected delays.

Interviews

In order to collect information and to get better idea about drone delivery, we have interviewed three people with different background knowledge.

- The first interview was with Engineer Hamda Al-Naimi, a Texas A&M graduate. She worked on similar drone delivery in her senior design project. She talked about her experience and the obstacles that she faced when implementing their drone. She recommended that we use a 5G network and use a static IP address. And from that we have decided on installing multiple charging stations to provide the optimum capabilities.
- The second interview was with Dr. Yasser Al-Hamidi from the mechanical engineering department. He helped us with the different drones' specifications. He recommended the multi rotor type and he emphasized on researching the passive cooling system.
- The third and final interview was with a medical student in Weil Cornell. We discussed the possibility of transporting blood through drones and he informed us with the conditions that the blood should be transported in.

Design Specifications

Drone Model:

Multicopter

Uses:

Aerial photography, and delivering packages.

Pros

- Long-lasting Lithium battery that will allow it to fly as long as possible.
- Flies at an altitude of 400 ft maximum, to reduce colliding into tall buildings.
- Can hover in a stationary position and provide vertical take-off and landing.

Cons

- Limited flying time (between 15-30 minutes)
- Small payload capabilities (2.3kg up to 6kg).
- Most of the drone's energy is spent on stabilizing in the air.

Prototype

- 1 • GPS tracker that will broadcast the drone's live location, along with 5G router.
- 2 • A thermally insulated container that withstands pressure, shocks, and is sturdy against possible transporting accidents.
- 3 • A sound sensor for detecting obstacles and alerting the drone to change its path.



- 4 • A birds and buildings detection camera sensor to avoid collisions.
- 5 • Firewall security system to exclude vulnerabilities by regulating all hospital network exchanged data.
- 6 • A lightweight carbon fiber body to improve strength and withstand bird strikes.