

DRONE INTERNSHIP

DESIGN PRACTICES

Submitted in partial fulfilment of the requirements for the
Professional Training –I of
Bachelor of Engineering Degree in
Electrical and Electronics Engineering
By

SNEHA DEVAKUMAR (39140053)



**DEPARTMENT OF ELECTRICAL AND ELECTRONICS
SCHOOL OF ELECTRICAL AND ELECTRONIC
SATHYABAMA INSTITUTE OF SCIENCE AND
TECHNOLOGY
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06 October 2021

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This is to certify that **Ms. SNEHA D**, Register Number **39140053** is a Bonafide student of our Institution pursuing **BACHELOR OF ENGINEERING** in **ELECTRICAL AND ELECTRONICS ENGINEERING** during the academic year **2021-2022**. She will be completing the course in the year **2023**.

This certificate is issued for the purpose of Applying **INTERNSHIP**.

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I.

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II.



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This is to certify that **Ms. Sneha D (19S149005)** of **Electrical and Electronics Engineering** Department from Sathyabama Institute of Science and Technology has attended and successfully completed **15 days Drone Internship** from 15 September to 29 September 2021 via Online Medium through our Platform.

We wish her all the best in future endeavors.

Regards,



S. Karan

Head Technical Services

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III.

Abstract

Interfacing Infrared Pulse Sensor with Barola' s Microcontroller which could be connected to drone for health care emergency applications and visualize the output in the serial plotter (Proof of concept).

In recent years the health monitor systems for patients was developed by using wireless technologies such as Internet of Things (IoT), Wireless Sensor Network (WSN), or Websites. In this research a patient's position in Google map, heartbeat rate, and temperature were measured and transmitted to the family or doctor based GPRS technology via the smartphone and microcontroller. This system has advantages of low cost design, Early warning of patient status through SMS message or email, position recognize based on GPS and fast of treatment patient.

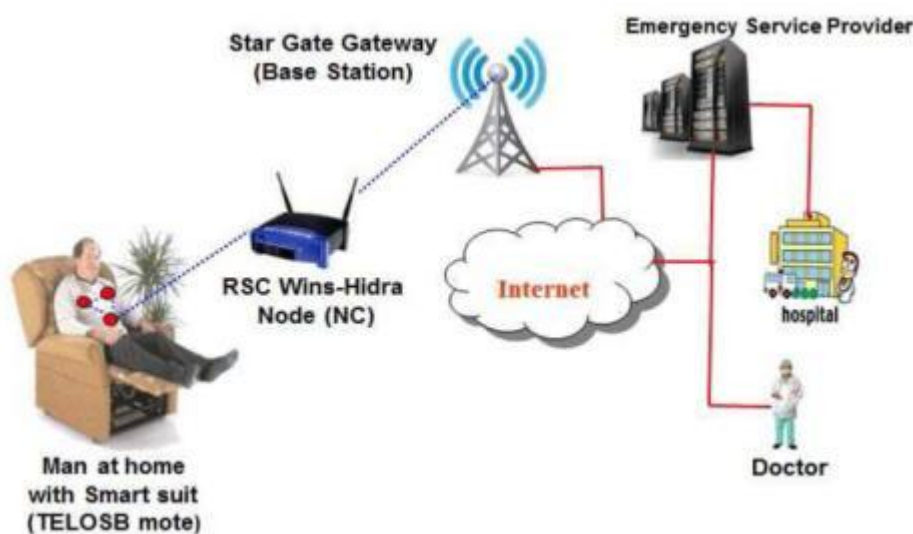
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Introduction

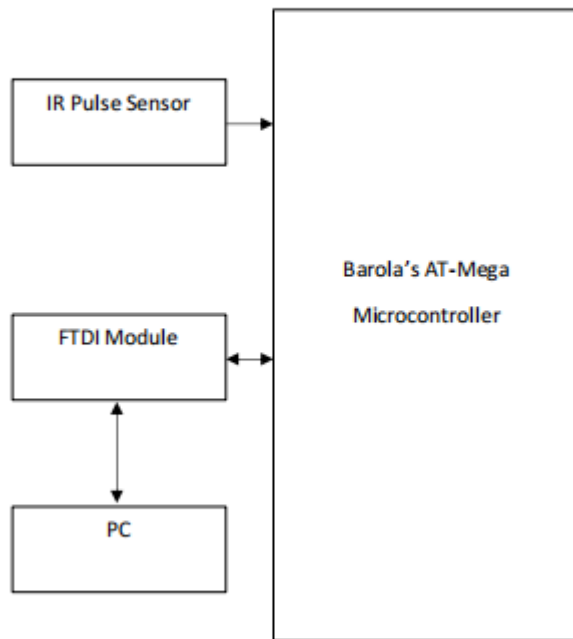
A heartbeat sensor is a device that helps us to detect the heart rate of a person. It helps a person to get the heart rate checked up and thus helps us to monitor the heartbeat. It is mainly a heartbeat sensor framework that is connected with the database and there is also an emergency system that is associated with any hospital management. Said device also, can store the data of patients as well.



Working of IR Pulse Sensor

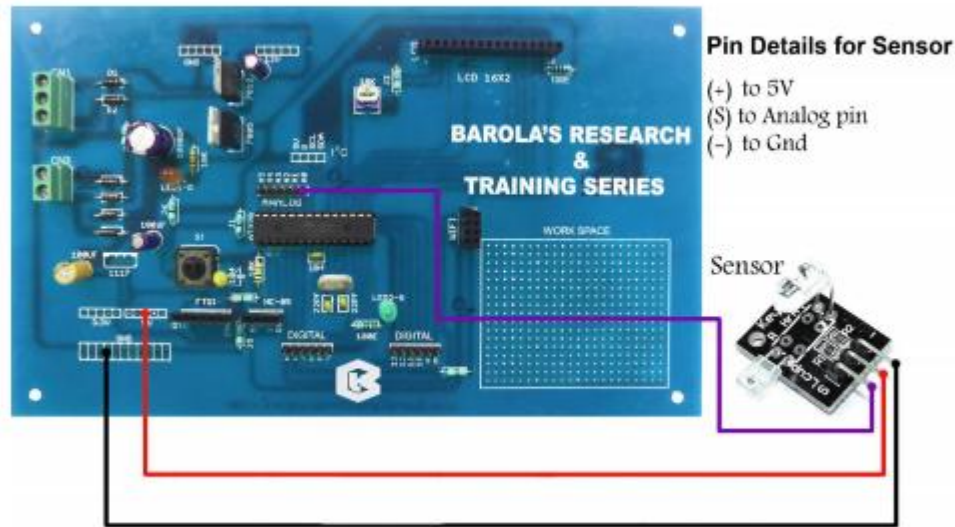
- A pulse wave is the change in the volume of a blood vessel that occurs when the heart pumps blood, and a detector that monitors this volume change is called a pulse sensor.
- The basic heartbeat sensor consists of a light-emitting diode and a detector like a light detecting resistor or a photodiode. The heartbeat pulses cause a variation in the flow of blood to different regions of the body. The amount of light absorbed depends on the blood volume in that tissue.

Block Diagram—



- The KY-039 heartbeat sensor is designed to detect a pulse while a human finger is placed between the infrared diode and the photo transistor. The pulse will be represented on the signal output pin.
- Pulse sensor has three pins- VCC, GND, and a signal pin.
- Some of the applications are—
- Portable Sensing

Connection of IR Pulse Sensor with Barola's Microcontroller—



Drones are commonly known as Unmanned Aerial Vehicles (UAVs). This term was first coined in the 1980s to describe autonomous, or remotely controlled, multi-use aerial vehicles. Speed and versatility of UAV technology offers virtually unlimited opportunities to deliver needed medical supplies and assistance to individuals in remote or dangerous areas. They can even connect doctors to patients in a more expeditious manner. Victims of natural disasters or emergency situations could be administered life-saving care by good-Samaritan bystanders who are provided remote instruction on treatment administration.

Inclement weather conditions or differences in ambient temperatures may cause drones to lose their functionality. Cost of building and maintaining drones needs to be carefully reviewed so that a cost–benefit analysis could be done. Regulatory, legal and environmental issues need to be addressed

History

The more familiar public term “drone” was first coined because of the resemblance of the loud and cadenced sound of old military unmanned target aircraft to that of a male bee. In 1942, the Navy developed a radio-controlled drone that carried a torpedo. Today the drone is all set to be a major

disruptive force in transportation. The origins of UAVs can be traced back almost 100 years dating back to World War I. While UAVs were originally created for the military, they are now being used for a wide variety of applications. A few weeks ago, the US military force used a drone controlled from the USA to selectively eliminate an Iranian General in Baghdad.

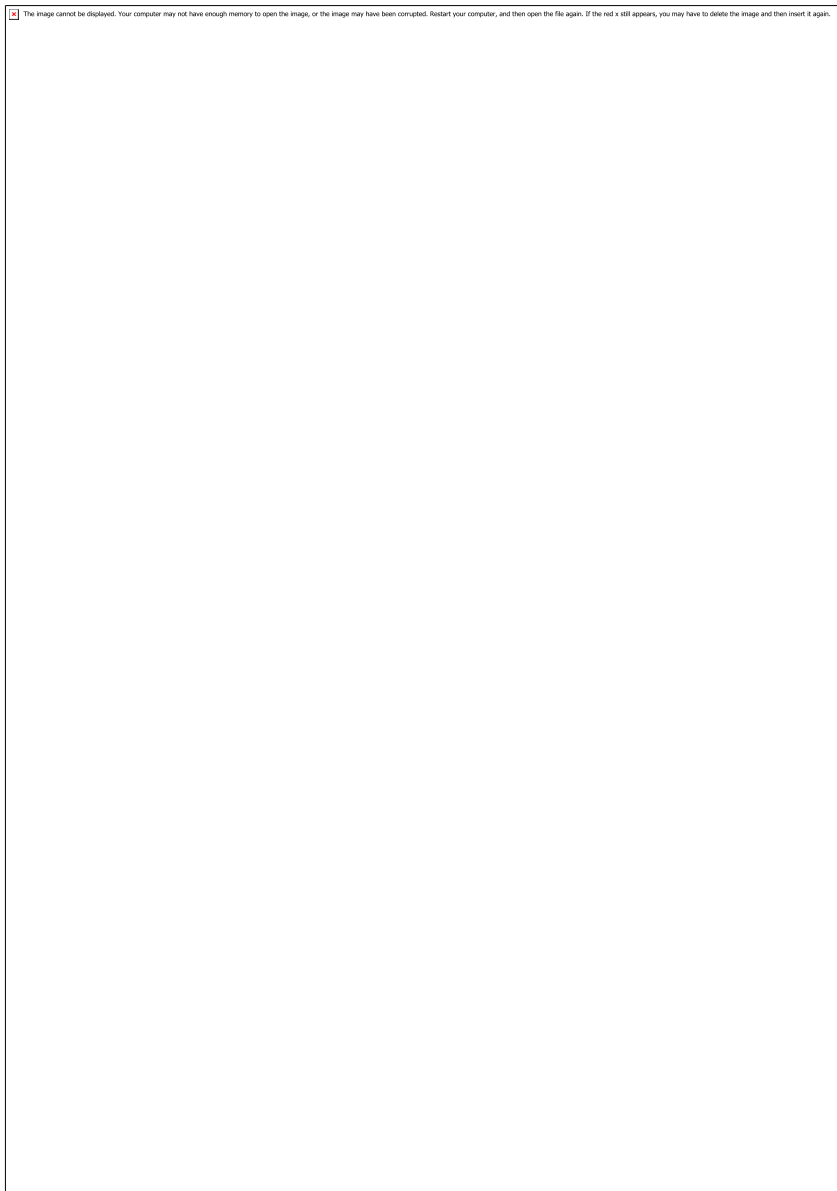
Drone use for commercial purposes has gotten much press of late due to Amazon announcing it intends to use drones to deliver packages to customers. This is a very intriguing and transformational idea with many intended and unintended consequences.

The future use of drones in healthcare also is very thought provoking. Drones already have been trialed to deliver food aid and medical supplies to areas hit by disaster, such as Haiti, by a startup called Matternet.

The rapid delivery of vaccines, medications and supplies right to the source could quash outbreaks of life-threatening communicable diseases. Communication equipment, mobile technology, portable shelter comprise the vast list of what could be delivered in a rapid fashion to areas where critical infrastructure damage would prevent ground or typical air transport.

Drones help provide more efficient healthcare to patients from a distance or while mobile.

In the future, small indoor drones could deliver medicine to the bedside of a patient from the pharmacy, thus eliminating some human steps. This would lead to more rapid and less error prone administration of medications. Nurses and pharmacists can work more efficiently as supplies can be summoned to the bedside instead of the time consuming task of gathering necessary items.



Drones could deliver medications and supplies to patients being cared for in the home instead of a hospital-based setting. The future will see more outpatient care and even home-based care that used to be delivered in the hospital. For many conditions, drone technology may make it easier and safer to provide this home-based care. When a provider rounds on a home patient, blood can be drawn and immediately sent by drone to the lab to be tested. Medications, antibiotics and treatments ordered by the provider may be delivered to the home by drone.

This technology may allow more people in nursing homes to receive care at home for a longer period of time, which would increase the independence of the growing boomer population as they age. A drone could keep tabs on a patient living at home with dementia or deliver a meal to someone who cannot prepare his or her own meals. I can envision drone automated external defibrillators (AED) that would fly to the patient in a public space to provide rapid defibrillation for ventricular fibrillation. No longer would a person have obtain AEDs from a specific location that may be challenging to find in a rapid fashion. Simply summon the AED with the push of a button or smart phone app.

Healthcare organizations already are deploying mobile technology to solve some of the problems in the industry today. Mobile devices, wearable tech, remote monitoring, telemedicine and information sharing platforms all are transforming healthcare. Likely in the foreseeable future, drones, robots and artificial intelligence will assume many tasks in healthcare that are performed by humans, to reduce variability, cost and error.

Drones Deliver Healthcare

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Drones make it possible to deliver blood, vaccines, birth control, snake bite serum and other medical supplies to rural areas and have the ability to reach victims who require immediate medical attention within minutes, which in some cases could mean the difference between life and death. They can transport medicine within hospital walls and courier blood between hospital buildings, as well as give elderly patients tools to support them as they age in place. UAS offer a variety of exciting possibilities to the health care industry, possibilities that help save money as well as lives.

The opportunities are there, which is why researchers, manufacturers and nonprofit organizations are starting to look to UAS to provide applications that boost efficiencies and improve medical outcomes.

Transporting Blood and Other Supplies

Extensive research is already being done in this area with some countries beginning to benefit from this type of UAS application.

Drone manufacturer Flirtey recently completed the first ship-to-shore drone delivery in the U.S. The mission, held in conjunction with the John Hopkins University School of Medicine and the nonprofit Field Innovation Team (FIT), demonstrated how UAS can ferry aid such as medical supplies and water during a disaster situation, according to a press release. During the demo the drones carried medical samples for emergency testing, flying them between an onshore medical relief camp at Cape May, N.J., and a test facility on a vessel off the New Jersey coast. The drones also transported medical supplies from the vessel to the onshore medical camp.

This isn't the first time Flirtey has completed successful missions for the health care field. Last summer, the company was part of the Let's Fly Wisely event in Wise, Va., where they worked with the Remote Area

Medical clinic (RAM), the Mid-Atlantic Aviation Partnership at Virginia Tech (MAAP) and NASA to deliver medical packages to volunteers on the ground, who in turn made sure underserved attendees received the packages—marking the first time a UAS delivered medical supplies and pharmaceuticals in the US.

Stan Brock, founder and president of RAM, a nonprofit organization that provides medical care to remote areas, first became interested in deploying delivery drones a few years ago. At the time, the group had just begun air ambulance operations to bring medicine and vaccines to parts of the upper Amazon rain forest. Manned fixed-wing helicopters fly about every two days to take vaccines, snakebite serum and other medical supplies to remote villages, a more costly and complex operation as compared to using UAS.

“It would be extremely helpful if we were able to send packages of medicine and vaccines over great distances by drone,” Brock said. “In that part of Virginia (where Let’s Fly Wisely took place), a large number of underserved people can’t get out of the house during the winter, particularly during inclement weather, but are in desperate need of blood pressure medicine or whatever medicine it is. A drone could take that medicine to them where a vehicle wouldn’t be able to do so.”



The UAS also will be equipped with a defibrillator—something Dr. Mark Head, RAM foreign crisis coordinator, Greece, said is a huge step forward in saving time and lives. Alec Mormot began work on developing the first UAS prototype with a defibrillator as a graduate industrial design student at TU Delft University in Holland. In his version, a smart phone app is used to call the drone during an emergency. Once the drone arrives, a medical professional can walk a friend or bystander through how to use the defibrillator over the phone.

“If you can get a drone to a downed person having a heart attack quicker than an ambulance, you can save lives,” Head said. “The thing about a defibrillator is it doesn’t matter how you use it as long as you can get to the patient quickly. It’s the time after the event that’s critical.”

Delivering Care in Rwanda

The UPS Foundation, Zipline and Gavi, the Vaccine Alliance recently formed a partnership to begin transporting blood and vaccines to rural areas in Rwanda. They’re also working closely with the Rwandan

government, whose leadership is actively looking for ways to dispatch vaccines and medicine to its citizens, Gavi spokesperson Frédérique Tissandier said.

During the first phase of the 18-month project, which is expected to begin in mid-August, the UAS will deliver blood to transfusion facilities. The blood will primarily be used to save women experiencing postpartum hemorrhaging, which is a common problem in the country, Gavi Manager of Global Operational Partnerships Mozammil Siddiqui said. After evaluating and determining how well the UAS were operated, how many deliveries were made and how the UAS were perceived, the second phase, which involves delivering rabies vaccine, will begin.

“The global health community is looking for new ways to deliver vaccines, increase coverage and protect children against various diseases,” Tissandier said. “With all the mountains in Rwanda it’s hard to get to remote villages. Some places can only be reached by boat. We’re using this partnership to save kids’ lives and protect them from vaccine-preventable disease.”

Time is critical in emergency situations, especially when victims need blood or a rabies vaccine, Siddiqui said. If a child in Rwanda is bitten by a rabid animal, for example, instead of waiting hours to get the necessary vaccine, a UAS can deliver it in about 15 minutes. This type of use is why Gavi has been looking into using drones for vaccine delivery for a few years now. They just needed the right partners to help them move forward, which they found through Zipline and its drone’s capabilities and the UPS Foundation’s logistic expertise.

While drone delivery makes it possible to courier needed vaccines to remote areas in harsh weather, it isn’t without its challenges. Both blood and the vaccines must be kept at a certain temperature during transport,

Siddiqui said, or they will be unusable when they arrive. Anyone working with the payloads must be properly trained to ensure the products arrive at the right temperature and that deliveries go smoothly.

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Zipline has been developing the UAS, known as Zips, for the last two years, software team lead Ryan Oksenhorn said. The drones have the ability to complete about 150 blood deliveries a day to transfusing facilities in the western half of the country. The development team had to overcome a variety of challenges, such as finding a way to make deliveries without actually landing at the site and creating a UAS designed for this type of long-distance delivery.

For orders of magnitude less money and less time you can deliver the blood with a drone. There's no need to send several humans in a helicopter. You can send the blood directly to the person who needs it."

Oksenhorn said the work in Rwanda is just a start and he hopes to see Zips used to deliver blood, vaccines and medication in remote locations all over the world.

In fact, Zipline recently announced it will soon begin flying missions in the U.S., according to the company. Zipline is partnering with Ellumen, ASD Healthcare and Bloodworks Northwest to deliver blood, medicine and medical products to rural/remote communities in Maryland, Nevada and Washington State, including Indian reservations and their surrounding communities. Flights are expected to begin six months after regulatory approval.

Hospital Deliveries

Today, much of the research involving health care-related drones centers around delivery to remote areas, but that's not the only way UAS can benefit this industry.

One way is by transporting blood samples and medications from floor to floor or building to building, rather than making such deliveries by foot or through the pneumatic tube systems hospitals typically use. This can be particularly helpful for growing hospitals making additions. Expanding a pneumatic tube system is a costly endeavor, but using a drone instead gives hospitals the ability to transport specimens and medications from floor to floor at a low cost.

Many of the people reluctant to use drones inside hospitals are worried it could cost people their jobs. But it will free them up to spend more time with patients and focus on other tasks. There will also be a need for people to provide flight paths and manage the drones to ensure they're

transporting the right package at the right temperature to the right location.

With a smart phone app nurses can indicate they need such and such delivered to room X and the drone can be immediately programmed to do so. This also gives hospitals the opportunity to use existing staff to do other jobs and support other demands of the hospital. Drones can take on some of the smaller roles such as moving meds from floor to floor. This means patients receive better care.

Helping the Elderly

Research is also being done to find ways to use drones to benefit the growing senior population. For the last year Naira Hovakimyan, W. Grafton and Lillian B. Wilkins professor of mechanical science and engineering at the University of Illinois at Urbana-Champaign, has been working on a project designed to help the elderly age in place rather than spend their final years in a nursing home. Small drones with manipulator arms can be used to bring them medication, grab a glass of water, clean a chandelier, pick something up from under the table or even sort laundry.

The main challenge is developing a robot that is as reliable as your refrigerator or washer. But unlike your refrigerator or washer, these drones must be able to move around all over the home and reliably deliver every time, whether they' re fetching medicine or cleaning. Researchers must also create a drone that elderly from all different backgrounds will consider safe. For it to work, they must feel comfortable interacting with it.

The Future

As more innovations are made and users continue to become more proficient, a whole other world of opportunity and potential applications will open up. The industry is eager to fly beyond visual line of sight, and many hope that is addressed more specifically in the next set of rules. For now most seem happy with the guidance they finally have from the FAA and are looking forward to seeing this industry continue to grow.

Conclusion—

This paper focuses on the heartrate monitoring which is able to monitor the heart beat rate condition of patient/Person. This device could be connected to drone as it is portable, cost effective and very efficient system, it provides great flexibility and serves as a great improvement over other conventional monitoring system.