1 Project description

What is the project about?

Creating a tool for lifeguards in order to help them prevent drownings as well as problems such as fights that may occur on the beach. This is done by using a drone that monitors what is happening on the beach in real time, giving the lifeguard a more direct and focused way of managing events on the beach.

2 Problem Description

What problem or problems are we trying to fix/solve?

The problem we are trying to solve is the issue of drownings on the beaches, the inability to monitor and watch the entire beach area which may be large and to be able to clearly see a single person in the water from a distance. Today, all a lifeguard has are binoculars and a megaphone, with the help of which he scans the swimming area, and communicates with the bathers to ensure they remain within the limits defined as safe.

In addition to the main problem we also have some sub-problems regarding the functionality of the product:

A. Low technological skills of future end users.
B. High latency for rescue forces once a situation that needs them emerges.
C. Difficulty in communicating with swimmers in the water.

3 Project Goals

What are we going to do about the problem?

Our main goal is to provide lifeguards with a tool that enables them to monitor the water area and the beach, detect any problems and communicate with the relevant people. The lifeguards will use drones to patrol the beach and communicate with people using a microphone and a speaker.
In addition to the main goal we have sub-goals regarding the functionality of the product:

- To create the an intuitive interface for non-technical users
- Adding automatic functionality that will call 911(Ambulance) the shortest time possible.
- Creating clear communication with the swimmer.

4 The Approach

How are we going to do it?

Our product will include - a drone with additional facilities for the use of the lifeguards so that the lifeguard will be able to see the camera output, communicate with the people in the water .

We are planning to meet lifeguards, elicit their specific needs and present them with our idea in order to be able to better fit our system to their needs.

A. By controlling the drone, the lifeguard will be able to monitor the beach from the lifesaver's station and still be able to look at the beach and monitor it.
B. We will use the drone base navigator feature so that the navigation and the handling of the drone are the most intuitive. Also, some minimal training will be necessary.
C. We will implement an automatic emergency call service.

Our approach has two parts:

1) We will extend the drone functionality by adding a speaker and mic for audio I/O, this is alongside the already built-in camera that is in the drone (we will get the video output to the controller of the drone) and use it to provide the lifeguard with a wide view angle. The drone should provide the lifeguard with the ability to communicate with the swimmers without disturbing all the other people on the beach..

2) The lifeguards user interface will be intuitive and will make their work easier. The user interface will include all of the functionalities required to see people and talk and hear them via the speaker and microphone, call emergency services if needed, and see them, all in one app, one layout.

5 Audience (or intended users of the system/application)

What group or groups of people are going to use the system?

The audience of the system will be lifeguards from various ages and different levels of familiarity with computer technology.

6 Content, scope and division of labor

What will the project include and what will it not include?

The project will include:

- Drone which is capable of sufficient flight time and carrying the weight of the necessary equipment.
- Single board computer for controlling all of the I/O extensions.
- Camera control (Zoom IN/OUT and movement).
- Speaker and Mic for communications with the crowd.
- Interface with the drone as generically as possible.
- The lifeguard will be able to pin a point on the screen and the droneguard will fly above this point.

The project will not include:

- The project will not include automatic identification of persons in distress. The idea of this project is to make the task of identifying distress situations easier.
- The drone will not drop any aid facilities to the bather.

7 Market Survey

Are there any similar products/systems/applications already in use in the market or being developed? Are they in competition with your ideas or are they complementary?

There are several solutions around the world-

- The Australian drone Little Ripper is used to detect sharks autonomously, and provides rescue options. The identification of the swimmers is not done automatically (Shah, 2018).
- The Iranian Pars Robot drone has eight propellers and can carry up to three life rings which it can drop within arms-length of potential victims (Kelion, 2013).
- The drone from Dubai - The flying rescuer allows you to carry four lifebelts at any time, and a drop of an automatically inflatable lifebuoy when it touches the water (The National, 2018).
- The Spanish drone LifeGuard allows photography and release of the inflatable life jacket when it touches the water, and stays attached to the drone until the swimmer who needs it pulls it towards him (Coxworth, 2018).
- Auxdron Lifeguard Drone from General Drone (aided by throwing a lifebelt into the sea next to the person in need of rescue (Kesteloo, 2018).

8 Literature Survey

Are there any academic publications relating to your idea that are relevant?

Conclusions -

- The articles in the "Market Survey" section, refer to drones and the benefits they bring to the purpose of saving lives, and the articles show and explain multiple techniques and ways of using the drone in order to achieve the goal of saving swimmers life. They reflect the market situation in relation to the use of drones in many different areas. The existing products on the market are all using mic and speakers in order to communicate with people. our idea is different from theirs where we are also looking to use the drone in order to maintain order on the beach itself and not only in the water, another thing we only managed to see in our product is that we also want to create a UI to the life guards and give them the ability to call emergency services with a click of a button. (The National, 2018; Kesteloo, 2018; Coxworth, 2018; Shah, 2018; & Kelion, 2013).
- The use of the drone and the functionality it allows depends on its size, type and power, and this should be emphasized when designing a system that uses the drone.
- The advantage of using a drone to save lives when it comes to a swimmer who is far in the water, is first and foremost the possibility to streamline the work of the lifeguard in order to try and prevent the occurrence of emergencies. Another advantage is the ability to take off a life jacket in a very short time.

9 Project contribution

The scientific contribution of our project is the use of drones in order to save lives for the first time in Israel.

10 Project evaluation criteria

- The guard will be able to maneuver the drone to any point it sees necessary within the range of the drone's camera image.
- The drone will hold a time of about 15 minutes in the air.
- Finding a suitable drone that can carry all you need and withstand the normal weather on the beach.
- The lifeguard will be able to communicate successfully with people on the beach and in water.
- We will find a drone that will satisfy our needs.

11 Risks and its management

- Incompatibility of drone interface components. This risk can be reduced by conducting in-depth research on drones in general and the drone we would like to use in the project in particular, to make sure it fits these components and is able to interface with them.
- The bigger risk is choosing a drone that will not be able to carry the weight of itself with the microcontroller and I/O components and will not be able to withstand certain weather conditions.

12 References

- Shah, S. (January 18th, 2018). Lifeguard drone completes world-first ocean rescue. Retrieved from https://www.engadget.com/2018/01/18/little-ripper-lifeguard-drone-rescue
- Kelion, L. (November 13th, 2013). Iran develops sea rescue drone prototype in Tehran. Retrieved from https://en.wikipedia.org/wiki/Pars_robot
- The National. (October 10th, 2018). The Flying Rescuer: meet Dubai's new life-saving drone. Retrieved from https://www.thenational.ae/uae/the-flying-rescuer-meet-dubai-s-new-life-saving-drone-1.779153
- Coxworth, B. (August 16th, 2018). "Lifeguard drone" rescues swimmers in Spain". Retrieved from https://newatlas.com/drone-rescues-swimmer/55934/