Project Documentation

Team ID	PNT2022TMID38853
Project Name	VirtualEye-Lifeguard for Swimming Pools to Detect the Active Drowning

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1. **INTRODUCTION:**

a. Project Overview

Safety in swimming pools is a critical issue. In this a real time drowning detection method, using HSV color space analysis is presented, which uses prior knowledge of the video sequence to set the best value for color channels.

b. Purpose:

- To monitor the swimming pool in real-time through the camera installed above the water surface in a real public swimming place.
- Gives an alarm, with an alert message to notify that the swimmer is in a cautious situation drowning inside the swimming pool.

2. **LITERATURE SURVEY**:

a. Existing problem:

One important environment that the need for monitoring systems is crucially sensed is the swimming pool. Each year many people including children are drowned or very close to drowning in the deeps of the swimming pools, and the life guards are not trained well enough to handle these problems. This raises the need for having a system that will automatically detect the drowning person and alarm the lifeguards of such danger. Real-time detection of a drowning person in swimming pools is a challenging task that requires an accurate system. The challenge is due to the presence of water ripples, shadows and splashes and therefore detection needs to have high accuracy.

b. References:

[1] Foresti, Gian Luca, Petri Mähönen, and Carlo S. Regazzoni, eds. Multimedia video-based surveillance systems: Requirements, Issues and Solutions. Vol. 573. Springer Science & Business Media, 2012.

[2] Jones, Graeme A., Nikos Paragios, and Carlo S. Regazzoni, eds. Video-based surveillance systems: computer vision and distributed processing. Springer Science & Business Media, 2012.

[3] Conde, Cristina, et al. "HoGG: Gabor and HoG-based human detection for surveillance in non-controlled environments." Neurocomputing 100 (2013): 19-30.

[4] Wang, Xiaogang. "Intelligent multi-camera video surveillance: A review." Pattern recognition letters 34.1 (2013): 3-19.

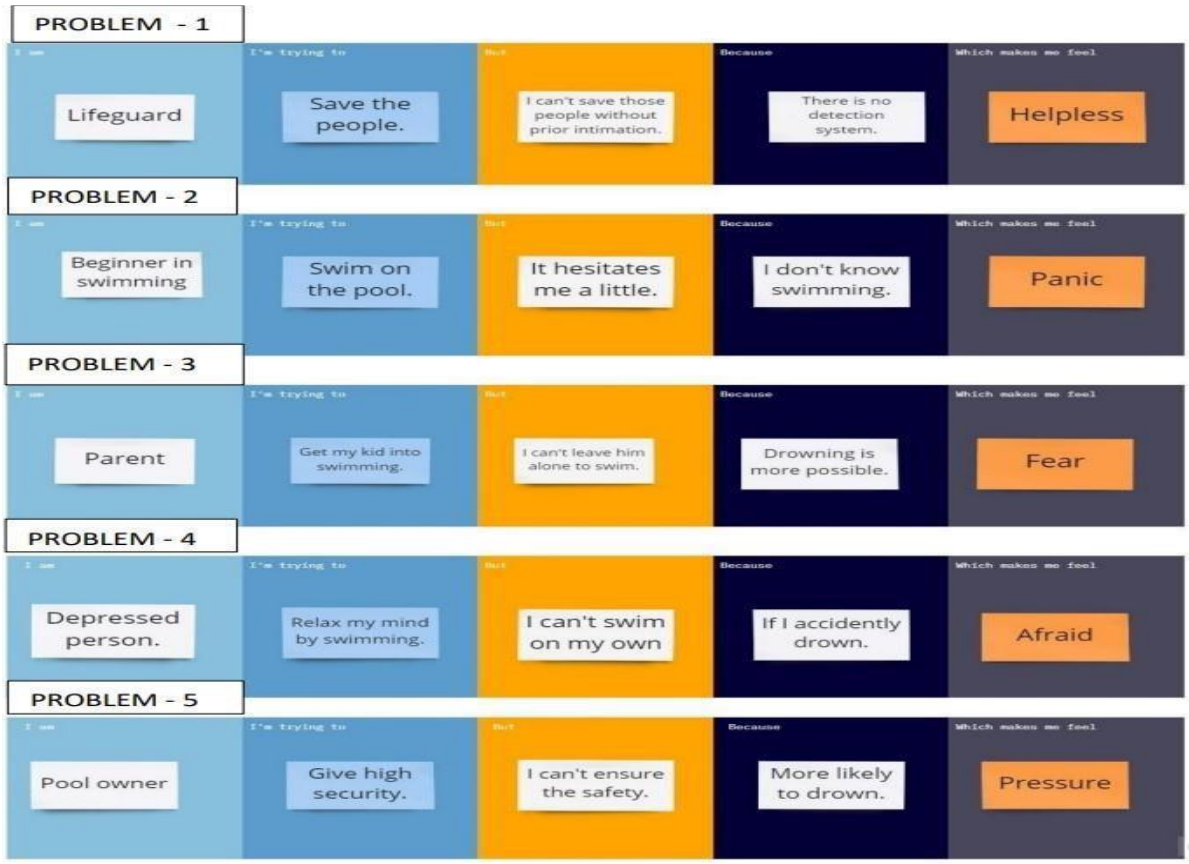
[5] Gudyś, Adam, et al. "Tracking people in video sequences by clustering feature motion paths." Computer Vision and Graphics. Springer International Publishing, 2014. 236-245.

[6] Vezzani, Roberto, Davide Baltieri, and Rita Cucchiara. "People reidentification in

surveillance and forensics: A survey." ACM Computing Surveys (CSUR) 46.2 (2013): 29

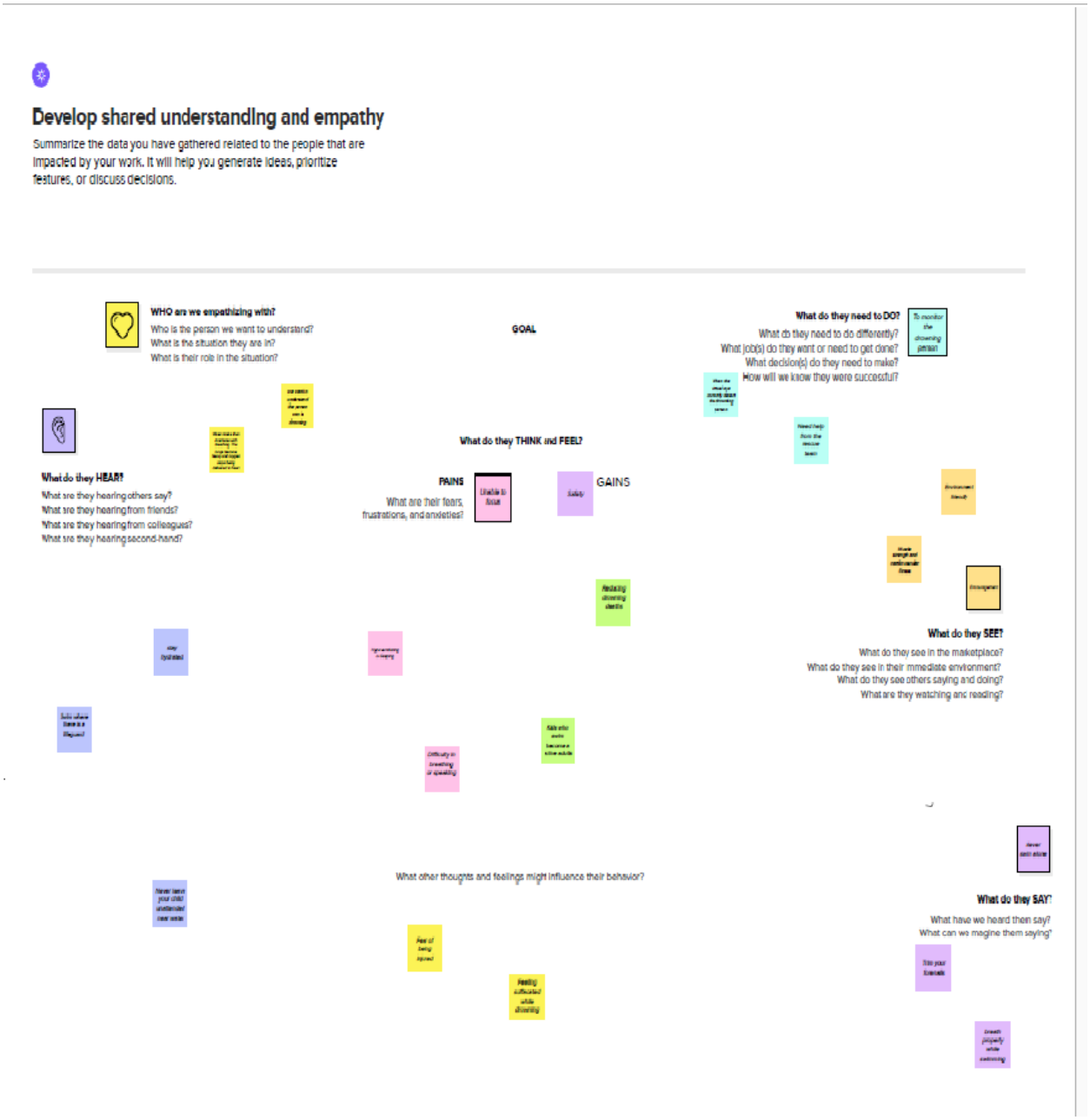
c. Problem statement definition:

Problem statement definitions can be made respectively , in several problems, as given below:



3. IDEATION & PROPOSED SOLUTION:

a. Empathy map canvas:



b. Ideation and Brainstorming:

Problem Statement: Safety in swimming pools is a critical issue. In this a real time drowning detection method, using HSV color space analysis is presented ,which uses prior knowledge of the video sequence to set the best value for color channels.

Big Idea:

i. Time decrement

ii. Ejection fraction for earlier predict

iii. Pulse rate detection

iv. Send notification to control monitor as well.

c. Proposed Statement:

Problem Statement :

Drowning detection system that detects every dangerous situation and accident. This software works in close integration with the cameras installed in the pool to continuously scan the pool.

Idea / Solution description:

This system by analyzing the movement and shape, evaluates swimmers' condition based on visual based monitoring device and an alarm to alert the lifeguards and provides solution in detecting drowning incidents.

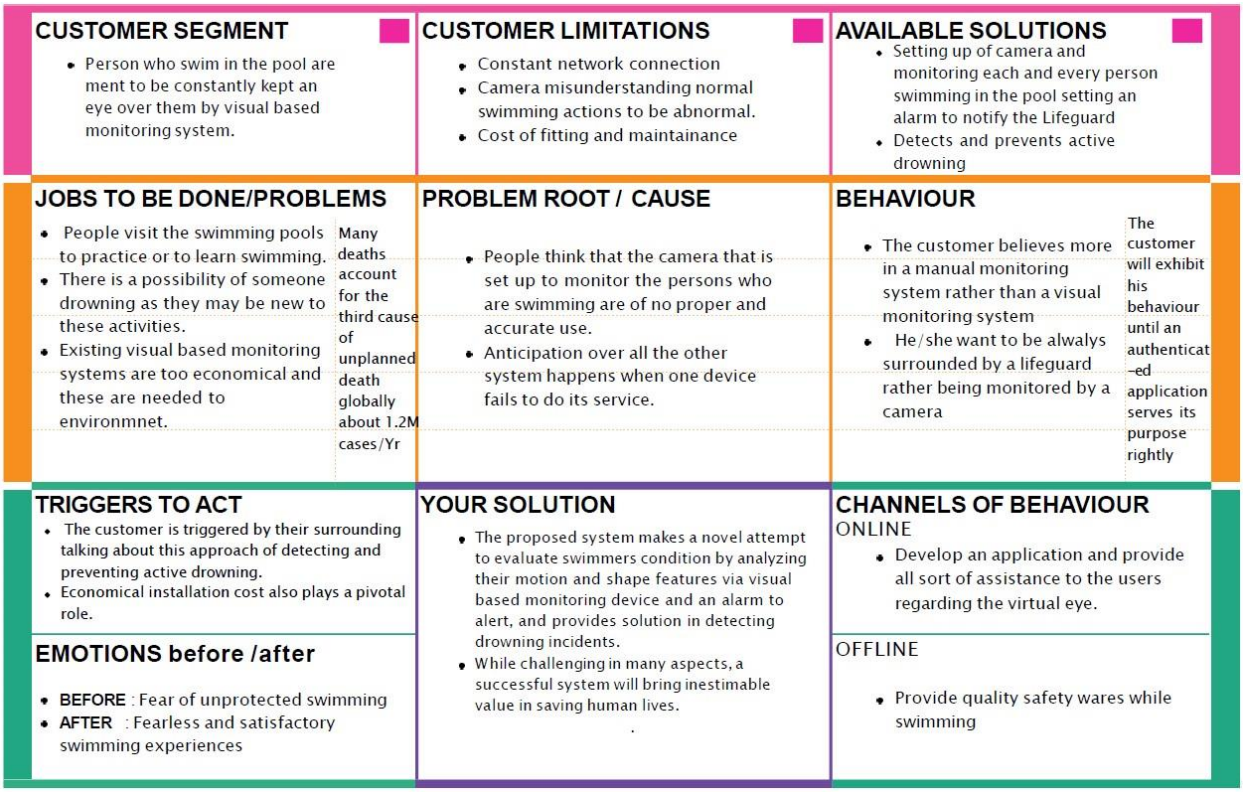
While challenging in many aspects, a successful system will bring inestimable value in saving human lives.

Scalability of the Solution:

Our proposed solution is very scalable i.e., in future ,there are a lot of rooms for evolving our present model by Adding new features to enhance our system in the future.

d. Problem solution fit:

Below figure depicts the problem solution fit of our problem



4. Requirement Analysis:

a. Functional Requirements:

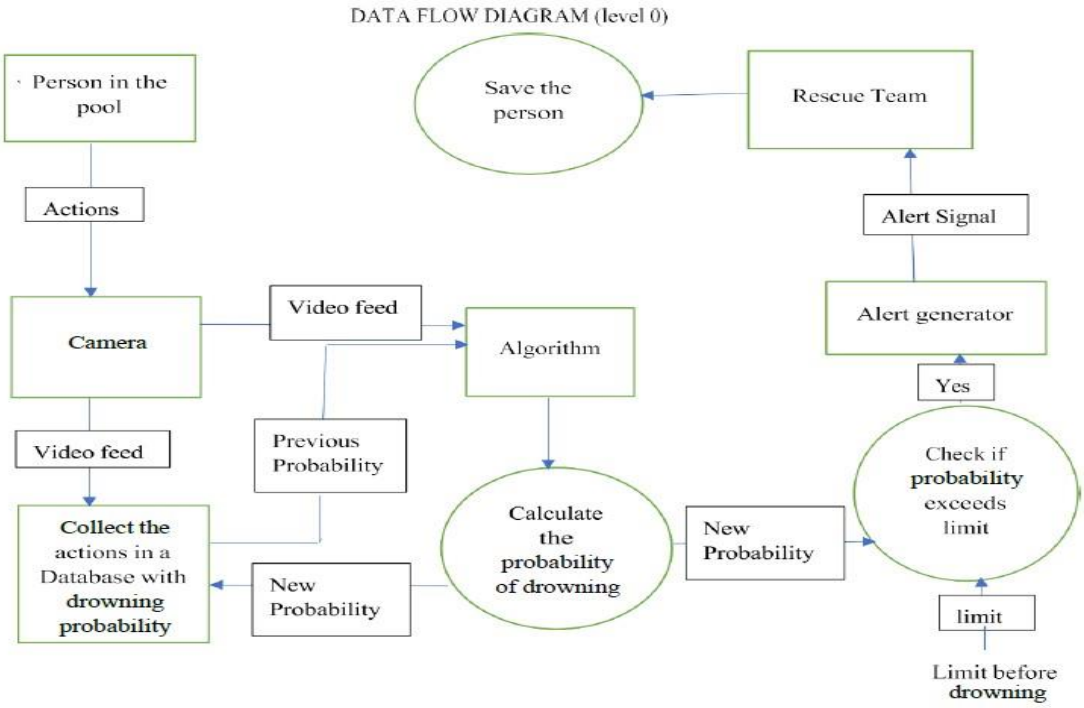
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration Via Email Registration Via phone number
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP Create and store the data
FR-3	Alarm system	Monitor and detect the drowning person Alert the lifeguard by trigger the alarm
FR-4	Output	Visual representation Image detection Report generation

b. Non- functional Requirements:

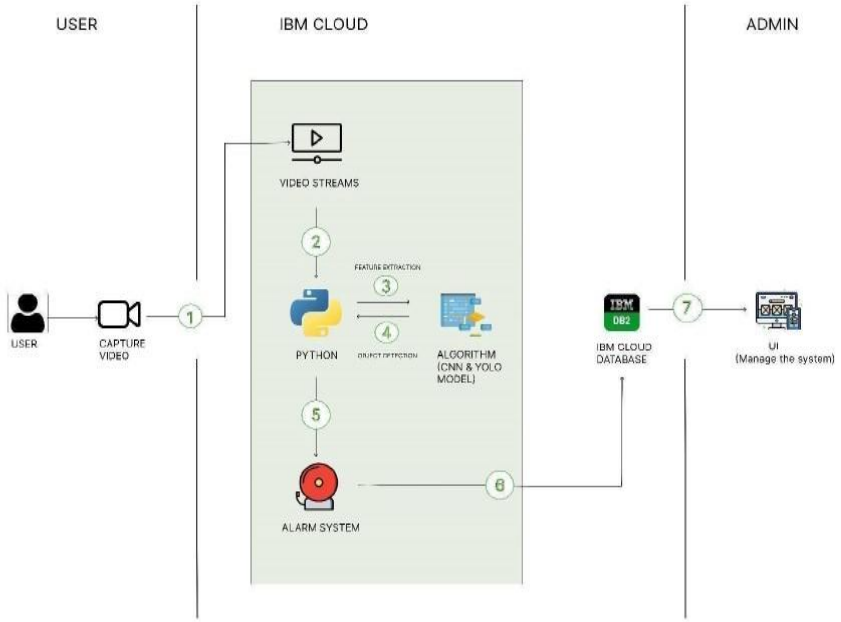
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	To ensure the safety of each and every person present in the pool. A Lifeguard should bepresent all the time in the pool.
NFR-2	**Security**	Lifeguards should be aware of the alert message to save the life of the swimmer
NFR-3	**Reliability**	Virtual eye lifeguard triggers an immediate prior alarm if a swimmer is in peril, helping to avoid panic even in critical situations.
NFR-4	**Performance**	The alarm is triggered when the swimmer is drowning
NFR-5	**Availability**	Equipment and accessories include lifesaver rings, inflatable vests, aShepherd's Crook, life hooks, spine boards,rescue tubes, and a first aid kit. Remember tokeep the maccessible to quickly pull someone from the water safely.
NFR-6	**Scalability**	Virtual eye lifeguard detects potential drowning and promptly notifies you. It features the latest artificial intelligence technology and adapts to the needs of the user.

5. Project Design:

a. Data Flow Diagram:



b. Solution & Technical Architecture:



c. User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user/ Web user)	Sign in	USN-1	The user will open the browser and go to the URL bar.	I can type my URL.	High	Sprint-1
		USN-2	The user will type the project URL.	I can open my project URL.	High	Sprint-1
	Dashboard	USN-3	The user will see a permission popup.	I can give permission.	High	Sprint-1
		USN-4	The user will permit to access the camera.	I can allow the site to access the camera.	High	Sprint-1
Customer Care Executive	Maintenance	USN-5	The camera will be set in the proper position.	The camera angle will be placed properly.	High	Sprint-1
		USN-6	Checks whether the camera has a clear view.	The camera will have a proper view.	Medium	Sprint-2
		USN-7	Checks whether the lens of the camera is clean.	A clear picture is seen.	High	Sprint-2
		USN-8	Checks whether the camera has a good pixel quality	We will get a high-quality image.	Medium	Sprint-2
Administrator	Monitoring	USN-9	Sees the viewfinder.	We will get a focused image even if it is far.	High	Sprint-3
		USN-10	Reads and checks the manual.	Checks whether proper information is given.	Medium	Sprint-3
		USN-11	Checks whether a proper alert is given.	Gives out alert sounds.	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING:

a. Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	Registration	USN-1	As a lifeguard , I can register for the application by entering my email, password, and confirming my password.	2	High
Sprint 1	User conformation	USN-2	As a lifeguard, I will receive the conformation mail once I have registered for the application	2	Medium
Sprint-1	Login	USN-3	As a lifeguard , I can log into the application by entering email& password	2	High

Sprint-2	Cloudant DB	USN-1	Create DB	2	High

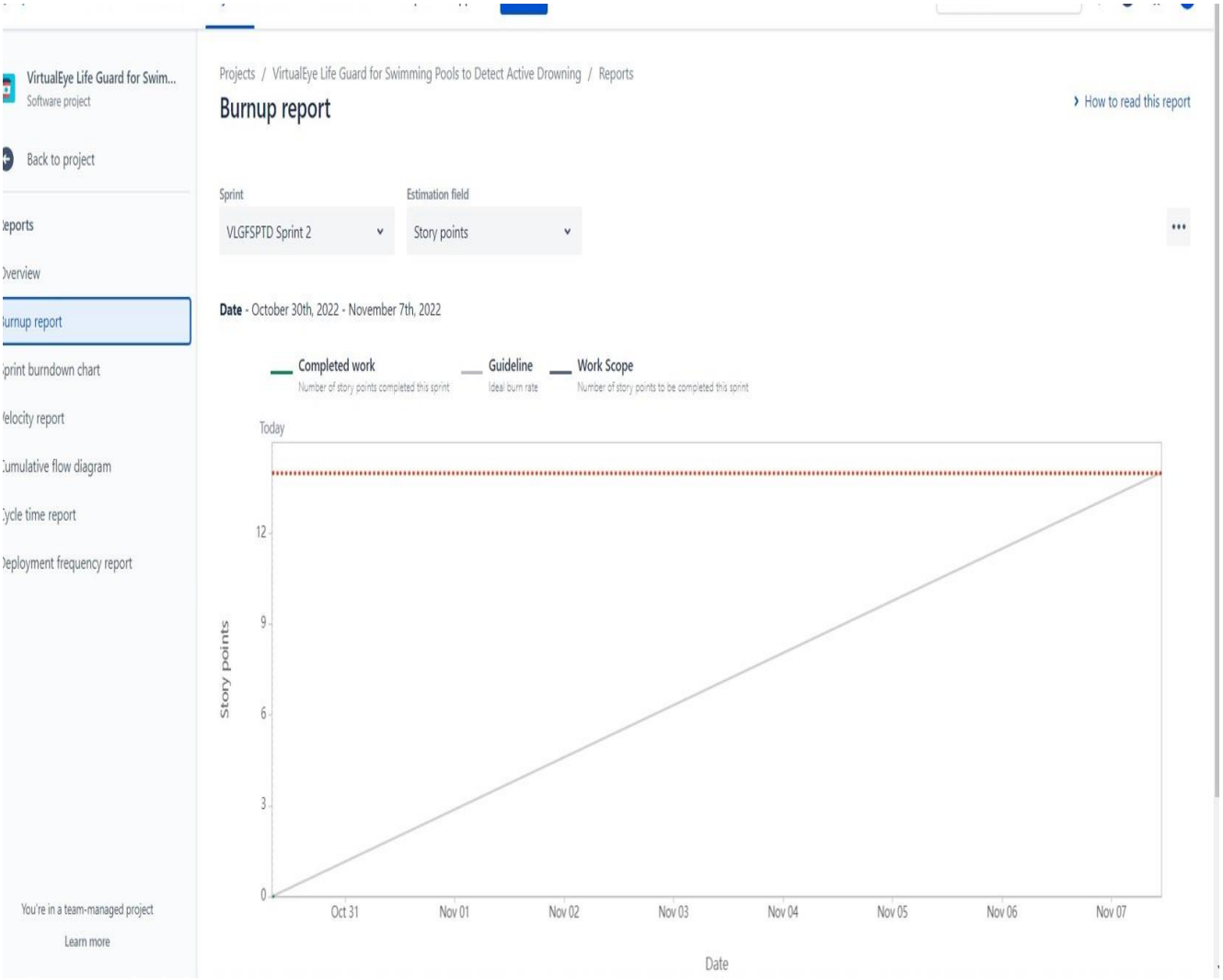
Sprint-3	Coding (Accessing datasets)	USN-1	Coding is a set of instructions used to manipulate information so that a certain input results in a particular output.	2	High
Sprint-4	Application building	USN-1	As a Lifeguard , It will show the current Information of the swimming pool	1	Medium

b. Sprint Delivery Schedule:

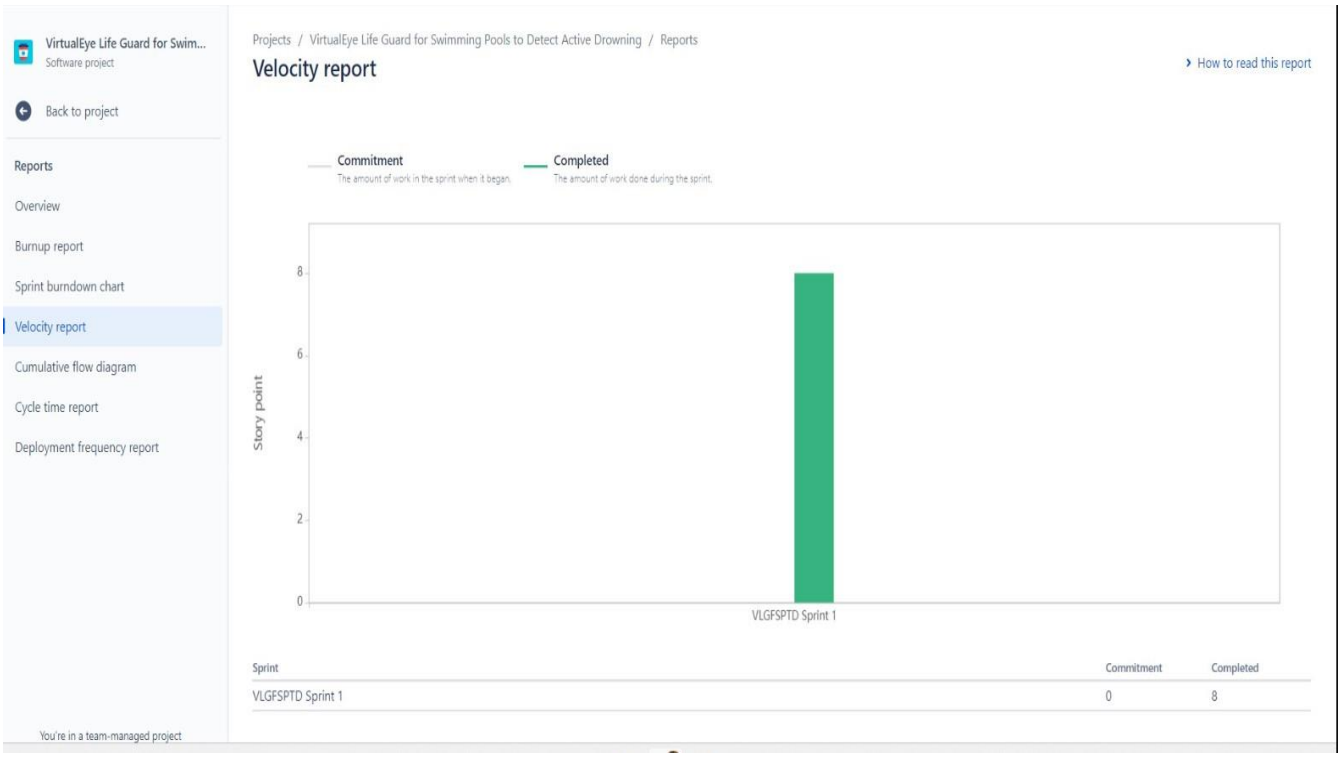
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	4 Days	24 Oct 2022	27 Oct 2022	20	29 Oct 2022
Sprint-2	20	5 Days	28 Oct 2022	01 Nov 2022	20	04 Nov 2022
Sprint-3	20	8 Days	02 Nov 2022	09 Nov 2022	20	11 Nov 2022
Sprint-4	20	9 Days	10 Nov 2022	18 Nov 2022	20	19 Nov 2022

c. Reports from JIRA:

Burnup Report:



Velocity Report:



7. CODING & SOLUTIONING:

a. Feature 1:

We use HTML & CSS for creating a front end web page for our application, to register a user, and then letting the user to login . The script goes as below,

Login.html

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<meta name="author" content="templatemo">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
<link
href="https://fonts.googleapis.com/css2?family=Roboto:wght@100;300;400;500;700;900&displa y=swap" rel="stylesheet">
<title>Drowning Detection</title>
<!-- Bootstrap core CSS -->
<link type="text/css" rel="stylesheet" href="{{ url_for('static', filename='bootstrap/css/bootstrap.min.css') }}" />
```

```
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/bootstrap.min.css')
}}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/style1.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/fontawesome.css')
}}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/templatemo-liberty- market.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/owl.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/animate.css') }}" />
<link type="text/css" rel="stylesheet" href="https://unpkg.com/swiper@7/swiper-
bundle.min.css" />
</head>
<body>
<!-- ***** Preloader Start ***** -->
<div id="js-preloader" class="js-preloader">
<div class="preloader-inner">
<span class="dot"></span>
<div class="dots">
<span></span>
<span></span>
<span></span>
</div>
</div>
</div>
<!-- ***** Preloader End ***** -->
<!-- ***** Header Area Start ***** -->
<header class="header-area header-sticky">
<div class="container">
<div class="row">
<div class="col-12">
<nav class="main-nav">
<!-- ***** Logo Start ***** -->
<a href="index.html" class="logo">
<img src="{{ url_for('static', filename='images/Untitled.png') }}" alt="">
</a>
<!-- ***** Logo End ***** -->
<!-- ***** Menu Start ***** -->
<ul class="nav">
<li><a href="/" >Home</a></li>
<li><a href="/login" class="active">Sign In</a></li>
<li><a href="/register">Sign Up</a></li>
<li><a href="/login">Drown Detect</a></li>
</ul>
<a class='menu-trigger'>
<span>Menu</span>
```

```
</a>
<!-- ***** Menu End ***** -->
</nav>
</div>
</div>
</div>
</header>
<!-- ***** Header Area End ***** -->
<!-- ***** Main Banner Area Start ***** -->
<div class="main-banner">
<div class="container">
<div class="row">
<div class="col-lg-6 align-self-center">
<div class="header-text">
<h6>Let's </h6>
<h2>Sign In</h2>
<p> Welcome You Back!</p>
</div>
</div>
<div class="col-lg-6">
<div class="owl-banner owl-carousel">
<div class="col-md-11 col-md-offset-1">
<div class="booking-form">
<form class="form" method="post" action="/login_validation">
<div class="row">
<div class="col-md-12">
<div class="form-group">
<span class="form-label">Email</span>
<input type="email" class="form-control" name="email" placeholder="Enter Your
Email" required="true">
<span class="select-arrow"></span>
</div>
</div>
</div>
<div class="row">
<div class="col-md-12">
<div class="form-group">
<span class="form-label">Password</span>
<input type="password" class="form-control" name="password"
placeholder="Enter Your Password" required="true">
<span class="select-arrow"></span>
</div>
</div>
</div>
<div class="form-btn">
<button class="submit-btn">Sign In</button>
</div>
<p class="mt-2" style="color:#000"> Not a member? <a href="/register">Create
Account</a> </p>
</form>
```

```
</div>
<!Booking form>
</div>
</div>
</div>
</div>
</div>
<!-- ***** Main Banner Area End ***** -->
<!-- Scripts -->
<!-- Bootstrap core JavaScript -->
<script src="{{ url_for('static', filename='jquery/jquery.min.js') }}"></script>
<script src="{{ url_for('static', filename='bootstrap/js/bootstrap.min.js') }}"
></script>
<script src="{{ url_for('static', filename='js/isotope.min.js') }}"></script>
<script src="{{ url_for('static', filename='js/owl-carousel.js') }}"></script>
<script src="{{ url_for('static', filename='js/tabs.js') }}"></script>
<script src="{{ url_for('static', filename='js/popup.js') }}"></script>
<script src="{{ url_for('static', filename='js/custom.js') }}"></script>
</body>
</html>
```

Register.html

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<meta name="author" content="templatemo">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-
fit=no">
<link
href="https://fonts.googleapis.com/css2?family=Roboto:wght@100;300;400;500;7
00;900&displa y=swap" rel="stylesheet">
<title>Drowning Detection</title>
<!-- Bootstrap core CSS -->
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='bootstrap/css/bootstrap.min.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/bootstrap.min.css')
}}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/style1.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/fontawesome.css')
}}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/templatemo-liberty- market.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/owl.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/animate.css') }}" />
```

```
<link type="text/css" rel="stylesheet" href="https://unpkg.com/swiper@7/swiper-bundle.min.css" />
</head>
<body>
<!-- ***** Preloader Start ***** -->
<div id="js-preloader" class="js-preloader">
<div class="preloader-inner">
<span class="dot"></span>
<div class="dots">
<span></span>
<span></span>
<span></span>
</div>
</div>
</div>
<!-- ***** Preloader End ***** -->
<!-- ***** Header Area Start ***** -->
<header class="header-area header-sticky">
<div class="container">
<div class="row">
<div class="col-12">
<nav class="main-nav">
<!-- ***** Logo Start ***** -->
<a href="index.html" class="logo">
<img src="{{ url_for('static', filename='images/Untitled.png') }}" alt="">
</a>
<!-- ***** Logo End ***** -->
<!-- ***** Menu Start ***** -->
<ul class="nav">
<li><a href="/" >Home</a></li>
<li><a href="/login">Sign In</a></li>
<li><a href="/register" class="active">Sign Up</a></li>
<li><a href="/login">Drown Detect</a></li>
</ul>
<a class='menu-trigger'>
<span>Menu</span>
</a>
<!-- ***** Menu End ***** -->
</nav>
</div>
</div>
</div>
</header>
<!-- ***** Header Area End ***** -->
<!-- ***** Main Banner Area Start ***** -->
<div class="main-banner">
<div class="container">
<div class="row">
<div class="col-lg-6 align-self-center">
<div class="header-text">
```

```
<h6>Let's</h6>
<h2>Sign Up</h2>
<p>Create Your Account With Us.</p>
</div>
</div>
<div class="col-lg-6">
<div class="owl-banner owl-carousel">
<div class="col-md-11 col-md-offset-1">
<div class="booking-form">
<form class="form" method="post" action="/add_user">
<div class="row">
<div class="col-md-12">
<div class="form-group">
<span class="form-label">Name</span>
<input type="text" class="form-control" name="name" placeholder="Enter Your
Name" required="true">
<span class="select-arrow"></span>
</div>
</div>
</div>
<div class="row">
<div class="col-md-12">
<div class="form-group">
<span class="form-label">Email</span>
<input type="email" class="form-control" name="email" placeholder="Enter Your
Email" required="true">
<span class="select-arrow"></span>
</div>
</div>
</div>
<div class="row">
<div class="col-md-12">
<div class="form-group">
<span class="form-label">Password</span>
<input type="password" class="form-control" name="password"
placeholder="Enter Your Password" required="true">
<span class="select-arrow"></span>
</div>
</div>
</div>
<div class="form-btn">
<button class="submit-btn">Sign Up</button>
</div>
<div class="form-btn">
<p class="mt-2" style="color:#000" > Already a member? <a href="/login">Sign
In</a> </p>
</div>
</form>
</div>
<!Booking form>
```

```
</div>
</div>
</div>
</div>
</div>
<!-- ***** Main Banner Area End ***** -->
<!-- Scripts -->
<!-- Bootstrap core JavaScript -->
<script src="{{ url_for('static', filename='jquery/jquery.min.js') }}"></script>
<script src="{{ url_for('static', filename='bootstrap/js/bootstrap.min.js') }}"
></script>
<script src="{{ url_for('static', filename='js/isotope.min.js') }}"></script>
<script src="{{ url_for('static', filename='js/owl-carousel.js') }}"></script>
<script src="{{ url_for('static', filename='js/tabs.js') }}"></script>
<script src="{{ url_for('static', filename='js/popup.js') }}"></script>
<script src="{{ url_for('static', filename='js/custom.js') }}"></script>
</body>
</html>
```

Index.html(Before detection):

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<meta name="author" content="templatemo">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-
fit=no">
<link
href="https://fonts.googleapis.com/css2?family=Roboto:wght@100;300;400;500;7
00;900&displa y=swap" rel="stylesheet">
<title>Drowning Detection</title>
<!-- Bootstrap core CSS -->
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='bootstrap/css/bootstrap.min.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/fontawesome.css')
}}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/templatemo-liberty- market.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/owl.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/animate.css') }}" />
<link type="text/css" rel="stylesheet" href="https://unpkg.com/swiper@7/swiper-
bundle.min.css" />
</head>
<body>
<!-- ***** Preloader Start ***** -->
<div id="js-preloader" class="js-preloader">
<div class="preloader-inner">
<span class="dot"></span>
```

```
<div class="dots">
<span></span>
<span></span>
<span></span>
</div>
</div>
</div>
<!-- ***** Preloader End ***** -->
<!-- ***** Header Area Start ***** -->
<header class="header-area header-sticky">
<div class="container">
<div class="row">
<div class="col-12">
<nav class="main-nav">
<!-- ***** Logo Start ***** -->
<a href="index.html" class="logo">
<img src="{{ url_for('static', filename='images/Untitled.png') }}" alt="">
</a>
<!-- ***** Logo End ***** -->
<!-- ***** Menu Start ***** -->
<ul class="nav">
<li><a href="/" class="active">Home</a></li>
<li><a href="/login">Sign In</a></li>
<li><a href="/register">Sign Up</a></li>
<li><a href="/login">Drown Detect</a></li>
</ul>
<a class='menu-trigger'>
<span>Menu</span>
</a>
<!-- ***** Menu End ***** -->
</nav>
</div>
</div>
</div>
</header>
<!-- ***** Header Area End ***** -->
<!-- ***** Main Banner Area Start ***** -->
<div class="main-banner">
<div class="container">
<div class="row">
<div class="col-lg-6 align-self-center">
<div class="header-text">
<h6>Let's Start.</h6>
<h2>Drowning Detection</h2>
<p>It is an active drowning detection system using artificial intelligence.</p>
<div class="buttons">
<div class="main-button">
<a href="/login">Detect</a>
</div>
</div>
```

```
</div>
</div>
<div class="col-lg-5 offset-lg-1">
<div class="owl-banner owl-carousel">
<div class="item">
<img src="{{ url_for('static', filename='images/banner-01.png') }}" alt="">
</div>
<div class="item">
<img src="{{ url_for('static', filename='images/banner-02.png') }}" alt="">
</div>
</div>
</div>
</div>
</div>
</div>
<!-- ***** Main Banner Area End ***** -->
<!-- Scripts -->
<!-- Bootstrap core JavaScript -->
<script src="{{ url_for('static', filename='jquery/jquery.min.js') }}"></script>
<script src="{{ url_for('static', filename='bootstrap/js/bootstrap.min.js') }}"
></script>
<script src="{{ url_for('static', filename='js/isotope.min.js') }}"></script>
<script src="{{ url_for('static', filename='js/owl-carousel.js') }}"></script>
<script src="{{ url_for('static', filename='js/tabs.js') }}"></script>
<script src="{{ url_for('static', filename='js/popup.js') }}"></script>
<script src="{{ url_for('static', filename='js/custom.js') }}"></script>
</body>
</html>
```

Index1.html(After detection) :

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<meta name="author" content="templatemo">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-
fit=no">
<link
href="https://fonts.googleapis.com/css2?family=Roboto:wght@100;300;400;500;7
00;900&displa y=swap" rel="stylesheet">
<title>Drowning Detection</title>
<!-- Bootstrap core CSS -->
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='bootstrap/css/bootstrap.min.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/fontawesome.css')
}}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/templatemo-liberty- market.css') }}" />
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/owl.css') }}" />
```

```
<link type="text/css" rel="stylesheet" href="{{ url_for('static',
filename='css/animate.css') }}" />
<link type="text/css" rel="stylesheet" href="https://unpkg.com/swiper@7/swiper-
bundle.min.css" />
</head>
<body>
<!-- ***** Preloader Start ***** -->
<div id="js-preloader" class="js-preloader">
<div class="preloader-inner">
<span class="dot"></span>
<div class="dots">
<span></span>
<span></span>
<span></span>
</div>
</div>
</div>
<!-- ***** Preloader End ***** -->
<!-- ***** Header Area Start ***** -->
<header class="header-area header-sticky">
<div class="container">
<div class="row">
<div class="col-12">
<nav class="main-nav">
<!-- ***** Logo Start ***** -->
<a href="index.html" class="logo">
<img src="{{ url_for('static', filename='images/Untitled.png') }}" alt="">
</a>
<!-- ***** Logo End ***** -->
<!-- ***** Menu Start ***** -->
<ul class="nav">
<li><a href="/" >Home</a></li>
<li><a href="/login">Sign In</a></li>
<li><a href="/register">Sign Up</a></li>
<li><a href="/home" class="active">Drown Detect</a></li>
</ul>
<a class='menu-trigger'>
<span>Menu</span>
</a>
<!-- ***** Menu End ***** -->
</nav>
</div>
</div>
</div>
</header>
<!-- ***** Header Area End ***** -->
<!-- ***** Main Banner Area Start ***** -->
<div class="main-banner">
<div class="container">
<div class="row">
```

```
<div class="col-lg-6 align-self-center">
<div class="header-text">
<h6>Let's Start.</h6>
<h2>Drowning Detection</h2>
<p>It is an active drowning detection system using artificial intelligence.</p>
<div class="buttons">
<div class="main-button">
<a href="/step2">Detect</a>
</div>
</div>
</div>
</div>
<div class="col-lg-5 offset-lg-1">
<div class="owl-banner owl-carousel">
<div class="item">
<img src="{{ url_for('static', filename='images/banner-01.png') }}" alt="">
</div>
<div class="item">
<img src="{{ url_for('static', filename='images/banner-02.png') }}" alt="">
</div>
</div>
</div>
</div>
</div>
</div>
<!-- ***** Main Banner Area End ***** -->
<div class="currently-market">
<div class="container">
<div class="row">
<div class="col-lg-6">
<div class="section-heading">
<div class="line-dec"></div>
<h2><em>Current</em> Drowning Details.</h2>
</div>
</div>
<div class="col-lg-12">
<div class="row grid">
<div class="col-lg-6 currently-market-item all msc">
<div class="item">
{% if prediction_text == "0" %}
<h2>" The Person is Swimming "</h2>
{% elif prediction_text == "1" %}
<div class="left-image">
<img src="{{ url_for('static', filename='images/avatar.png') }}" alt="" style="border-
radius: 20px; min-width: 195px;">
</div>
<div class="right-content">
<h4>1 Person Drowning<h4>
</div>
</div>
```

```
</div>
</div>
</div>
{% endif %}
</div>
</div>
</div>
<!-- Scripts -->
<!-- Bootstrap core JavaScript -->
<script src="{{ url_for('static', filename='jquery/jquery.min.js') }}"></script>
<script src="{{ url_for('static', filename='bootstrap/js/bootstrap.min.js') }}"
></script>
<script src="{{ url_for('static', filename='js/isotope.min.js') }}"></script>
<script src="{{ url_for('static', filename='js/owl-carousel.js') }}"></script>
<script src="{{ url_for('static', filename='js/tabs.js') }}"></script>
<script src="{{ url_for('static', filename='js/popup.js') }}"></script>
<script src="{{ url_for('static', filename='js/custom.js') }}"></script>
</body>
</html>
```

Style.css:

```
.section {
position: relative; height: 100vh;
}
.section .section-center {
position: absolute; top: 50%;
left: 0;
right: 0;
-webkit-transform: translateY(-50%); transform: translateY(-50%);
}
.booking-form {
position: relative; background: #fff; max-width: 642px; width: 100%; margin: auto;
padding: 45px 25px 25px; border-radius: 4px;
-webkit-box-shadow: 0px 0px 10px -5px rgba(0, 0, 0, 0.4);
box-shadow: 0px 0px 10px -5px rgba(0, 0, 0, 0.4);
}
.booking-form .form-group { position: relative; margin-bottom: 20px;
}
.booking-form .form-control { background-color: #fff; height: 65px;
padding: 0px 15px; padding-top: 24px; color: #191a1e;
border: 2px solid #7453fcab; font-size: 16px;
font-weight: 700;
-webkit-box-shadow: none; box-shadow: none;
border-radius: 4px;
-webkit-transition: 0.2s all; transition: 0.2s all;
}
.booking-form .form-control::-webkit-input-placeholder { color: #fff;
}
.booking-form .form-control:-ms-input-placeholder { color: #fff;
}
.booking-form .form-control::placeholder { color: #00000099;
```

```
}
.booking-form .form-control:focus { background: #fff;
}
.booking-form input[type="date"].form-control:invalid { color: #dfe5e9;
}
.booking-form select.form-control {
-webkit-appearance: none;
-moz-appearance: none; appearance: none;
}
.booking-form select.form-control+.select-arrow { position: absolute;
right: 6px; bottom: 6px; width: 32px;
line-height: 32px; height: 32px;
text-align: center; pointer-events: none; color: #dfe5e9;
font-size: 14px;
}
.booking-form select.form-control+.select-arrow:after { content: '\279C';
display: block;
-webkit-transform: rotate(90deg); transform: rotate(90deg);
}
.booking-form .form-label { position: absolute; top: 6px;
left: 20px;
font-weight: 700;
text-transform: uppercase; line-height: 24px;
height: 24px; font-size: 12px; color: #7453fc;
}
.booking-form .form-checkbox input { position: absolute !important; margin-left: -
9999px !important; visibility: hidden !important;
}
.booking-form .form-checkbox label { position: relative;
padding-top: 4px; padding-left: 30px; font-weight: 700; color: #191a1e;
}
.booking-form .form-checkbox label+label { margin-left: 15px;
}
.booking-form .form-checkbox input+span { position: absolute;
left: 2px; top: 4px; width: 20px; height: 20px;
background: #fff;
border: 2px solid #dfe5e9; border-radius: 50%;
}
.booking-form .form-checkbox input+span:after { content: '';
position: absolute; top: 50%;
left: 50%; width: 0px; height: 0px;
border-radius: 50%; background-color: #4fa3e3;
-webkit-transform: translate(-50%, -50%);
transform: translate(-50%, -50%);
-webkit-transition: 0.2s all; transition: 0.2s all;
}
.booking-form .form-checkbox input:not(:checked)+span:after { opacity: 0;
}
.booking-form .form-checkbox input:checked+span:after { opacity: 1;
width: 10px; height: 10px;
```

```
}
.booking-form .submit-btn { color: #fff;
background-color: #7453fc; font-weight: 400;
height: 65px; font-size: 18px; border: none; width: 100%;
border-radius: 4px;
text-transform: uppercase
}
.booking-cta {
margin-top: 10px;
}
.booking-cta h1 {
font-size: 52px;
text-transform: uppercase; color: #fff;
font-weight: 400;
}
.booking-cta p {
font-size: 22px; color: #fff;
}
```

b. Feature 2:

We use python to create backend processing of our drowning detection system . The code as follows below:

App.py:

```
# import necessary packages import cvlib as cv
from cvlib.object_detection import draw_bbox # import necessary packages
from flask import Flask, render_template, request import requests
import os
from sys import exit import cvlib as cv
from cvlib.object_detection import draw_bbox import cv2
import time
import numpy as np import math
import argparse import playsound
import mysql.connector app = Flask( name )
conn=mysql.connector.connect(host="localhost", user="root", password="",
database="login") cursor=conn.cursor()
@app.route('/') def index():
return render_template('index.html')
@app.route('/login')
def login(): # put application's code here return render_template('login.html')
@app.route('/register') def register():
return render_template('register.html')
@app.route('/home') def home():
return render_template('index1.html')
@app.route('/login_validation', methods=['POST']) def login_validation():
email=request.form.get('email') password=request.form.get('password')
```

```
cursor.execute("""SELECT * FROM `users` WHERE `email` LIKE'{}' AND `password`
LIKE '{}'""".format(email,password))
users = cursor.fetchall()
if len(users)>0:
return render_template('index1.html') else:
return render_template('login.html', prediction_text = "1" )
@app.route('/add_user', methods=['POST']) def add_user():
name= request.form.get('name') email = request.form.get('email')
password = request.form.get('password')
cursor.execute("""INSERT INTO `users`(`id`, `name`, `email`, `password`) VALUES
(NULL,'{}','{}','{}')""".format(name,email,password))
conn.commit()
return render_template('login.html', prediction_text = "0")
@app.route('/step2') def step2():
print("Begin")
webcam = cv2.VideoCapture("garden.mp4") padding = 20
if not webcam.isOpened(): print("Could not open webcam") exit()
t0 = time.time() #gives time in seconds after 1970 #print('t0=',t0)
#variable dcount stands for how many seconds the person has been standing still
for centre0 = np.zeros(2)
isDrowning = False
#this loop happens approximately every 1 second, so if a person doesn't move, #or
moves very little for 10seconds, we can say they are drowning
# loop through frames
while webcam.isOpened():
# read frame from webcam status, frame = webcam.read()
if not status: break
#small_frame = cv2.resize(frame,(0,0),fx = 0.5,fy = 0.5) # apply object detection
bbox, label, conf = cv.detect_common_objects(frame, confidence=0.25,
model='yolov3-
tiny')
print(bbox, label, conf)
if(len(bbox)>0): bbox0 = bbox[0]
#centre = np.zeros(s) centre = [0,0]
#for i in range(0, len(bbox)):
#centre[i] =[(bbox[i][0]+bbox[i][2])/2,(bbox[i][1]+bbox[i][3])/2 ] centre
=[(bbox0[0]+bbox0[2])/2,(bbox0[1]+bbox0[3])/2 ]
#make vertical and horizontal movement variables hmov = abs(centre[0]-
centre0[0])
vmov = abs(centre[1]-centre0[1])
#there is still need to tweek the threshold
#this threshold is for checking how much the centre has moved x=time.time()
threshold = 10 #print("hmov=",hmov)
if(hmov>threshold or vmov>threshold): print(x-t0, 'sif')
t0 = time.time() isDrowning = False
else:
print(x-t0, 'selse') if((time.time() - t0) > 10):
isDrowning = True
print('bbox: ', bbox, 'centre:', centre, 'centre0:', centre0) print('Is he/she drowning: ',
isDrowning)
```

```
#print('End of the program')
centre0 = centre
# draw bounding box over detected objects # draw bounding box over detected
objects
out = draw_bbox(frame, bbox, label, conf, write_conf=True) # display output
cv2.imshow("Real-time object detection", out) if(isDrowning == True):
webcam.release() cv2.destroyAllWindows()
return render_template('index1.html', prediction_text = "1") # press "Q" to stop
if cv2.waitKey(1) & 0xFF == ord('q'): break
# release resources webcam.release() cv2.destroyAllWindows()
if name == ' main ': app.run(debug=True)
```

8. TESTING :

a. Test Cases

Drowning detected:

User is safe:

				PNT2022TMID25916 VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning 4 marks			
Test case ID	Feature Type		Test Scenario	Steps TO Execute	Test	Expected Result	Actual Result
LoginPage_TC_OO1	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	I.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup displayed or not	Login.html	Login/Signup popup should display	Working as
LoginPage_TC_002		Home Page	Verify the UI elements in Login/Signup popup	I.Enter tJRL and dick go 2. Click on My Account dropdown 3. Verify login/Singup popup with below UI elements: a.email text box b.password text box c. L%in button d.New customer? Create account link e. Last password? Recovery password link	Login.html	Application should show below elements: a.email text box b.password text box c. Login button with orange colour d. New custotner? Create account link e. Last password? Recovery password link	Working as expected
LoginPage_TC_OO3	Functional	Home page	Verify user is able to log into application with Valid credentials	I.Enter URL and dick go 2. Click on My Account dropdown 3. Enter Valid username/email in Email text 4.Enter valid password in password text box 5. Click On in button	Username:lax@gmail password: lax26	User should navigate to prediction homepage	working as
LoginPage_TC_OO4	Functional	Login page	Verify user is able to log into application with Invalid credentials	1, Enter URL and click go 2.Click on My Account dropdownbutton 3.Enter Invalid username/email in Email text box 4.Enter valid password in password text box 5.Click on •n button	Username:lax password:lax26	Application should show 'Incorrect email or password ' validation message.	working as
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with Invalid credentials	I-Enter URL and click go 2. Click On My Account dropdown 3. Enter Valid username/email in Email text box 4.Enter Invalid password in password text box 5.Click on in button	username:lax26@mail password:lax26	Application should show •Incorrect email or password ' validation message.	working as
LoginPage_TC_OO5	Functional	Login page	Verify user is able to into application with InValid credentials	I.Enter URL and click go 2. Click on My Account dropdown 3. Enter Invalid username/email in Email text box 4. Enter Invalid password in password text box 5. Click on I in button	username:lax26@mail password:1803	Application should show 'Incorrect email or password ' validation message.	working as
Predictionpage_TC_ 00 6	Functional	Prediction Page	Page should display whether the person is drowning or not	1, Camera should take pictures of people swimming in pools 2. It should predict the probability of drowning 3. It should show a bounding box displaying the probability Of drowning	image Of people drowning	generate a alert to lifeguard if people are drowning	Working as

c. User Acceptance Testing:

Defect Analysis:

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	2	0	0	2
Client Application	2	0	0	2
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Exception Reporting	2	0	0	2
Final Report Output	1	0	0	1

Test Case Analysis:

This report shows the number of test cases that have passed, failed, and untested.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

9. RESULTS:

a. Performance Metrics/Testing:

S.No.	Parameter	Values	Screenshot
1.	Model Summary	-	
2.	Accuracy	Training Accuracy - 28 Validation Accuracy -44	

Drowning Detection and Tracking Results The YOLO detection algorithm uses 416X416 as input size. Drowning victims are detected in three stages using a YOLO-based detection technique. Even if the swimmer stayed underwater for a long time, the Deep SORT algorithm was able to track him.
Accuracy = (TP + TN) / (TP + TN + FP + FN)
TP - True Positives
FP - False Positives
TN - True Negatives
FN - False Negatives
ACCURACY VARIABLES
COUNT
TP
220
TN
208
FP
42
FN
30

10. ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

- Helps in surveillance of young children/beginners of swimming , from drowning risks.
- Blows an alarm too, so it is helpful to rescue the victim swimmer ,instantly.

DISADVANTAGES:

- Concerns over inconsistent levels of reliability of systems and situations where glare, swimming aids or high occupancy / activity rates can cause false alarms
- Impact of the additional cost on financial viability
- Limited level of in-use knowledge and experience

11. CONCLUSION:

Consistently numerous people, including kids, are suffocated or near suffocating in the deeps of the swimming pools, and the lifeguards are not prepared all around to deal with these issues. In this manner raises the necessities for having a framework that will thus recognize the suffocating people and alert the lifeguards at such hazard. It can be installed in International standardized schools where classes are held for training kids.

12. FUTURE SCOPE:

The European Union is encouraging the use of wearable life jackets by increasing distribution and educating and supervising people within the swimming pool environment. The U.K. government is also supporting technological developments that can enhance the role of life suits by adding an additional layer of safety and providing first aid in emergencies.

Market Highlights:

The global anti-drowning system market size was valued at USD 67.68 million in 2021. It is projected to reach USD 98.86 million by 2030, growing at a CAGR of 4.3% during the forecast period (2022-2030).
The residential segment by application is estimated to grow at a CAGR of 3.9% during the forecast period. The rising drowning incidents among children in bathtubs, residential swimming pools, and others due to negligence of parents, which can be further attributed to

hectic schedules, and the poor construction of bathing/swimming premises in homes have increased the need for effective safety measures in residential pools.
The indirect sales channel is expected to grow at a CAGR of 3.8%, propelled by the increasing number of credit card owners and favorable transaction schemes and discounts that have reduced manufacturers' financial risk.
North America Dominates the Market with More Than Half the Global Value Share.
Some of the key players operating in the market are

- Variopool
- Swim Eye
- Poolview Limited
- Coral Detection System
- Sentag
- SEAL SwimSafe
- Poseidon Technologies
- AngelEye

13. APPENDIX:

Source Code:

Login.html

```
<!DOCTYPE html>

<html >

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial- scale=1">

<title>Virtual Eye</title>

<link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Open+Sans+Conde nsed:300' rel='stylesheet'
type='text/css'>
```

```
<!link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">
<link href='https://fonts.googleapis.com/css?family=Merriweather' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Josefin Sans' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>
<style>
.header {
}
.topnav {
top:0; margin:0px; left: 0px; right: 0px;
position: fixed;
background-color: #28272c; color: white;
box-shadow: 0px 8px 4px grey; overflow: hidden;
padding-left:20px;
font-family: 'Josefin Sans'; font-size: 2vw;
width: 100%; height:8%;
text-align: center;
overflow: hidden; background-color: #333;
}
.topnav-right a {
float: left; color: #f2f2f2;
text-align: center; padding: 14px 16px; text-decoration: none; font-size: 18px;
}
.topnav-right a:hover { background-color: #ddd; color: black;
}
```

```
.topnav-right a.active { background-color: #565961; color: white;

}

.topnav-right { float: right;

padding-right:100px;

}

.login{

margin-top:-70px;

}

body {

background-color:#ffffff; background-repeat: no-repeat; background-size:cover; background-position: 0px 0px;

}

.login{

margin-top:100px;

}

form {border: 3px solid #f1f1f1; margin-left:400px;margin- right:400px;}

input[type=text], input[type=email],input[type=number],input[type=password] { width: 100%;

padding: 12px 20px; display: inline-block; margin-bottom:18px; border: 1px solid #ccc; box-sizing: border-box;

}

button {

background-color: #28272c; color: white;

padding: 14px 20px; margin-bottom:8px; border: none; cursor: pointer; width: 100%;

font-weight:bold;

}
```

```
button:hover { opacity: 0.8;
}
.cancelbtn { width: auto;
padding: 10px 18px; background-color: #f44336;
}
.imgcontainer { text-align: center;
margin: 24px 0 12px 0;
}
img.avatar { width: 30%;
border-radius: 50%;
}
.container { padding: 16px;
}
span.psw { float: right;
padding-top: 16px;
}
/* Change styles for span and cancel button on extra small screens
*/
@media screen and (max-width: 300px) { span.psw {
display: block; float: none;
}
.cancelbtn { width: 100%;
}
}
```

```
</style>

</head>

<body style="font-family:Montserrat;">

<div class="header">

<div style="width:50%;float:left;font-size:2vw;text-align:left;color:white; padding-top:1%">Virtual Eye</div>

<div class="topnav-right" style="padding-top:0.5%;">

<a href="{{ url_for('index')}}">Home</a>

<a class="active" href="{{ url_for('login')}}">Login</a>

<a href="{{ url_for('register')}}">Register</a>

</div>

</div>

<div id="login" class="login">

<form action="{{url_for('afterlogin')}}" method="post">

<div class="imgcontainer">

<img style="" src="https://cdn.digitalhealth.net/wp-content/uploads/2017/03/eye_image_generic_555.jpg" alt="Avatar" class="avatar">

</div>

<div class="container">

<input type="email" placeholder="Enter registered email ID" name="_id" required><br>

<input type="password" placeholder="Enter Password" name="psw" required>

{{pred}}

<button type="submit">Login</button><br>

</div>

</form>
```

```
</div>

</body>

</html>
```

Register.html

```
<!DOCTYPE html>

<html >

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial- scale=1">

<title>Virtual Eye</title>

<link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Open+Sans+Conde nsed:300' rel='stylesheet'
type='text/css'>

<link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">

<link href='https://fonts.googleapis.com/css?family=Merriweather' rel='stylesheet'>

<link href='https://fonts.googleapis.com/css?family=Josefin Sans' rel='stylesheet'>

<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>

<style>

.header {

}

top:0; margin:0px; left: 0px; right: 0px;

position: fixed;

background-color: #28272c; color: white;
```

```
box-shadow: 0px 8px 4px grey; overflow: hidden;

padding-left:20px;

font-family: 'Josefin Sans'; font-size: 2vw;

width: 100%; height:8%;

text-align: center;

.topnav {

overflow: hidden; background-color: #333;

}

.topnav-right a { float: left; color: #f2f2f2;

text-align: center; padding: 14px 16px; text-decoration: none; font-size: 18px;

}

.topnav-right a:hover { background-color: #ddd; color: black;

}

.topnav-right a.active { background-color: #565961; color: white;

}

.topnav-right { float: right;

padding-right:100px;

}

.login{

margin-top:-70px;

}

body {

background-color:#ffffff; background-repeat: no-repeat; background-size:cover; background-position: 0px 0px;

}
```

```
.login{

margin-top:100px;

}

form {border: 3px solid #f1f1f1; margin-left:400px;margin- right:400px;}

input[type=text], input[type=email],input[type=number],input[type=password] { width: 100%;

padding: 12px 20px; display: inline-block; margin-bottom:18px; border: 1px solid #ccc; box-sizing: border-box;

}

button {

background-color: #28272c; color: white;

padding: 14px 20px; margin-bottom:8px; border: none; cursor: pointer; width: 100%;

}

button:hover { opacity: 0.8;

}

.cancelbtn { width: auto;

padding: 10px 18px; background-color: #f44336;

}

.imgcontainer { text-align: center;

margin: 24px 0 12px 0;

}

img.avatar { width: 30%;

border-radius: 50%;

}

.container { padding: 16px;

}
```

```
span.psw { float: right;

padding-top: 16px;

}

/* Change styles for span and cancel button on extra small screens

*/

@media screen and (max-width: 300px) { span.psw {

display: block;

float: none;

}

.cancelbtn { width: 100%;

}

}

</style>

</head>

<body style="font-family:Montserrat;">

<div class="header">

<div style="width:50%;float:left;font-size:2vw;text- align:left;color:white; padding-top:1%">Virtual Eye</div>

<div class="topnav-right" >

<a href="{{ url_for('home')}}">Home</a>

<a href="{{ url_for('login')}}">Login</a>

<a class="active" href="{{ url_for('register')}}">Register</a>

</div>

</div>

<div id="login" class="login">
```

```
<form action="{{url_for('afterreg')}}" method="post">

<div class="imgcontainer">

<img style="" src="https://cdn.digitalhealth.net/wp-content/uploads/2017/03/eye_image_generic_555.jpg" alt="Avatar" class="avatar">

</div>

<div class="container">

<input type="text" placeholder="Enter Name" name="name" required><br>

<input type="email" placeholder="Enter Email ID" name="_id" required><br>

<input type="password" placeholder="Enter Password" name="psw" required>

{{pred}}

<button type="submit">Register</button><br>

</div>

<div class="container" style="background-

color:#f1f1f1">

<div class="psw">Already have an account?   <a href="{{ url_for('login') }}">Login</a></div >

</div>

</form>

</div>

</body>

    </html>
```

Base.html

```
<html lang="en">

<head>

<meta charset="UTF-8">
```

```
<meta name="viewport" content="width=device-width, initial- scale=1.0">
<meta http-equiv="X-UA-Compatible" content="ie=edge">
<title>High Quality Facial Recognition</title>
<link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min. css" rel="stylesheet">
<script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.j s"></script>
<script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script
>
<script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js "></script>
<link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
<style>
.bg-dark {
background-color: #42678c!important;
}
#result {
color: #0a1c4ed1;
}
</style>
</head>
<body style="background-color:black";>
<header id="head" class="header">
<section id="navbar">
<h1 class="nav-heading"></i>Virtual Eye</h1>
<div class="nav--items">
<ul>
```

```
<li><a href="{{ url_for('index')}}">Home</a></li>

<li><a

href="{{ url_for('logout')}}">Logout</a></li>

<!-- <li><a href="#about">About</a></li>

<li><a href="#services">Services</a></li> -->

</ul>

</div>

</section>

</header>

<div class="container">

<div id="content" style="margin-top:2em">

<div class="container">

<div class="row">

<div class="col-sm-6 bd" >

<h2><em style="color:white;">High Quality Facial Recognition</em></h2>

<br>

<p><h5><i style="color:white;">Emotion Detection Through Facial Feature
Recognition</i></h5></p>

<img src="https://130e178e8f8ba617604b-
8aedd782b7d22cfe0d1146da69a52436.ssl.cf1.rackcdn.com/facial- recognition-use-triggers-gdpr-
fine-showcase_image-10-a- 12991.jpg" style="height:240px"class="img-rounded" alt="Gesture">

</div>

<div class="col-sm-6">

<div>

<h4 style="color:white;">Upload

Image Here</h4>
```

```
<form action = "http://localhost:5000/" id="upload-file" method="post" enctype="multipart/form-data">

<label for="imageUpload" class="upload-

label">

Choose Image

</label>

<input type="file" name="image"

id="imageUpload" accept=".png, .jpg, .jpeg,.pdf">

</form>

<div class="image-section" style="display:none;">

<div class="img-preview">

<div id="imagePreview">

</div>

</div>

<div>

<button type="button" class="btn btn- info btn-lg " id="btn-predict">Analyse</button>

</div>

</div>

<div class="loader" style="display:none;"></div>

<h3>

<span id="result"> </span>

</h3>

</div>

</div>

</div>
```

```
</body>

</div>

</div>

</div>

<footer>

<script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script>

</footer>

</html>
```

Index.html

```
<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta http-equiv="X-UA-Compatible" content="IE=edge">

<meta name="viewport" content="width=device-width, initial- scale=1.0">

<!--Bootstrap -->

<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/boo
tstrap.min.css" integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGg FAW/dAiS6JXm"
crossorigin="anonymous">

<script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpG FF93hXpG5KkN"
crossorigin="anonymous"></script>

<script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/ popper.min.js"
integrity="sha384- ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPsk
vXusvfa0b4Q" crossorigin="anonymous"></script>

<script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootst rap.min.js"
integrity="sha384- JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5

+76PVCmYl" crossorigin="anonymous"></script>
```

```
<script src="https://kit.fontawesome.com/8b9cdc2059.js" crossorigin="anonymous"></script>

<link href="https://fonts.googleapis.com/css2?family=Akronim&family= Roboto&display=swap"
rel="stylesheet">

<link rel="stylesheet" href="../static/style.css">

<!-- <script defer src="../static/js/main.js"></script> -->

<title>Virtual Eye</title>

</head>

<body>

<header id="head" class="header">

<section id="navbar">

<h1 class="nav-heading"></i>Virtual Eye</h1>

<div class="nav--items">

<ul>

<li><a

href="{{ url_for('index')}}">Home</a></li>

<li><a

href="{{ url_for('login')}}">Login</a></li>

<li><a

href="{{ url_for('register')}}">Register</a></li>

<li><a href="{{ url_for('login')}}">Demo</a></li>

</ul>

</div>

</section>

<section id="slider">

<div id="carouselExampleIndicators" class="carousel" data- ride="carousel">
```

```
<ol class="carousel-indicators ">
<li data-target="#carouselExampleIndicators" data-slide- to="0" class="active "></li>
<li data-target="#carouselExampleIndicators" data-slide- to="1"></li>
<li data-target="#carouselExampleIndicators" data-slide- to="2"></li>
</ol>
<div class="carousel-inner">
<div class="carousel-item active">
<img class="d-block w-100" src="../static/img/1.png" alt="First slide">
</div>
<div class="carousel-item">
<img class="d-block w-100" src="../static/img/second.jpg" alt="Second slide">
</div>
<div class="carousel-item">
<img class="d-block w-100" src="../static/img/third.jpg" alt="Third slide">
</div>
</div>
<a class="carousel-control-prev" href="#carouselExampleIndicators" role="button" data-slide="prev">
<span class="carousel-control-prev-icon" aria- hidden="true"></span>
<span class="sr-only">Previous</span>
</a>
<a class="carousel-control-next" href="#carouselExampleIndicators" role="button" data-slide="next">
<span class="carousel-control-next-icon" aria- hidden="true"></span>
<span class="sr-only">Next</span>
```

```
</a>
</div>
</section>
</header>
<section id="about">
<div class="top">
<h3 class="title text-muted"> ABOUT PROJECT
</h3>
<div class="line"></div>
</div>
<div class="body">
<div class="left">
<h2>Problem:</h2>
<p>
</p>
</div>
<div class="left">
<h2>Solution:</h2>
<p>
</p>
</div>
</div>
<div class="bottom">
<p ><b>
```

```
</b></p>
</div>
</section>
<section id="footer">
<div class="social">
<a href="#" target="_blank"><i class="fab fa-2x fa-twitter- square"></i></a>
<a href="#" target="_blank">
<i class="fab fa-2x fa-linkedin"></i></a>
<a href="#">
<i class="#"></i>
</a>
</div>
</section>
</body>
</html>
```

Logout.html

```
<!DOCTYPE html>
<html >
<head>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial- scale=1">
<title>Virtual Eye</title>
<link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>
```

```
<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Open+Sans+Conde nsed:300' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Merriweather' rel='stylesheet'>

<link href='https://fonts.googleapis.com/css?family=Josefin Sans' rel='stylesheet'>

<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>

<style>

.header {

top:0; margin:0px;

left: 0px; right: 0px;

position: fixed;

background-color: #28272c; color: white;

box-shadow: 0px 8px 4px grey; overflow: hidden;

padding-left:20px;

font-family: 'Josefin Sans'; font-size: 2vw;

width: 100%; height:8%;

text-align: center;

}

.topnav { overflow: hidden; background-color: #333;

}

.topnav-right a { float: left; color: #f2f2f2;

text-align: center; padding: 14px 16px; text-decoration: none; font-size: 18px;

}

.topnav-right a:hover { background-color: #ddd; color: black;

}
```

```
.topnav-right a.active { background-color: #565961; color: white;

}

.topnav-right { float: right;

padding-right:100px;

}

.login{

margin-top:-70px;

}

body {

background-color:#ffffff; background-repeat: no-repeat; background-size:cover; background-position: 0px 0px;

}

.main{

margin-top:100px; text-align:center;

}

form { margin-left:400px;margin-right:400px;}

input[type=text], input[type=email],input[type=number],input[type=password] { width: 100%;

padding: 12px 20px; display: inline-block; margin-bottom:18px; border: 1px solid #ccc;

box-sizing: border-box;

}

button {

background-color: #28272c; color: white;

padding: 14px 20px; margin-bottom:8px; border: none; cursor: pointer; width: 20%;

}

button:hover { opacity: 0.8;
```

```
}
.cancelbtn { width: auto;
padding: 10px 18px; background-color: #f44336;
}
.imgcontainer { text-align: center;
margin: 24px 0 12px 0;
}
img.avatar { width: 30%;
border-radius: 50%;
}
.container { padding: 16px;
}
span.psw { float: right;
padding-top: 16px;
}
/* Change styles for span and cancel button on extra small screens
*/
@media screen and (max-width: 300px) { span.psw {
display: block; float: none;
}
.cancelbtn { width: 100%;
}
}
</style>
```

```
</head>

<body style="font-family:Montserrat;">

<div class="header">

<div style="width:50%;float:left;font-size:2vw;text- align:left;color:white; padding-top:1%">Virtual eye</div>

<div class="topnav-right" style="padding-top:0.5%;">

<a href="{{ url_for('home')}}">Home</a>

<a href="{{ url_for('login')}}">Login</a>

<a href="{{ url_for('register')}}">Register</a>

</div>

</div>

<div class="main">

<h1>Successfully Logged Out!</h1>

<h3 style="color:#4CAF50">Login for more information<h3>

<a href="{{ url_for('login') }}"><button type="submit">Login</button></a>

</form>

</div>

</body>

</html>
```

Prediction.html

```
<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta http-equiv="X-UA-Compatible" content="IE=edge">
```

```
<meta name="viewport" content="width=device-width, initial- scale=1.0">

<!--Bootstrap -->

<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/css/boo
tstrap.min.css" integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGg FAW/dAiS6JXm"
crossorigin="anonymous">

<script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-

KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpG FF93hXpG5KkN"
crossorigin="anonymous"></script>

<script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/ popper.min.js"
integrity="sha384- ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPsk
vXusvfa0b4Q" crossorigin="anonymous"></script>

<script src="https://maxcdn.bootstrapcdn.com/bootstrap/4.0.0/js/bootst rap.min.js"
integrity="sha384- JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5

+76PVCmYl" crossorigin="anonymous"></script>

<script src="https://kit.fontawesome.com/8b9cdc2059.js" crossorigin="anonymous"></script>

<link href="https://fonts.googleapis.com/css2?family=Akronim&family= Roboto&display=swap"
rel="stylesheet">

<link rel="stylesheet" href="../static/style.css">

<script defer src="../static/js/JScript.js"></script>

<title>Prediction</title>

</head>

<body>

<header id="head" class="header">

<section id="navbar">

<h1 class="nav-heading"></i>Virtual Eye</h1>

<div class="nav--items">

<ul>

<li><a href="{{ url_for('index')}}">Home</a></li>
```

```
<li><a

href="{{ url_for('logout')}}">Logout</a></li>

<!-- <li><a href="#about">About</a></li>

<li><a href="#services">Services</a></li> -->

</ul>

</div>

</section>

</header>

<!-- dataset/Training/metal/metal326.jpg -->

</br>

<section id="prediction">

<h2 class="title text-muted">Virtual Eye- Life Guard for Swimming Pools to Detect Active Drowning</h1>

<div class="line" style="width: 900px;"></div>

</section>

</br>

<section id="about">

<div class="body">

<div class="left">

<p>

</p>

</div>

<div class="left">

<div class="prediction-input">

<img class="d-block w-100" src="../static/img/second.jpg" alt="Second slide">
```

```
</br>
<form id="form" action="/result" method="post" enctype="multipart/form-data">
<input type="submit" class="submitbtn" value="Click Me! For a Demo">
</form>
</div>
<h5 style="text-color:Red">
<b style="text-color:Red">{{prediction}}<b>
</h5>
</div>
</div>
</section>
</br></br>
<section id="footer">
</section>
</body>
    </html>
```

App.py:

```
import re

import numpy as np import os

from flask import Flask, app, request, render_template, redirect, url_for from tensorflow.keras import models

from tensorflow.keras.models import load_model from tensorflow.keras.preprocessing import image

from tensorflow.python.ops.gen_array_ops import concat import cvlib as cv

from cvlib.object_detection import draw_bbox import cv2

import time

from playsound import playsound import requests

#Loading the model

from cloudant.client import Cloudant # Authenticate using an IAM API key

client = Cloudant.iam('57f444d5-dfbd-4fc0-b752-dea54005c3cc-bluemix','HTLp9_GkWGDyMR9VHruMMwi_qzZ43qaI3UVR77GOI2GX', connect=True)

# Create a database using an initialized client my_database = client.create_database('my_database')

app=Flask( name )

#default home page or route @app.route('/')

def index():

return render_template('index.html')

@app.route('/index.html') def home():

return render_template("index.html")

#registration page @app.route('/register') def register():

return render_template('register.html')
```

```
@app.route('/afterreg', methods=['POST']) def afterreg():

x = [x for x in request.form.values()] print(x)

data = {

'_id': x[1], # Setting _id is optional 'name': x[0],

'psw':x[2]

}

print(data)

query = {'_id': {'$eq': data['_id']}}

docs = my_database.get_query_result(query) print(docs)

print(len(docs.all()))

if(len(docs.all())==0):

url = my_database.create_document(data) #response = requests.get(url)

return render_template('register.html', pred="Registration Successful, please login using your details")

else:

return render_template('register.html', pred="You are already a member, please login using your details")

#login page @app.route('/login') def login():

return render_template('login.html')

@app.route('/afterlogin',methods=['POST']) def afterlogin():

user = request.form['_id'] passw = request.form['psw'] print(user,passw)

query = {'_id': {'$eq': user}}

docs = my_database.get_query_result(query) print(docs)

print(len(docs.all()))
```

```
if(len(docs.all())==0):

return render_template('login.html', pred="The username is not found.") else:

if((user==docs[0][0]['_id'] and passw==docs[0][0]['psw'])): return redirect(url_for('prediction'))

else:

print('Invalid User')

@app.route('/logout') def logout():

return render_template('logout.html')

@app.route('/prediction') def prediction():

return render_template('prediction.html')

@app.route('/result',methods=["GET","POST"]) def res():

webcam = cv2.VideoCapture('drowning.mp4')

if not webcam.isOpened(): print("Could not open webcam") exit()

t0 = time.time() #gives time in seconds after 1970

#variable dcount stands for how many seconds the person has been standing still for

centre0 = np.zeros(2) isDrowning = False

#this loop happens approximately every 1 second, so if a person doesn't move, #or moves very little for 10seconds, we can say they are drowning

#loop through frames while webcam.isOpened():

# read frame from webcam status, frame = webcam.read() #print(frame)

if not status:

print("Could not read frame") exit()

# apply object detection

bbox, label, conf = cv.detect_common_objects(frame)
```

```
#simplifying for only 1 person #print('bbox',bbox) #print('label',label) #print('conf',conf)

#s = (len(bbox), 2)

if(len(bbox)>0): bbox0 = bbox[0]

#centre = np.zeros(s) centre = [0,0]

#for i in range(0, len(bbox)):

#centre[i] =[(bbox[i][0]+bbox[i][2])/2,(bbox[i][1]+bbox[i][3])/2 ] centre =[(bbox0[0]+bbox0[2])/2,(bbox0[1]+bbox0[3])/2 ]

#make vertical and horizontal movement variables hmov = abs(centre[0]-centre0[0])

vmov = abs(centre[1]-centre0[1])

#there is still need to tweek the threshold

#this threshold is for checking how much the centre has moved x=time.time()

threshold = 10

if(hmov>threshold or vmov>threshold): print(x-t0, 's')

t0 = time.time() isDrowning = False

else:

print(x-t0, 's') if((time.time() - t0) > 10):

isDrowning = True

#print('bounding box: ', bbox, 'label: ' label ,'confidence: ' conf[0], 'centre: ', centre)

#print(bbox,label ,conf, centre)

print('bbox: ', bbox, 'centre:', centre, 'centre0:', centre0) print('Is he drowning: ', isDrowning)

centre0 = centre

# draw bounding box over detected objects #print('came here')

out = draw_bbox(frame, bbox, label, conf,colors=None,write_conf=isDrowning) #print('Seconds since last epoch: ', time.time()-t0)
```

```
# display output

cv2.imshow("Real-time object detection", out) if(isDrowning == True):

playsound('alarm.mp3') webcam.release() cv2.destroyAllWindows()

#return render_template('prediction.html',prediction="Emergency !!! The Person is drowining")

#return render_template('base.html')

# press "Q" to stop

if cv2.waitKey(1) & 0xFF == ord('q'): break

# release resources webcam.release() cv2.destroyAllWindows()

return render_template('prediction.html',prediction="Emergency !!! The Person is drowining")

""" Running our application """ if name == " main ":

    app.run(debug=False)
```

GitHub & Project Demo Link:

CLICK HERE FOR >> **GITHUB REPO**

CLICK HERE FOR >> **PROJECT DEMO**