FINAL DELIVERABLE
PROJECT
DOCUMENTATION

Date	19 November 2022
Team ID	PNT2022TMID43584
Project Name	VirtualEye-Lifeguard for Swimming Pools to Detect the Active Drowning

CHAPTER-1

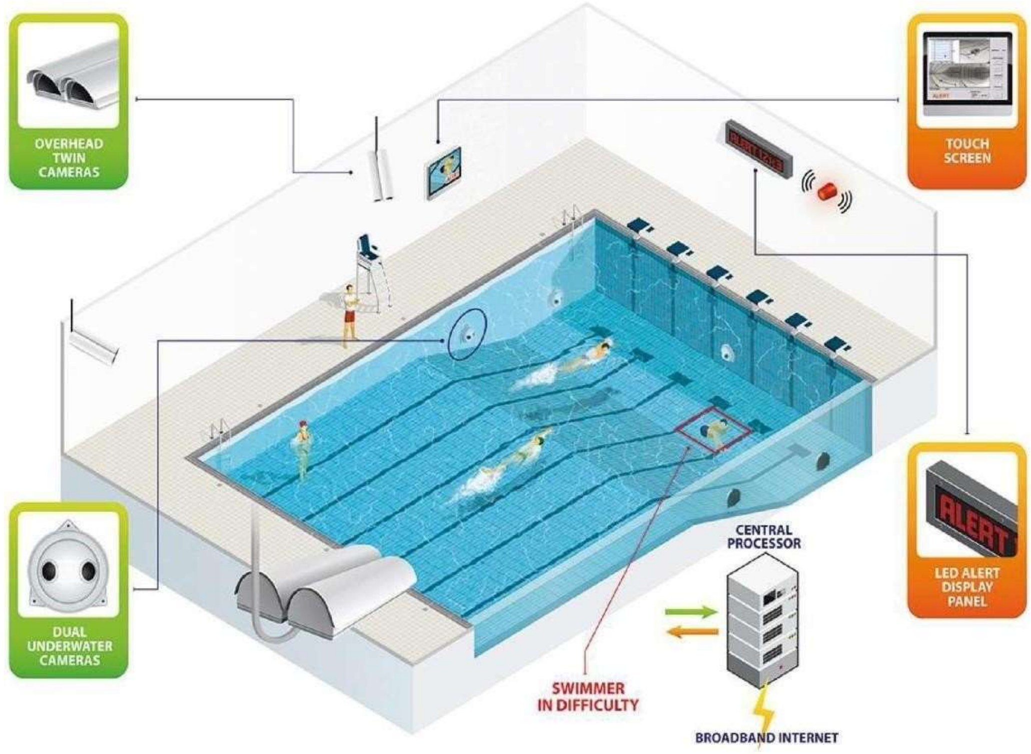
❖ Project Overview

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in hotels, and weekend tourist spots and barely people have them in their house backyard. Beginners, especially, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to be suffering the highest drowning mortality rates worldwide. Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly. To overcome this conflict, a meticulous system is to be implemented along the swimming pools to save human life.
By studying body movement patterns and connecting cameras to artificial intelligence (AI) systems we can devise an underwater pool safety system that reduces the risk of drowning. Usually, such systems can be developed by installing more than 16 cameras underwater and ceiling and analyzing the video feeds to detect any anomalies. But AS a POC we make use of one camera that streams the video underwater and analyses the position of swimmers to assess the probability of drowning, if it is higher than an alert will be generated to attract lifeguards' attention.

❖ Purpose

The system is not designed to replace a lifeguard or other human monitor, but to act as an additional tool. “It helps the lifeguard to detect the underwater situation where they can’t easily observe**.** Life Guard is a drowning detection system that detects every dangerous situation and accident. The software works in close integration with the cameras installed in the pool to continuously scan the pool. Thanks to this combination of hardware, software and profound innovations, today Life Guard represents excellence in drowning detection.

1.1 Project Overview



1.2 Purpose

>> Establish and outline what is known on Drowning Detection Systems.
>> Evaluate the current literature on Drowning Detection Systems, including their use in indoor pool environments along with interaction withtraditional lifeguarding.
>> Better understand where DDS are positioned in the health and safety landscape of indoor swimming pools.

The value that can be generated from these aims stem from the recognition that currently, there are no published documents drawing together all the current DDS research. The literature review aims to contribute as independent research in this field and hopes to signpost the potential future direction of DDS research.

CHAPTER-2

2. LITERATURE SURVEY

Of the differing definitions of DDS, most outline three defining elements:

1) surveillance,
2) detection of a pool user in difficulty, and
3) raising an alarm

For example, ISO_20380 (the document published by the International Organisation for Standardization (2017) outlining the international safety requirements and test standards for DDS) defines the technology as an 'automated system including means for digitizing series of images of people in the pool basin, means for comparing and analysing digitized images and decision means for setting off and sending an alarm to trained staff when a detection occurs'. In comparison, there are broader definitions that are inclusive of other technologies that focus on the surveillance aspect, for example, 'DDS is used to describe various electronic systems that are designed to assist with the surveillance of swimmers within the water of a swimming pool' (Sport England, 2011). This definition would includeCCTV that helps give lifeguards an underwater view but does not have the capacity to detect a pool user in difficulty or raise an alarm. For this to be effective, staff would have to make sure the CCTV is being monitored at alltimes, making the staff experience with this very different to the experienceofusing a DDS falling under the first definition. It is important to distinguishwhat exactly constitutes a DDS as there are different areas of responsibility required from different actors involved in the effective operation of DDS, which will be examined in chapter 4. For this literature review, research has focused on the definition used by the ISO and other sources that incorporate all three elements of surveillance, detection and alarm raising.

2.1 Existing Problem

Whilst literature on DDS mostly agrees on areas such as the risks and issues associated with DDS performance, there are other areas where sources offer differing points of view, for example, DDS and their co- existence with lifeguards. There is debate around whether DDS can be helpful or harmful towards lifeguarding practices and how DDS may changethe landscape of traditional lifeguarding, as well as some disagreement on whether they serve as justification for reducing lifeguard numbers. The term 'blended lifeguarding' or 'modern lifeguarding' has been newly coined to describe the concept of traditional lifeguarding practices being blended withtechnology for drowning detection (Swimming Pool Scene, 2017).

Currently, there is little qualitative or quantitative research analysing the experiences of lifeguards themselves relating to this concept.

2.2 References

[1] AngelEye. (2019). AngelEye – Distributors. Retrieved from: https://www.angeleye.it/news. php?id=28&newscat=10

[2] Aquatics International. (2007). Traumatic Experiences – Should we make our youngest lifeguards come face to face with death? Retrieved from: https://www.aquaticsintl.com/facilities/traumaticexperiences_o

[3] British Standards Institution. (2018). BS EN 15288-1, Swimming pools for public use. Safety requirements for design. Retrieved from: https://shop.bsigroup.com/ProductDetail/?pid=000000000030360254

[4] British Standards Institution 1. (2018). BS EN 15288-2, Swimming pools for public use. Safety requirements for operation. Retrieved from: https://shop.bsigroup.com/ProductDetail/?p id=000000000030360257

[5] Drowning Prevention. (2017). The Need. Retrieved from: https://www.drowningprevention.com.au/

[6] German Institute for Standardization. (2019). German national guideline DGfdB R 94.15 "Test methods for camera-based drowning detection systems under operational conditions" (German Association for Public Swimming Pools).

[7] Haizhou Li, Haizhou Li, Kar-Ann Toh and Liyuan Li. (2012). Advanced Topics in Biometrics, World Scientific Publishing Co. Pte. Ltd., ISBN-13 978-981-4287-84-5

[8] Health and Safety Executive. (2018). HSG179, Health and safety in swimming pools (Fourth edition)

[9] ISO (2017) ISO_20380, First edition, Public swimming pools — Computer vision systems for the detection of drowning accidents in swimming pools — Safety requirements and test methods.

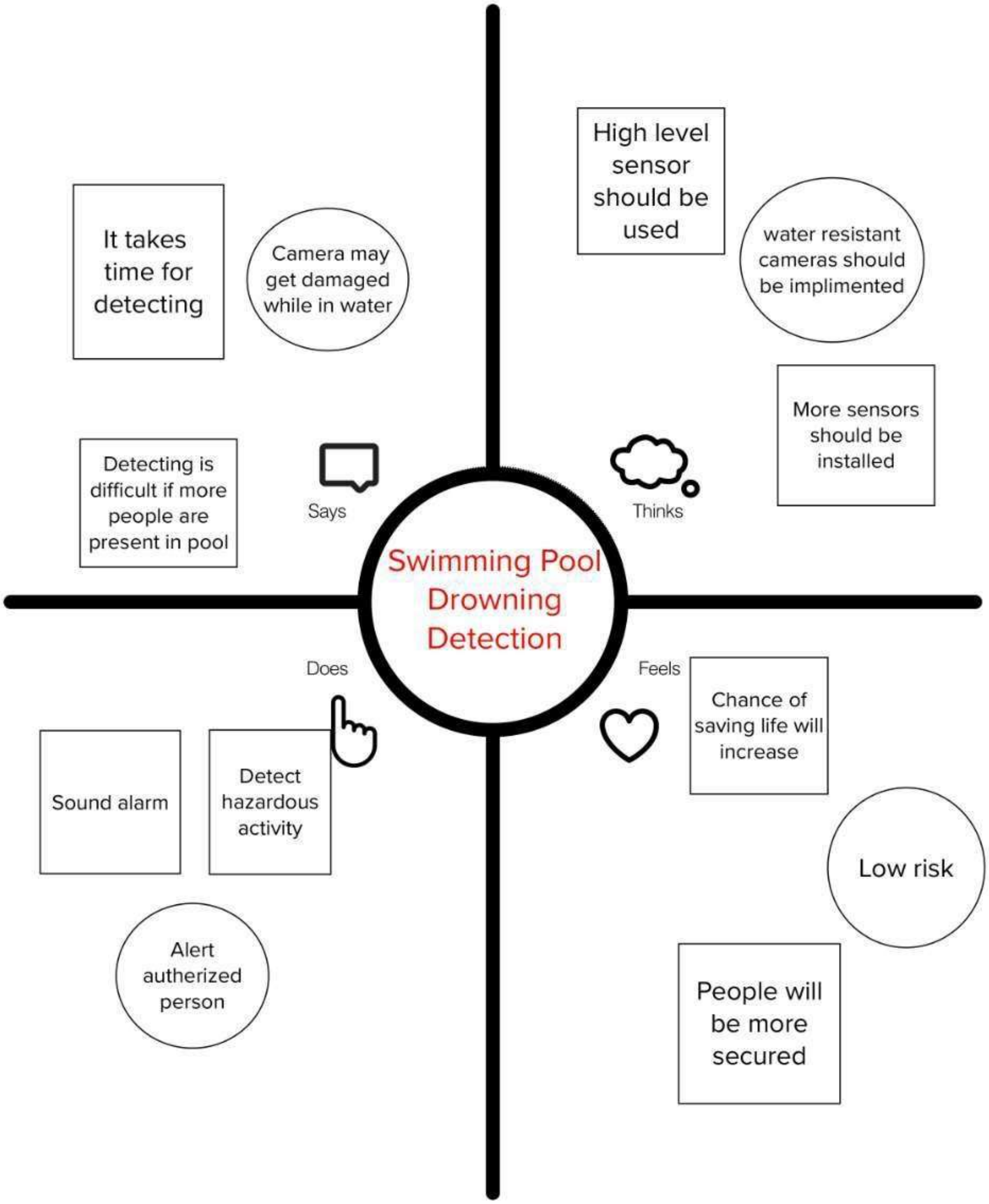
2.3 PROBLEM STATEMNET DEFINITION

1. Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in hotels.

2. Applying the CNN algorithm to the dataset.Beginners, especially, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident.

3. To overcome this conflict, a meticulous system is to be implemented along the swimming pools to save human life.

Empathy Map 2



Swimming Pool Drowning Detection

Says

It takes time for detecting

Camera may get damaged while in water

Detecting is difficult if more people are present in pool

Thinks

High level sensor should be used

water resistant cameras should be implimented

More sensors should be installed

Does

Sound alarm

Detect hazardous activity

Alert autherized person

Feels

Chance of saving life will increase

Low risk

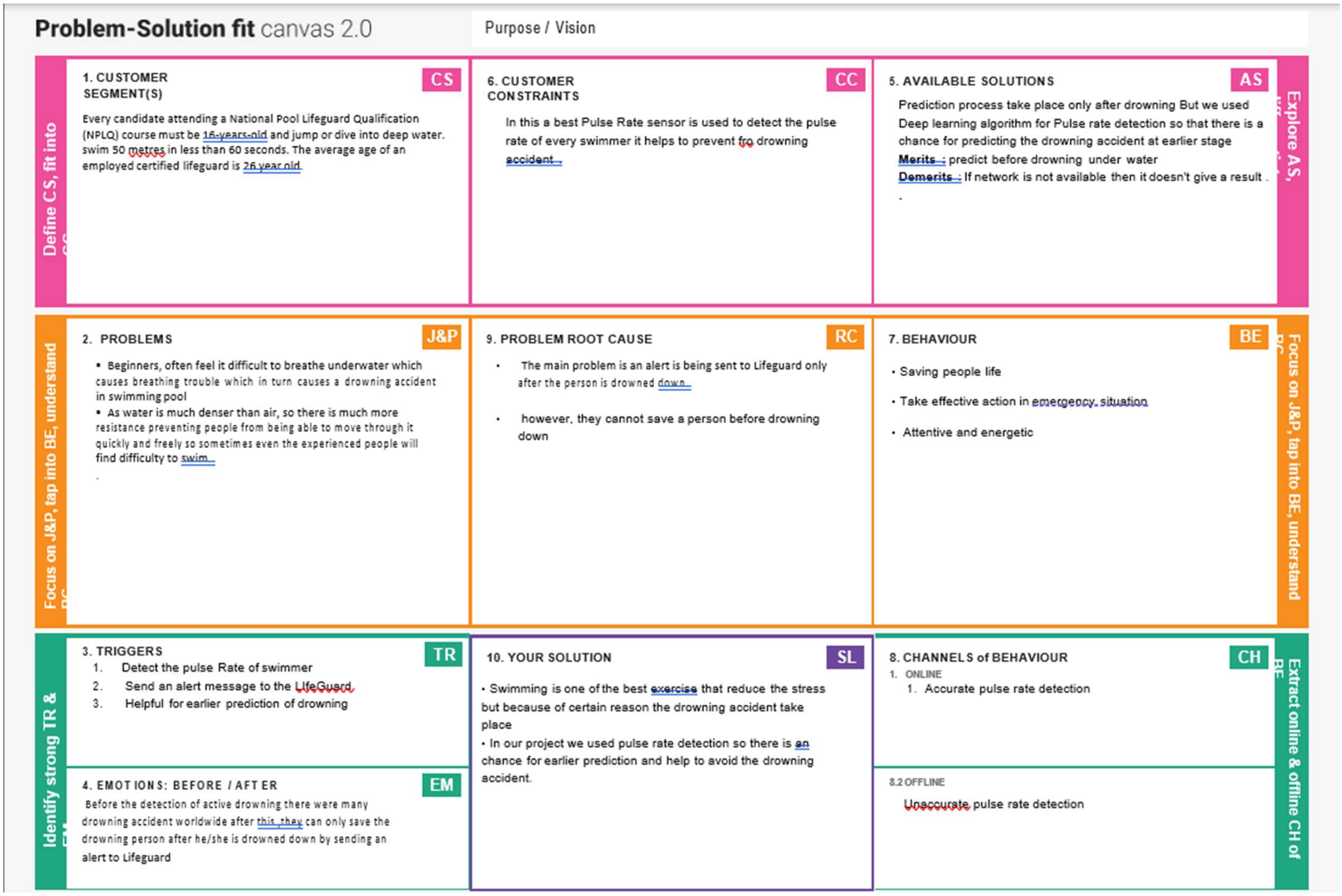
People will be more secured

Proposed Solution

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	**Problem Statement (Problem to be solved)**	VirtualEye - LifeGuard for Swimming Pools To Detect Active Drowning.
2.	**Idea / Solution description**	Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in hotels, and weekend tourist spots and barely people have them in their house backyard. Beginners, especially, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident so In This is project a Accurate Pulse Rate of every individual swimmer is also detected and sended as signal to the LifeGuard through alert message so it help LifeGuard to do earlier prediction of a swimmer pulse rate is reduced or increased By doing this they can get alert in advance and can save more then one person from Drowning.
3.	**Novelty / Uniqueness**	Accurate pulse rate detection using Deep learning.
4.	**Social Impact / Customer Satisfaction**	In case of an incident it is possible to extract and store not only the videos but also Pulse rate of a victim so it will be usefull to indentify the reason behind his/her drowness.
5.	**Business Model (Revenue Model)**	Can generate revenue from direct customers,like Lifeguard and collaborate with maritime sector and other swimming pool authorities.
6.	**Scalability of the Solution**	Deep learning Algorithm for the Pulse rate detection : It helps the LifeGuard for earlier prediction of drowning along with the Reason behind his/herdrowning.

Problem Solution Fit


Define CS, fit into
Explore AS,
Focus on J&P, tap into BE, understand
Focus on J&P, tap into BE, understand
Identify strong TR &
Extract online & offline CH of
CS
CC
AS
J&P
RC
BE
TR
EM
SL
CH

Problem-Solution fit canvas 2.0

Purpose / Vision

1. CUSTOMER SEGMENT(S)

Every candidate attending a National Pool Lifeguard Qualification (NPLQ) course must be 16-years-old and jump or dive into deep water. swim 50 metres in less than 60 seconds. The average age of an employed certified lifeguard is 26 year old.

6. CUSTOMER CONSTRAINTS

In this a best Pulse Rate sensor is used to detect the pulse rate of every swimmer it helps to prevent fro drowning accident .

5. AVAILABLE SOLUTIONS

Prediction process take place only after drowning But we used Deep learning algorithm for Pulse rate detection so that there is a chance for predicting the drowning accident at earlier stage

Merits : predict before drowning under water

Demerits : If network is not available then it doesn't give a result .

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2. PROBLEMS

- Beginners, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident in swimming pool
- As water is much denser than air, so there is much more resistance preventing people from being able to move through it quickly and freely so sometimes even the experienced people will find difficulty to swim .

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9. PROBLEM ROOT CAUSE

- The main problem is an alert is being sent to Lifeguard only after the person is drowned down .
- however, they cannot save a person before drowning down

7. BEHAVIOUR

- Saving people life
- Take effective action in emergency. situation
- Attentive and energetic

3. TRIGGERS

1. Detect the pulse Rate of swimmer
2. Send an alert message to the LIfeGuard
3. Helpful for earlier prediction of drowning

4. EMOTIONS: BEFORE / AFTER

Before the detection of active drowning there were many drowning accident worldwide after this, they can only save the drowning person after he/she is drowned down by sending an alert to Lifeguard

10. YOUR SOLUTION

- Swimming is one of the best exercise that reduce the stress but because of certain reason the drowning accident take place
- In our project we used pulse rate detection so there is an chance for earlier prediction and help to avoid the drowning accident.

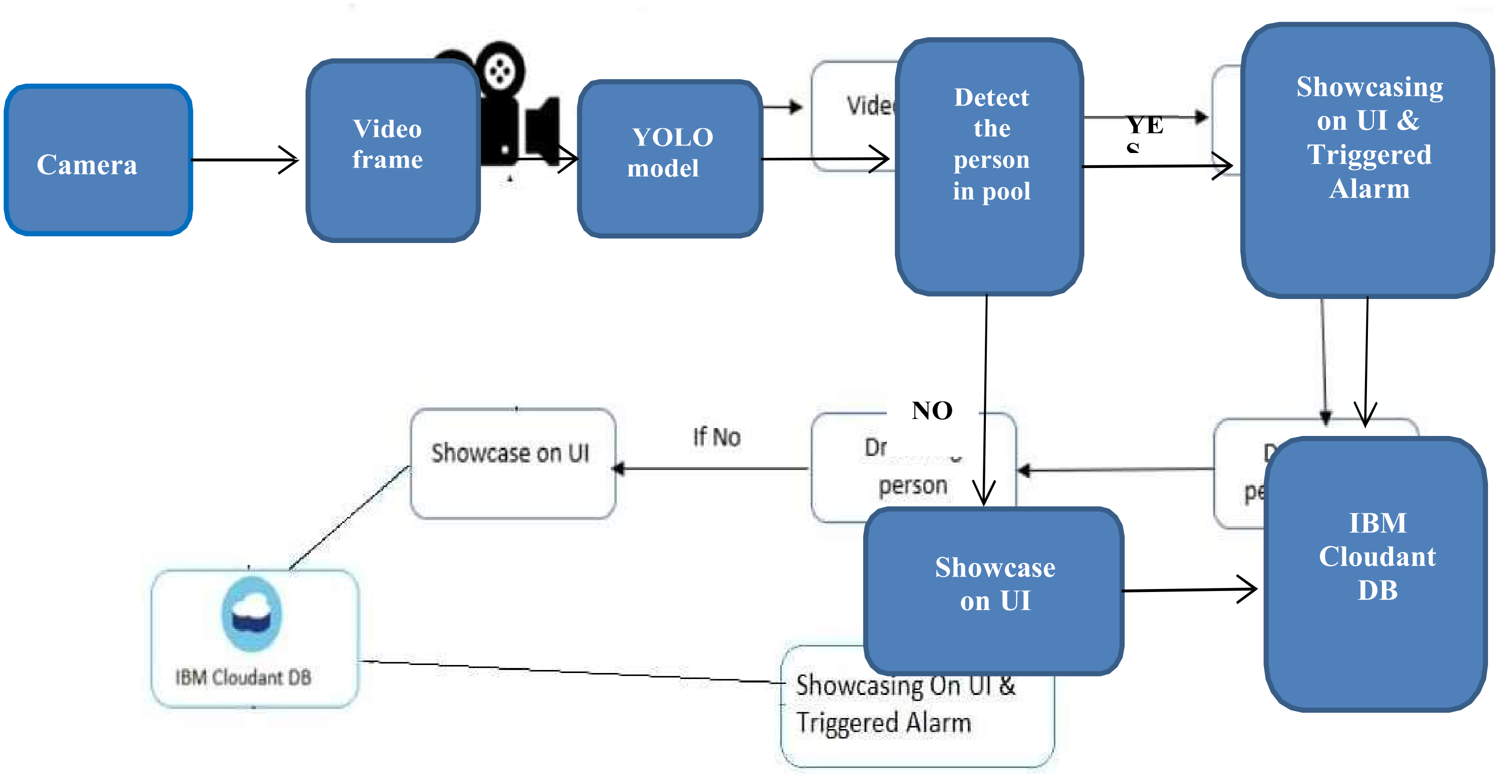
8. CHANNELS of BEHAVIOUR

1. ONLINE
   1. Accurate pulse rate detection

8.2 OFFLINE

Unaccurate pulse rate detection

Technical Architecture



Solution Architecture

Solution Requirements

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Installation	Needed to be fixed under the water without creating any disturbance to the people in the swimming pool.
FR-2	Deduction	Either horrified or in unconscious
FR-3	Audio	Ask for help or stay quiet if the person is unconscious
FR-4	Support	Take swim tubes or take the help of rescuer
FR-5	Prior Alert	Send alert message to the lifeguard

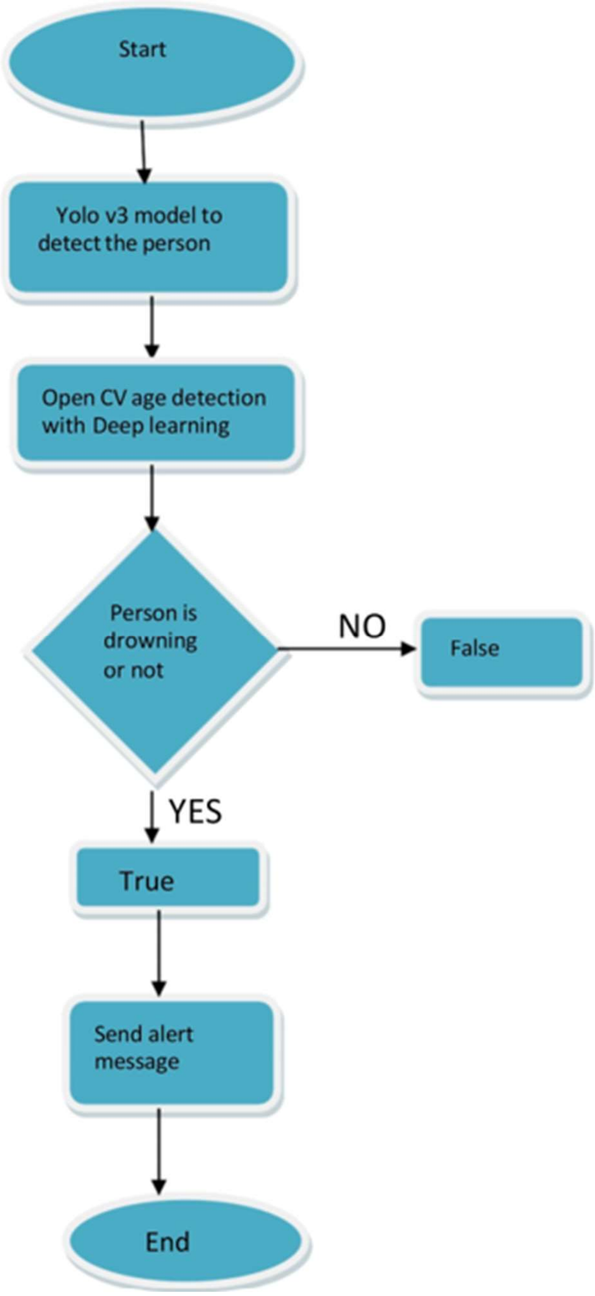
Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	To ensure the safety of each and every personpresent in the pool. A Lifeguard should bepresent all the time in the pool.

NFR-2	**Security**	Lifeguards should be aware of the alertmessage 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.

DATA FLOW DIAGRAM


Start
Yolo v3 model to detect the person
Open CV age detection with Deep learning
Person is drowning or not
NO
False
YES
True
Send alert message
End

PROJECT MILESTONE

S.NO	MILESTONE	DESCRIPTION	DURATION
1	Prerequisites	Prerequisites are all the needs at the requirement leve needed for the execution of the different phases of a project.	1 WEEK
2	Create & Configure IBM cloud services	IBM Cloud provides solutions that enable higher levels of compliance, security, and management, with proven architecture patterns and methods for rapid delivery for running mission-critical workloads.	1 WEEK
3	Develop the python script	A Python script is a set of commands included in a file that is intended to be run similarly to a program. The concept is that the file wi run or performed from the command line or from within a Python interactive shell to perform a particular activity. Of course, the file includes methods and imports different modules.	3 WEEKS
4	Develop web application	A web application (or web app) is application software that runs in a web browser, unlike software programs that run locally and natively on the operating system (OS) of the device.	1 WEEK

5	Ideation phase	Ideation is the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brain writing, Worst Possible Idea, and a wealth of other ideation techniques.	1 WEEK
6	Project design phases	Project design is an early phase of a project where the project's key features, structure, criteria for success, and major deliverables are planned out. The aim is to develop one or more designs that can be used to achieve the desired project goals.	1 WEEK
7	Project planning phase	In the Planning Phase, the Project Manager works with the project team to create the technical design, task list, resource plan, communications plan, budget, and initial schedule for the project, and establishes the roles and responsibilities of the project team and its stakeholders.	1 WEEK
8	Project development phase	Project development is the process of planning and allocating resources to fully develop a project or product from concept to go-live.	4 WEEKS

Project Planning (Product Backlog, Sprint Planning, Stories, Story points)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a lifeguard , I can registerfor the application by entering my email, password, and confirming my password.	2	High	Muhammed Rafeeq K Abin P Shahsal Mohammed Prasanth D Durairaj P
Sprint-1	User Confirmation	USN-2	As a lifeguard, I will Receive confirmation email once I have registered for the application	1	Medium	Muhammed Rafeeq K Abin P Shahsal Mohammed Prasanth D Durairaj P
Sprint-1	Login	USN-3	As a lifeguard , I can log into the application by entering email& password	2	High	Muhammed Rafeeq K Abin P Shahsal Mohammed Prasanth D Durairaj P
	Cloudant DB	USN-1	Create DB	2	High	Muhammed Rafeeq K Abin P Shahsal Mohammed Prasanth D Durairaj P

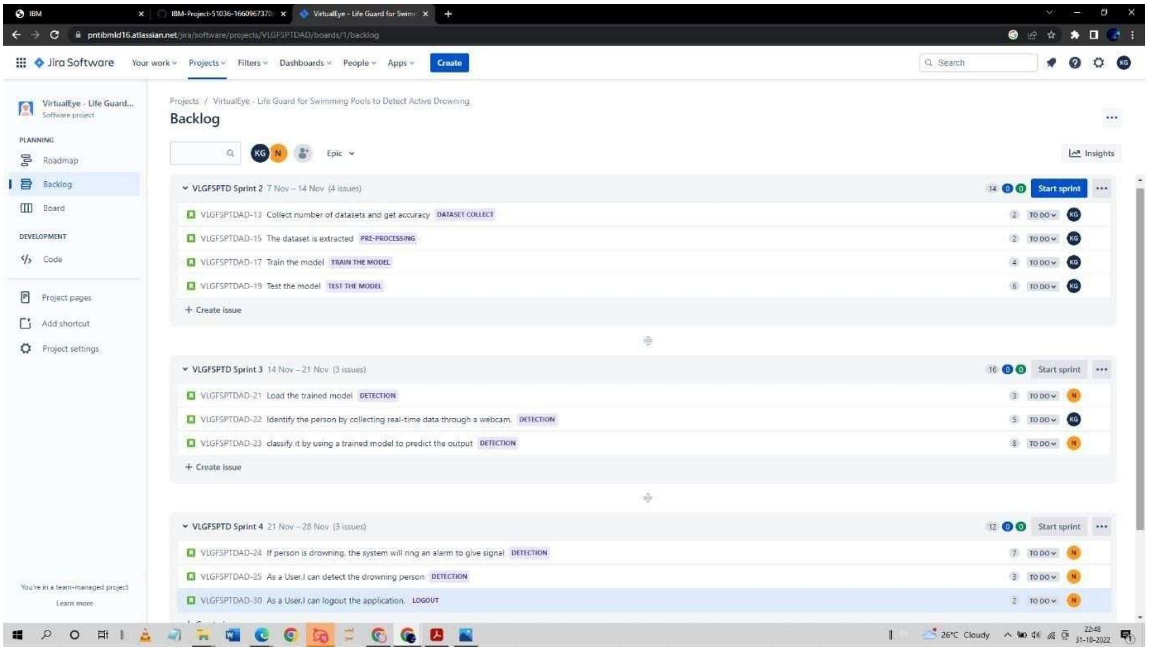
Sprint-3	Coding (Accessing datasets)	USN-1	Coding is a set of instructions used to manipulate information so that a certain input results ina particular output.	2	High	Muhammed Rafeeq K Abin P Shahsal Mohammed Prasanth D Durairaj P
Sprint-4	Application building	USN-1	As a Lifeguard , It will show the current Information of the swimming pool	1	Medium	Muhammed Rafeeq K Abin P Shahsal Mohammed Prasanth D Durairaj P

Project Tracker, Velocity & Burndown Chart

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

6.1 REPORT FROM JIRA

Backlog (scrum)



Projects / VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning

Backlog

VLGFSPTD Sprint 2 7 Nov – 14 Nov (4 issues) 14 0 0

Issue	Summary	Epic	Points	Status	Assignee
VLGFSPTDAD-13	Collect number of datasets and get accuracy	DATASET COLLECT	2	TO DO	KG
VLGFSPTDAD-15	The dataset is extracted	PRE-PROCESSING	2	TO DO	KG
VLGFSPTDAD-17	Train the model	TRAIN THE MODEL	4	TO DO	KG
VLGFSPTDAD-19	Test the model	TEST THE MODEL	6	TO DO	KG

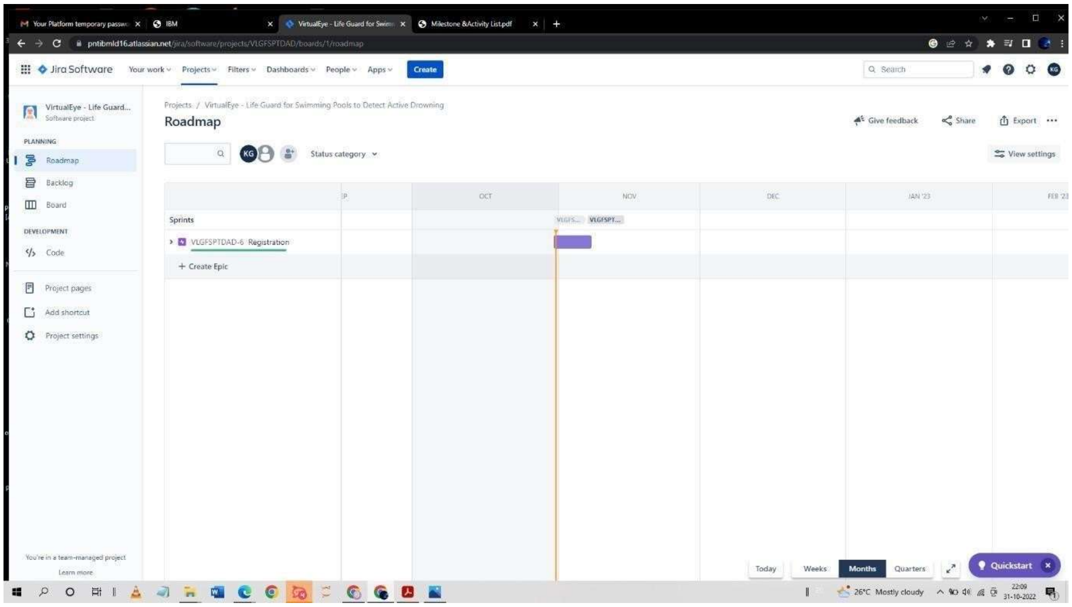
VLGFSPTD Sprint 3 14 Nov – 21 Nov (3 issues) 16 0 0

Issue	Summary	Epic	Points	Status	Assignee
VLGFSPTDAD-21	Load the trained model	DETECTION	3	TO DO	N
VLGFSPTDAD-22	Identify the person by collecting real-time data through a webcam.	DETECTION	5	TO DO	KG
VLGFSPTDAD-23	classify it by using a trained model to predict the output	DETECTION	8	TO DO	N

VLGFSPTD Sprint 4 21 Nov – 28 Nov (3 issues) 12 0 0

Issue	Summary	Epic	Points	Status	Assignee
VLGFSPTDAD-24	If person is drowning, the system will ring an alarm to give signal	DETECTION	7	TO DO	N
VLGFSPTDAD-25	As a User,I can detect the drowning person	DETECTION	3	TO DO	N
VLGFSPTDAD-30	As a User,I can logout the application.	LOGOUT	2	TO DO	N

Roadmap

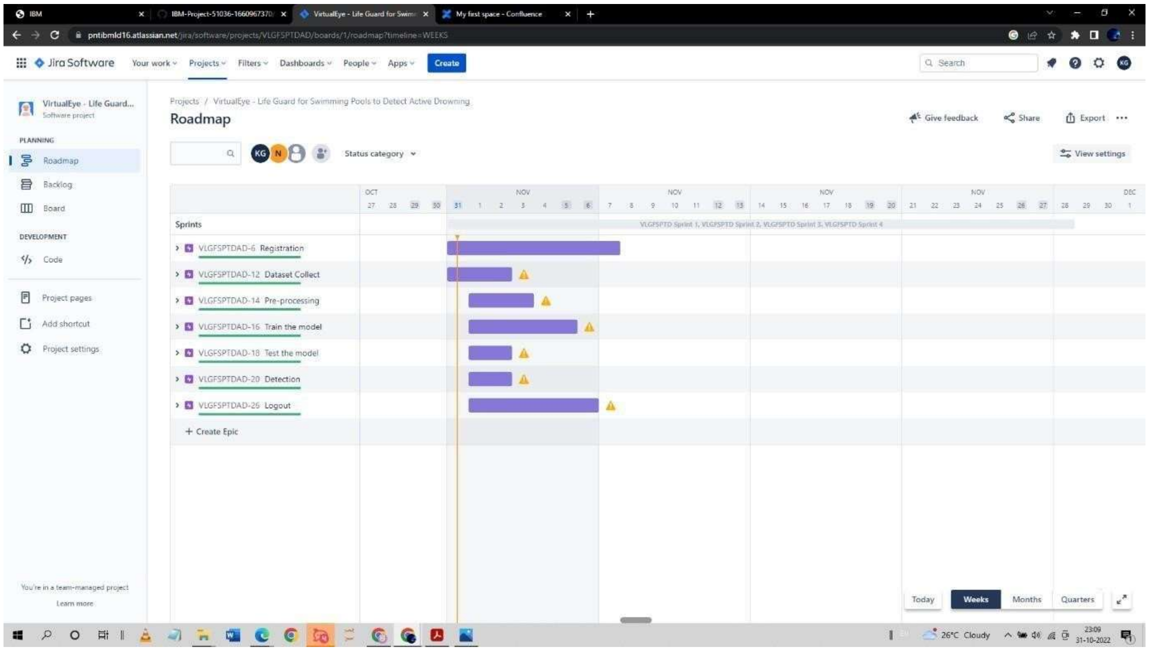


Projects / VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning

Roadmap

VLGFSPTDAD-6 Registration

Chart



VLGFSPTDAD-6 Registration

VLGFSPTDAD-12 Dataset Collect

VLGFSPTDAD-14 Pre-processing

VLGFSPTDAD-16 Train the model

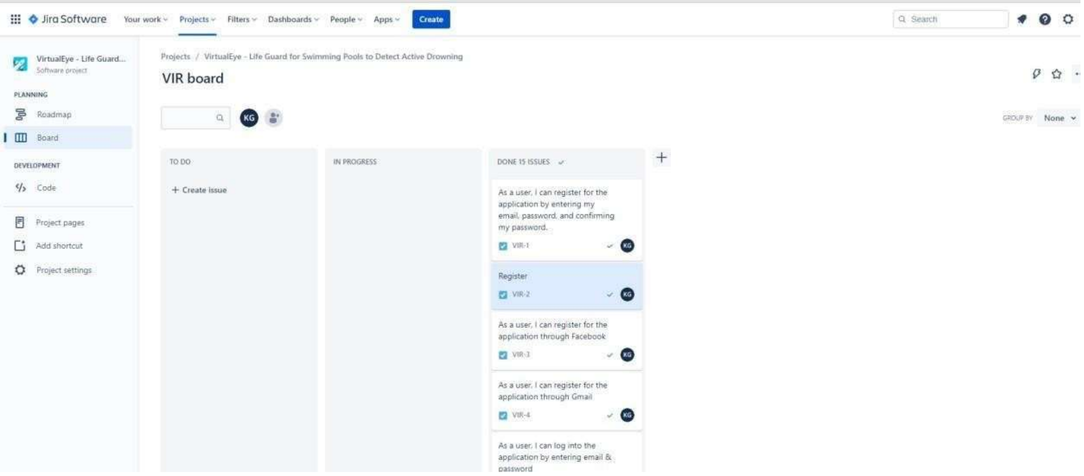
VLGFSPTDAD-18 Test the model

VLGFSPTDAD-20 Detection

VLGFSPTDAD-26 Logout

+ Create Epic

Board (Kanban)



As a user, I can register for the application by entering my email, password, and confirming my password.

☑ VIR-1 ✓ KG

Register

☑ VIR-2 ✓ KG

As a user, I can register for the application through Facebook

☑ VIR-3 ✓ KG

As a user, I can register for the application through Gmail

☑ VIR-4 ✓ KG

As a user, I can log into the application by entering email & password

CHAPTER-7

7. CODING & SOLUTION

7.1 FEATURE 1

```
[net]
# Testing#
batch=1
# subdivisions=1#
Training batch=64
subdivisions=16
width=608 height=608
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decay=0.0005 angle=0
saturation = 1.5
exposure = 1.5hue=.1

learning_rate=0.01
burn_in=1000 max_batches =
500200policy=steps
steps=400000,450000
scales=.1,.1

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# Downsample

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activation=leaky

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activation=leaky

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activation=leaky
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activation=linear#

Downsample

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activation=leaky

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activation=leaky

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activation=leaky

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activation=leaky

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activation=leaky

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```
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pad=1
activation=leaky

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activation=leaky

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activation=linear


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Downsample

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filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
```

```
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[shortcut]from=-
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activation=linear


[convolutional]
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filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
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activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
```

```
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
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activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=1024 size=3
```

```
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
```

```
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

######################

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
```

```
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 6,7,8
anchors = 10,13,  16,30,  33,23,  30,61,   62,45,   59,119,   116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1


[route] layers = -4

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 61



[convolutional]
```

```
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 3,4,5
```

```
anchors = 10,13,  16,30,  33,23,  30,61,   62,45,   59,119,   116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1



[route] layers = -4

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 36



[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1
```

```
pad=1 filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 0,1,2
anchors = 10,13,  16,30,  33,23,  30,61,   62,45,   59,119,   116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1
random=1
```

7.2 FEATURE 2

```
#import necessary packagesimport
cv2
import os
import numpy as np
from .utils import download_file

initialize = Truenet
= None
dest_dir = os.path.expanduser('~') + os.path.sep + '.cvlib' + os.path.sep + 'object_detection' +os.path.sep + 'yolo' +
os.path.sep + 'yolov3'
classes = None
#colors are BGR instead of RGB in python
COLORS = [0,0,255], [255,0,0]

def populate_class_labels():

    #we are using a pre existent classifier which is more reliable and more efficient than one#we could make
    using only a laptop
    #The classifier should be downloaded automatically when you run this scriptclass_file_name =
    'yolov3_classes.txt'
    class_file_abs_path = dest_dir + os.path.sep + class_file_name
    url = 'https://github.com/Nico31415/Drowning-Detector/raw/master/yolov3.txt'if not
    os.path.exists(class_file_abs_path):
        download_file(url=url, file_name=class_file_name, dest_dir=dest_dir)f =
    open(class_file_abs_path, 'r')
    classes = [line.strip() for line in f.readlines()]

    return classes


def get_output_layers(net)
```

```
#the number of output layers in a neural network is the number of possible#things the network
can detect, such as a person, a dog, a tie, a phone... layer_names = net.getLayerNames()

    output_layers = [layer_names[i[0] - 1] for i in net.getUnconnectedOutLayers()]

    return output_layers


  def draw_bbox(img, bbox, labels, confidence, Drowning, write_conf=False):

    global COLORS
    global classes

    if classes is None:
        classes = populate_class_labels()

    for i, label in enumerate(labels):

        #if the person is drowning, the box will be drawn red instead of blueif label ==
        'person' and Drowning:
            color = COLORS[0] label
            = 'DROWNING'
        else:
            color = COLORS[1]

        if write_conf:
            label += ' ' + str(format(confidence[i] * 100, '.2f')) + '%'
    #you only need to points (the opposite corners) to draw a rectangle. These points#are stored in the
    variable bbox
    cv2.rectangle(img, (bbox[i][0],bbox[i][1]), (bbox[i][2],bbox[i][3]), color, 2)

    cv2.putText(img, label, (bbox[i][0],bbox[i][1]-10), cv2.FONT_HERSHEY_SIMPLEX, 0.5, color, 2)

return img

                    def detect_common_objects(image, confidence=0.5, nms_thresh=0.3):

Height, Width = image.shape[:2]scale =
0.00392


global classes
global dest_dir

#all the weights and the neural network algorithm are already preconfigured#as we are using
YOLO

#this part of the script just downloads the YOLO files
config_file_name = 'yolov3.cfg'
config_file_abs_path = dest_dir + os.path.sep + config_file_name

weights_file_name = 'yolov3.weights'
                      weights_file_abs_path = dest_dir + os.path.sep + weights_file_name

url = 'https://github.com/Nico31415/Drowning-Detector/raw/master/yolov3.cfg'

if not os.path.exists(config_file_abs_path):
    download_file(url=url, file_name=config_file_name, dest_dir=dest_dir)
```

```
url = 'https://pjreddie.com/media/files/yolov3.weights'

if not os.path.exists(weights_file_abs_path):
    download_file(url=url, file_name=weights_file_name, dest_dir=dest_dir)



global initialize
global net

if initialize:
    classes = populate_class_labels()
    net = cv2.dnn.readNet(weights_file_abs_path, config_file_abs_path)initialize = False

blob = cv2.dnn.blobFromImage(image, scale, (416,416), (0,0,0), True, crop=False)

net.setInput(blob)

outs = net.forward(get_output_layers(net))

class_ids = []
confidences = []
boxes = []

for out in outs:
    for detection in out: scores =
        detection[5:]
        class_id = np.argmax(scores)
        max_conf = scores[class_id] if
        max_conf > confidence:
            center_x = int(detection[0] * Width) center_y =
            int(detection[1] * Height)w = int(detection[2] * Width)
            h = int(detection[3] * Height)x = center_x - w / 2
            y = center_y - h / 2 class_ids.append(class_id)
            confidences.append(float(max_conf))boxes.append([x, y, w, h])


indices = cv2.dnn.NMSBoxes(boxes, confidences, confidence, nms_thresh)

bbox = []label = []conf =
[]

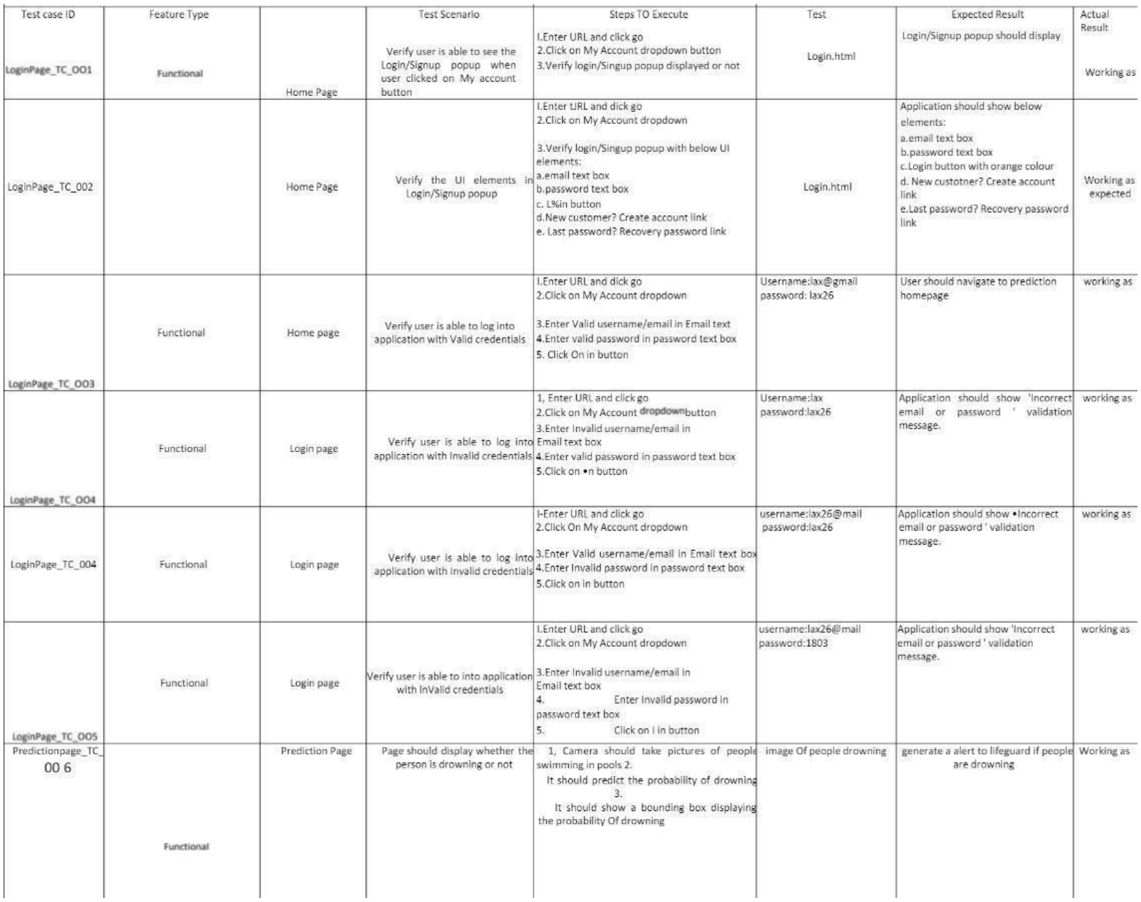
for i in indices:
    i = i[0]
    box = boxes[i]x = box[0]
    y = box[1] w = box[2]h =
    box[3]
    bbox.append([round(x), round(y), round(x+w), round(y+h)])
    label.append(str(classes[class_ids[i]])) conf.append(confidences[i])

return bbox, label, conf
```

CHAPTER-8

8. TESTING

8.1 TEST CASES



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

8.2 USER ACCEPTANCE TESTING

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	7	3	1	2	13
Duplicate	1	0	2	0	3
External	2	3	0	1	6
Fixed	10	2	4	10	26
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

Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	1	0	0	41
Security	42	0	0	42
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

CHAPTER-9

RESULT

PERFORMANCE METRICS

```
<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.js">

    </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>
           </div>
           </div>
</div>
</body>



<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>
     Swimming is one of the best exercises that helps people to reduce stress in
this urban lifestyle. Swimming pools are found larger in number in the hotels,
weekend tourist spots and barelypeople have in their house backyard. Beginners,
especially oftenfeel it difficult to breathe under water and causes breathing
trouble which in turn cause a drowning accident. Worldwide, drowning produces
a higher rate of mortality without causing injury to children. Children under six
of their age are found to besuffering the highest drowning mortality rates
worldwide..Such kinds of deaths account for the third cause of unplanned death
globally, with about 1.2 million cases yearly.

                    </p>
</div>
<div class="left">
        <h2>Solution:</h2>
        <p>
      To overcome the conflict, a meticulous system is to be implemented along the
swimming pools to save the human life. Bystudying body movement patterns and
connecting cameras to an artificial intelligence (AI)system we can devise an
underwater poolsafety system that reduces the risk of drowning. Usually such
systems can be developed by installing more than 16 cameras underwater and
ceiling and analysing the video feeds to detect any anomalies . but AS a POC we
make use of one camera that streams the video underwater and analyses the position
of
```

```
swimmers to assess the probability of drowning ,if it is higher thanan alert will be
generated to attract lifeguards attention.

</p>
</div>
</div>
<div class="bottom">
            <p ><b>
         Note : The system is not designed to replace a lifeguard or other human
monitor, but to act as an additional tool. â€œIt helpsthe lifeguard to detect the
underwater situation where they canâ€™t easily observe.
            </b></p>

      </div>
      </section>

<section id="footer">
         <p>Copyright Â© 2022. All Rights Reserved</p>
         <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+Condensed: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 forSwimming 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>
```

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barelypeople have in their house backyard. Beginners, especially oftenfeel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to besuffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

```
                            </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="ClickMe! For a
Demo">
                          </form>
                    </div>
                    <h5 style="text-color:Red">
                    <b style="text-color:Red">{{prediction}}<b>
                  </h5>
</div>
</div>
</section>



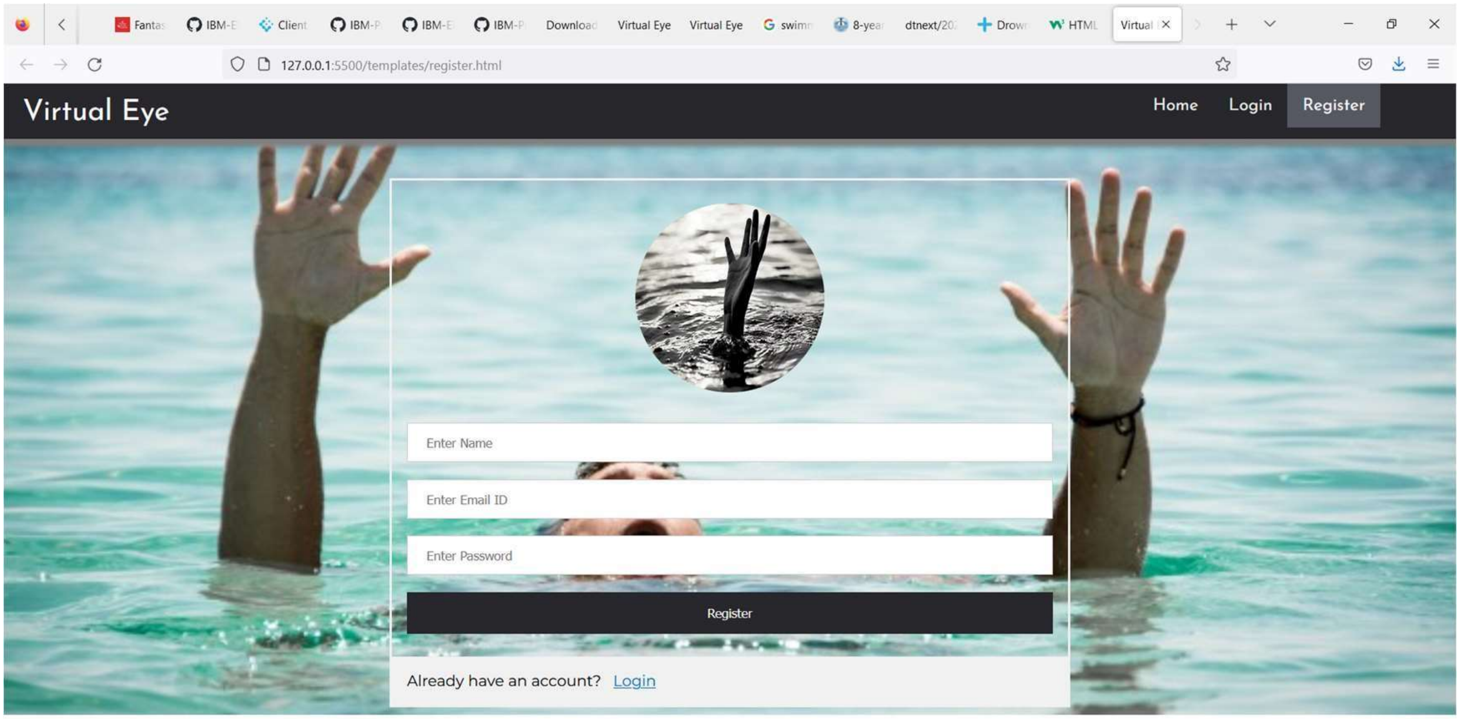
              </br></br>

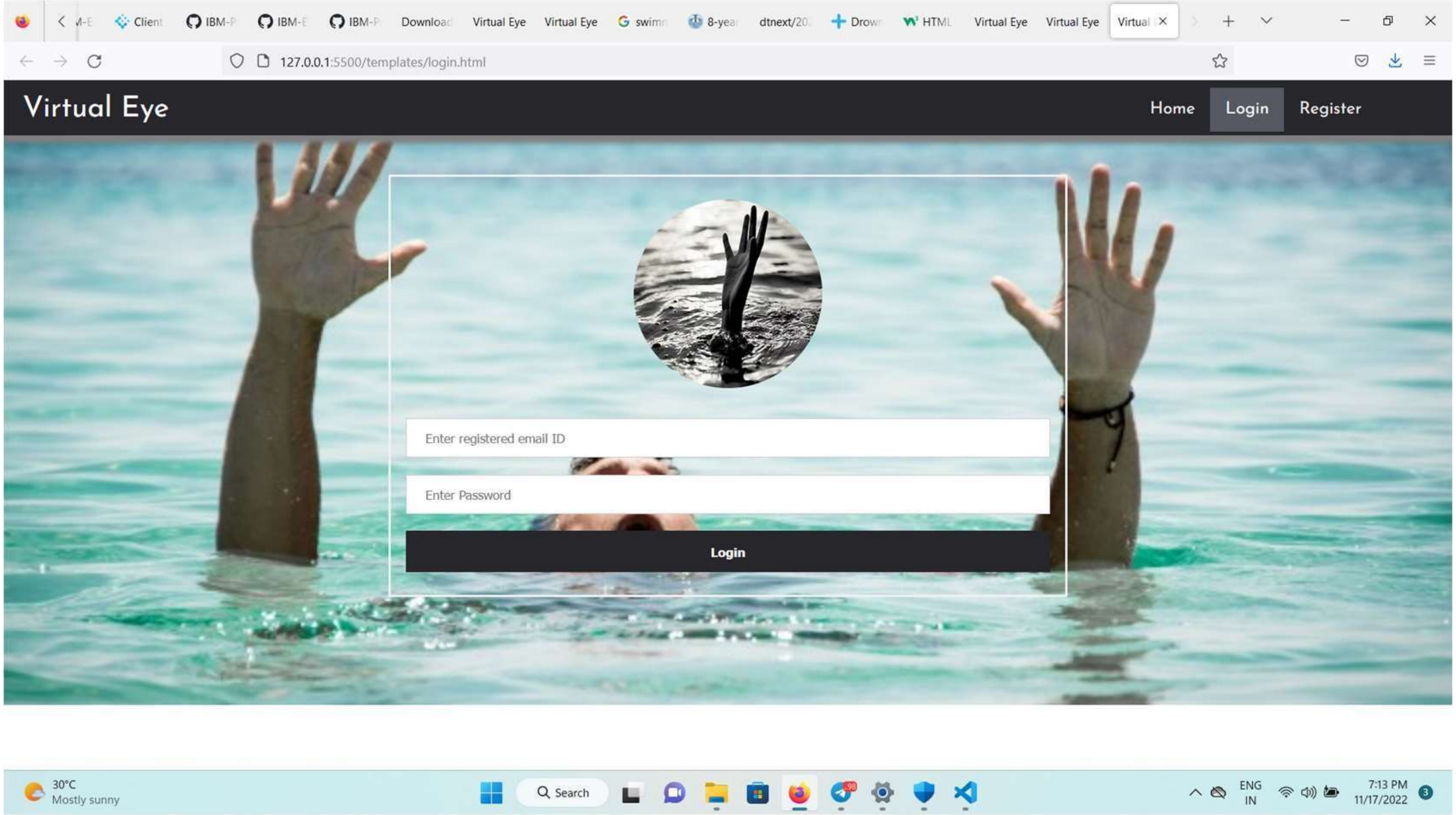


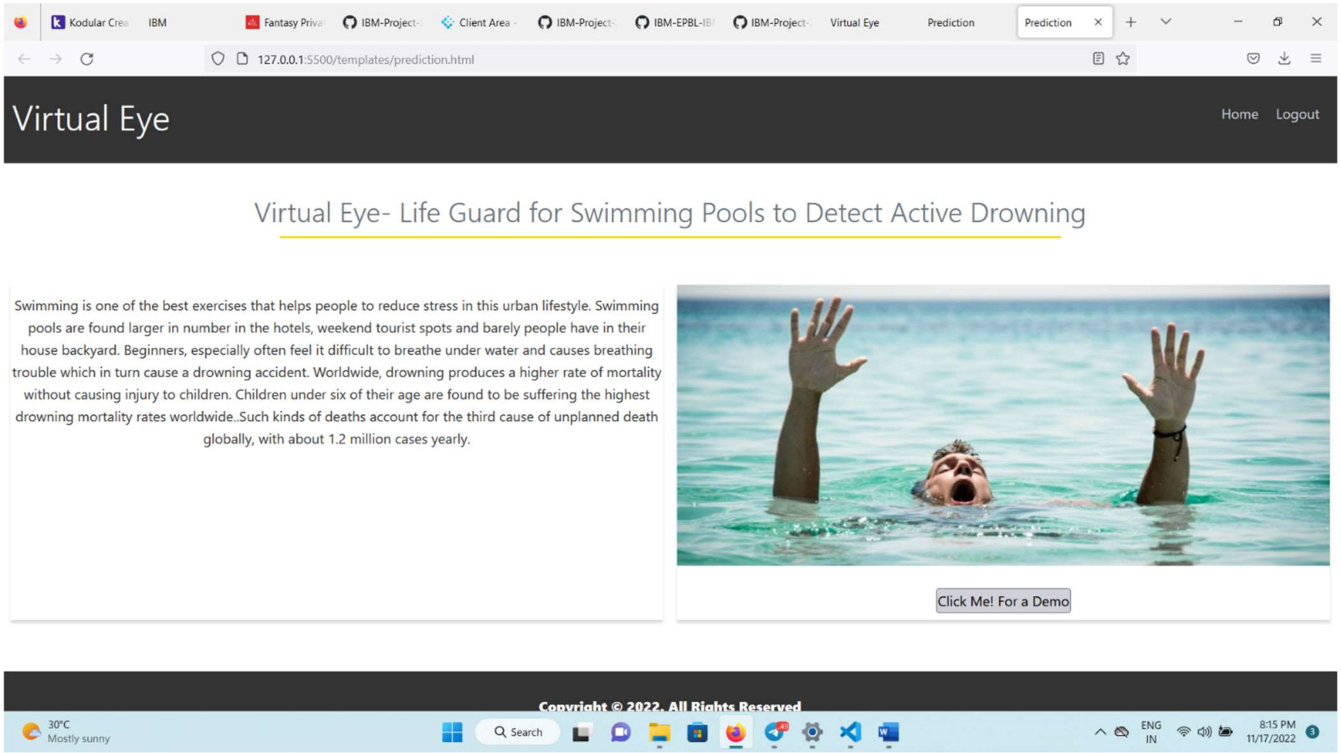
            <section id="footer">
                <p>Copyright Â© 2021. All Rights Reserved</p>

            </section>
</body>

</html>
```


127.0.0.1:5500/templates/register.html
Virtual Eye
Home
Login
Register
Enter Name
Enter Email ID
Enter Password
Register
Already have an account? Login


127.0.0.1:5500/templates/login.html
Virtual Eye
Home
Login
Register
Enter registered email ID
Enter Password
Login
30°C
Mostly sunny
Search
ENG
IN
7:13 PM
11/17/2022



Virtual Eye

Virtual Eye- Life Guard for Swimming Pools to Detect Active Drowning

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barely people have in their house backyard. Beginners, especially often feel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to be suffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

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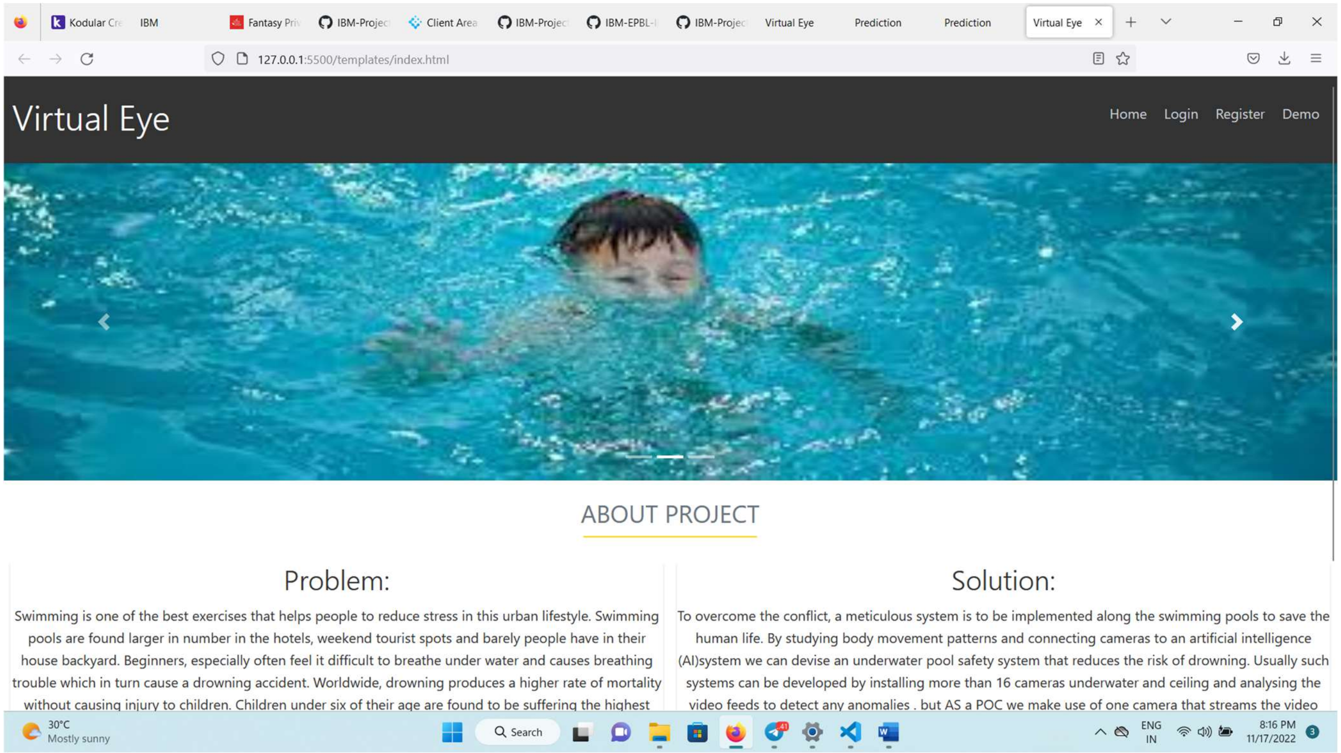

Virtual Eye

ABOUT PROJECT

Problem:

Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barely people have in their house backyard. Beginners, especially often feel it difficult to breathe under water and causes breathing trouble which in turn cause a drowning accident. Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to be suffering the highest

Solution:

To overcome the conflict, a meticulous system is to be implemented along the swimming pools to save the human life. By studying body movement patterns and connecting cameras to an artificial intelligence (AI)system we can devise an underwater pool safety system that reduces the risk of drowning. Usually such systems can be developed by installing more than 16 cameras underwater and ceiling and analysing the video feeds to detect any anomalies . but AS a POC we make use of one camera that streams the video

CHAPTER-10

9. ADVANTAGES & DISADVANTAGES

*ADVANTAGES:

(i) user feel comfortable and more secure

(ii) Children, adult, pet animal , old age people are used

(iii) spending more time for family, freedom for safety guards near the Swimming pool

(iv) Swimmers, resort are gain in the financal

(v) drowning should be monitored

*DISADVANTAGE:

(i) For uneducated people will suffer from this technology

(ii) Electricity will be required

(iii) Software and hardware requirement will need

CHAPTER-11

10. CONCLUSION

This section will draw from three core documents: ISO_20380, HSG179, and the recently published German guideline, DGfdB R 94.15. A summary of each is given, outlining the key messages they disseminate and what this means for those involved with DDS.

ISO_20380 This document focuses on the requirements for the installation, operation, maintenance and performance of DDS, the testing methods, and the information required from the supplier in the operating manual. These international standards do not apply to systems used in domestic pools or pools smaller than 150m2 .

Prior to the installation of any DDS, 'a technical study shall be carried out by the supplier in consultation with or based on information provided by the swimming pool's owner/operator'. This is to establish the quantity and positioning of the equipment making up the system such as cameras, central processing unit, alarm tools, and other related equipment. The technical study must also provide a technical drawing of the pool basin, showing areas of 'coverage' and 'non-coverage', as well as the minimum lighting levels required above and below the water surface for the DDS to operate within performance requirements. To carry out the study, a list of factors toconsider are given, outlining the variables that make each pool unique suchas the architecture, and alarm reception coverage area of mobile devices to be used with the system. With this information all in one document, the technical study can be used to help optimise performance of the system, andforms part of the contract between the supplier and the pool operator. The next area of the standard is the performance requirements. This outlines therequirements needed to pass the regular maintenance testing and performance requirements for normal operation. This section covers the alarm set off time for operational performance, which is to be 15 seconds orless and displayed on the system interface. It also states that the alarm set off time must be built-in and shall not be changeable by staff. The section also discusses the areas covered by the DDS and highlights that each trainedstaff member must be aware of these areas. Another coverage-related requirement is that the DDS must be able to temporarily create areas wheredetection is disabled, to manage specific activities such as rescue drills.

CHAPTER-12

FUTURE SCOPE

This lifeguard system consists of three main components, i.e., the drowning detection, the rescuing drone, and the hazardous activity detection. All three components combined will create a system capable of detecting drowning victims, dispatching an inflatable tube using a drone (as depicted in Fig.9) and detecting hazardous activities—eventually becoming an entity that could assist a lifeguard. The system is accessible to its primary user, presumably a pool owner or a lifeguard, in the form of an interface with a sound alarm and an android mobile service that holds the capabilities of receiving Firebase notifications. Confined with a few of the hardware limitations, such as the use of a single camera and the Jetson Nano at the presence of better-quality hardware, could affect the speed and accuracy of the overall system is becoming a state-of-theart.

This limitation could be omitted with the use of multiple cameras that could be placed over the premises in several ground coordinates, increasing the accuracy of the computer vision algorithms. Moreover, due to the inability to fly a drone in extreme weather conditions such as rain, strong winds or lightning, the systemis limited to be used under few specifications. As swimming in extreme weather conditions is not preferred either, the system could be further improved to emit a warning signal if a person was to swim in any of the above weather conditions, bypassing the need to fly the drone. Additionally, all the processing is done on the clientside of the applications on the Jetson Nano board, preventing any security and privacy issues that might arise due to the sensitive information inputted through the cameras. For future developments convenience wise, the system could benefit by having an additional set of cameras to identify and verify a drowning or a hazardous activity on the premises. Accessibility could also be improved by extending the Android service to be an application both in Android and iOS platforms that could hold the details of each premise individually, making a centralized system that watches over the decentralized pool premises. Both drown and hazardous activity detection could be improved by gathering a night time dataset that increases the accuracy of the data in low light.

CHAPTER-13

13. APPENDIX

(i) SOURCE CODE

```
[net]
# Testing#
batch=1
# subdivisions=1#
Training batch=64
subdivisions=16
width=608 height=608
channels=3
momentum=0.9
decay=0.0005 angle=0
saturation = 1.5
exposure = 1.5hue=.1

learning_rate=0.01
burn_in=1000 max_batches =
500200policy=steps
steps=400000,450000
scales=.1,.1

[convolutional]
batch_normalize=1
filters=32 size=3
stride=1
pad=1
activation=leaky

# Downsample

[convolutional]
batch_normalize=1
filters=64 size=3
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=32 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=64 size=3
stride=1
pad=1
activation=leaky
```

```
[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=128 size=3
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=64 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=64 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

# Downsample

[convolutional]
batch_normalize=1
```

```
filters=256size=3
stride=2 pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
```

```
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
```

```
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=512 size=3
stride=2
```

```
pad=1 activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
```

```
pad=1 activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
```

```
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear


[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear#

Downsample

[convolutional]
batch_normalize=1
filters=1024 size=3
```

```
stride=2
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
```

```
activation=leaky

[shortcut]from=-
3
activation=linear

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1
filters=1024 size=3
stride=1
pad=1
activation=leaky

[shortcut]from=-
3
activation=linear

######################

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
```

```
activation=leaky

[convolutional]
batch_normalize=1
filters=512 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=1024
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 6,7,8
anchors = 10,13,  16,30,  33,23,  30,61,   62,45,   59,119,   116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1


[route] layers = -4

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 61



[convolutional]
```

```
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]
batch_normalize=1
filters=256 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=512
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 3,4,5
```

```
anchors = 10,13,  16,30,  33,23,  30,61,   62,45,   59,119,   116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1random=1



[route] layers = -4

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[upsample]
stride=2

[route]
layers = -1, 36



[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1
```

```
pad=1 filters=256
activation=leaky

[convolutional]
batch_normalize=1
filters=128 size=1
stride=1
pad=1
activation=leaky

[convolutional]
batch_normalize=1size=3
stride=1 pad=1
filters=256
activation=leaky

[convolutional]size=1
stride=1
pad=1 filters=255
activation=linear


[yolo]
mask = 0,1,2
anchors = 10,13,  16,30,  33,23,  30,61,   62,45,   59,119,   116,90,
156,198, 373,326
classes=80
num=9 jitter=.3
ignore_thresh = .7
truth_thresh = 1
random=1
```

Source code(ii)

```
#import necessary packagesimport
cv2
import os
import numpy as np
from .utils import download_file

initialize = Truenet
= None
dest_dir = os.path.expanduser('~') + os.path.sep + '.cvlib' + os.path.sep + 'object_detection' +os.path.sep + 'yolo' +
os.path.sep + 'yolov3'
classes = None
#colors are BGR instead of RGB in python
COLORS = [0,0,255], [255,0,0]

def populate_class_labels():

    #we are using a pre existent classifier which is more reliable and more efficient than one#we could make
    using only a laptop
    #The classifier should be downloaded automatically when you run this scriptclass_file_name =
    'yolov3_classes.txt'
    class_file_abs_path = dest_dir + os.path.sep + class_file_name
    url = 'https://github.com/Nico31415/Drowning-Detector/raw/master/yolov3.txt'if not
    os.path.exists(class_file_abs_path):
        download_file(url=url, file_name=class_file_name, dest_dir=dest_dir)f =
    open(class_file_abs_path, 'r')
    classes = [line.strip() for line in f.readlines()]

    return classes


def get_output_layers(net)
```

```
#the number of output layers in a neural network is the number of possible#things the network
can detect, such as a person, a dog, a tie, a phone... layer_names = net.getLayerNames()

    output_layers = [layer_names[i[0] - 1] for i in net.getUnconnectedOutLayers()]

    return output_layers


  def draw_bbox(img, bbox, labels, confidence, Drowning, write_conf=False):

    global COLORS
    global classes

    if classes is None:
        classes = populate_class_labels()

    for i, label in enumerate(labels):

        #if the person is drowning, the box will be drawn red instead of blueif label ==
        'person' and Drowning:
            color = COLORS[0] label
            = 'DROWNING'
        else:
            color = COLORS[1]

        if write_conf:
            label += ' ' + str(format(confidence[i] * 100, '.2f')) + '%'
        #you only need to points (the opposite corners) to draw a rectangle. These points#are stored in the
        variable bbox
        cv2.rectangle(img, (bbox[i][0],bbox[i][1]), (bbox[i][2],bbox[i][3]), color, 2)

        cv2.putText(img, label, (bbox[i][0],bbox[i][1]-10), cv2.FONT_HERSHEY_SIMPLEX, 0.5, color, 2)

    return img

                def detect_common_objects(image, confidence=0.5, nms_thresh=0.3):

    Height, Width = image.shape[:2]scale =
    0.00392


    global classes
    global dest_dir


    #all the weights and the neural network algorithm are already preconfigured#as we are using
    YOLO


    #this part of the script just downloads the YOLO files
    config_file_name = 'yolov3.cfg'
    config_file_abs_path = dest_dir + os.path.sep + config_file_name

    weights_file_name = 'yolov3.weights'
                 weights_file_abs_path = dest_dir + os.path.sep + weights_file_name

    url = 'https://github.com/Nico31415/Drowning-Detector/raw/master/yolov3.cfg'

    if not os.path.exists(config_file_abs_path):
        download_file(url=url, file_name=config_file_name, dest_dir=dest_dir)
```

```
url = 'https://pjreddie.com/media/files/yolov3.weights'

if not os.path.exists(weights_file_abs_path):
    download_file(url=url, file_name=weights_file_name, dest_dir=dest_dir)



global initialize
global net

if initialize:
    classes = populate_class_labels()
    net = cv2.dnn.readNet(weights_file_abs_path, config_file_abs_path)initialize = False

blob = cv2.dnn.blobFromImage(image, scale, (416,416), (0,0,0), True, crop=False)

net.setInput(blob)

outs = net.forward(get_output_layers(net))

class_ids = []
confidences = []
boxes = []

for out in outs:
    for detection in out: scores =
        detection[5:]
        class_id = np.argmax(scores)
        max_conf = scores[class_id] if
        max_conf > confidence:
            center_x = int(detection[0] * Width) center_y =
            int(detection[1] * Height)w = int(detection[2] *
            Width)
            h = int(detection[3] * Height)x =
            center_x - w / 2
            y = center_y - h / 2 class_ids.append(class_id)
            confidences.append(float(max_conf))boxes.append([x, y,
            w, h])


indices = cv2.dnn.NMSBoxes(boxes, confidences, confidence, nms_thresh)

bbox    =    []
label    =    []
conf = []


for i in indices:
    i = i[0]
    box  =  boxes[i]x  =
    box[0]
    y = box[1] w =
    box[2]     h     =
    box[3]
    bbox.append([round(x),     round(y),     round(x+w),     round(y+h)])
    label.append(str(classes[class_ids[i]])) conf.append(confidences[i])


return bbox, label, conf
```

Github Link:

Link- Github

Demo link