KONGUNADU COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HX 8001-PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

VISUALIZING AND PREDICTING HEART DISEASES WITH AN INTERACTIVE DASH BOARD

NALAIYA THIRAN PROJECT REPORT 2022

Submitted by

HEMALA V	**621319106028**
BOOMIKA V.G	**621319106008**
JAYANTHI R	**621319106032**
KANIMOZHI D	**621319106033**

Team ID: PNT2022TMID13390

NOVEMBER 2022

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FINAL DELIVARABLE PROJECT
DOCUMENTATION

Date	11 November 2022
Team ID	PNT2022TMID13390
Project Name	VirtualEye-Lifeguard for Swimming Pools to Detect the Active Drowning

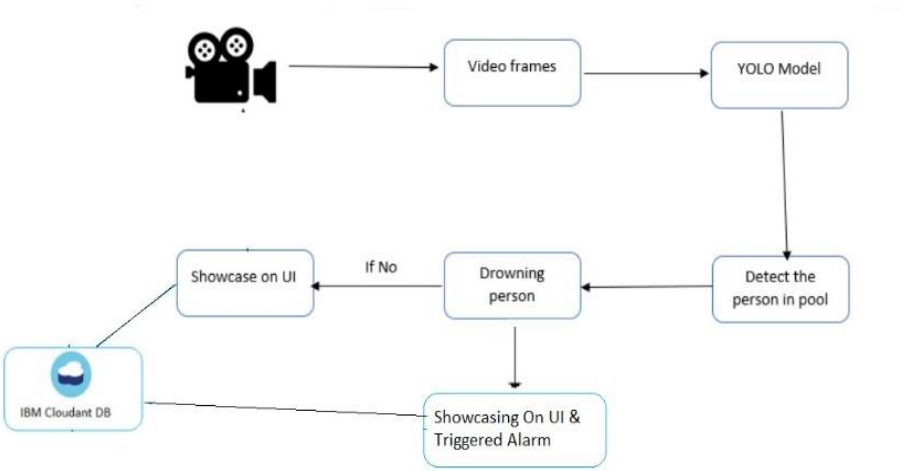
1. INTRODUCTION

1.1 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 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 than an alert will be generated to attract lifeguards' attention. 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. The live video stream from our underwater cameras is automatically monitored by our “state-of-the-art” object recognition software.

1.1 PROJECT OVERVIEW



1.2PURPOSE

>> 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. 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 analysing the video feeds to detect any anomalies.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

1. Visual search for drowning swimmers: Investigating the impact oflifeguarding experience

The various sub-processes considered above have been studied in a variety of applied settings including driving, airport security, and radiology Biggs & Mitroff, Crundall, Nodine. One under-researched area of application however is that of lifeguarding. Lifeguards have an important, but extremely difficult job of supervising swimmers in a pool or beach setting. This includes searching for any swimmers that may be experiencing distress or drowning in the water. Explicit practical training in visual search of a pool is not currently part of lifeguard training in the UK, though search techniques are discussed with trainees (e.g., how to monitor a particular "zone"). Beyond problems with limited training, the swimming environment makes scanning difficult due to factors such as heat, long periods on duty and a large overlap in drowning and swimming characteristics Griffiths & Griffiths, Lanagan-Leitzel, Skow, & Moore. While drowning in lifeguarded pools within the UK is incredibly rare, there are instances where supervision fails, resulting in injury or death. To prevent these fatal incidents, UK lifeguards are trained to recognize certain behaviours that are associated with drowning and distress.

2. The effect of lifeguard experience upon the detection of drowning victims in a real dynamic visual search task.

Drowning incidents are potentially severe but thankfully rare for most lifeguards. Due to the infrequency of drowning incidents, the visual search for such occurrences is challenging Lanagan-Leitzel, Skow, & Moore. The difficulties involved in detecting infrequent drowning targets are reflected in other areas of real-world visual search with uncommon target items, such as airport security screenings Biggs & Mitroff, Wolfe, Horowitz, & Kenner found low-prevalence targets (occurring on 1% of trials) were missed more frequently than high-prevalence targets (occurring on50% of trials), with error rates of 30% and 7% respectively. In regards to lifeguarding, visual search has been defined as observing part of an aquatic environment (beaches, pools and open water) and processing and assessing the events happening within that location Fenner, Leahy, Buhk, &Dawes. While this

definition suggests that the surveillance of the water is a fundamental and critical role of the lifeguard, there is relatively little focus on training in these areas Lanagan-Leitzel & Moore. This is reflected in the UK National Pool Lifeguard Qualification training manual with this limited focus on visual training, lifeguards may be underprepared for detecting struggling swimmers in a timely manner for most lifeguards.

3. Drowning behavior detection in swimming poolbased on deep learning

With the constant improvement of public swimming pool facilities, people in large numbers flock to the swimming pool. But drowning has become a concern when people enjoy the pleasure that comes with swimming . The reason for drowning is that beginners cannot breathe freely in the water,and it is difficult to maintain body balance. Swimmers who have mastered swimming skills will also drown when they suffer from sudden cramps and stress. At present, for the safety of natatoriums and outdoor swimming venues, some of the venues use conventional human supervision mode. Each swimming pool relies on 2–4 lifeguards to keep a close eye on the water surface to prevent and rescue drowning swimmers. However, this kind of super-vision model is not very reliable for the ability of lifeguards to deal with emergencies is weak, and the rescue speed of drowned swimmers is also very slow.

4. Characteristics and Function Analysis of Swimming Life Saving System Based on Machine VisionTechnology

Due to the limitation of human physiological conditions, it is difficult for lifeguardsto maintain high concentration for a long time. In addition, the reflection of light from the surface of the swimming pool will make lifeguards dizzy, and the swimming poolis often crowded with noisy environment. All the above reasons will lead to the fact that it is difficult for the rescuers to pay attention to the rescue actions of the drowning person on the water surface in case of drowning, and once the drowning person is submerged, it is more difficult to be detected. Swimming is a kind of sports with poor safety coefficient. It is far from enough to blindly pursue the improvement of swimming skills, so swimming should be analysed and explored as a system. Image is an image and vivid description of objective things, an intuitive and specific form of information expression, and the most important information carrier of human beings.As a part of the social system, life-saving swimming becomes a system. It is possible

to study it from the perspective of system theory. A system is an organic whole with certain structure and function, which is composed of several elements of interaction and interdependence.

5. Drowning Detection Systemusing LRCN Approach

This project aims to create a system that will be able to automatically detect drowning incidents in the swimming pool using human action detection. The drowning detection model will be used to process and classify video that will be given to the system which will be recorded using live surveillance cameras. The system will break this video in image frames and apply model over it and if the early actions of drowning like hand waving, water splashing or diving is detected then the system will set the alarm so that the lifeguards can initiate their rescue operations. The classifier model is trained using a Long-term Recurrent Convolutional Network which is acombination of convolutional neural network and recurrent neural network which is suitable for large-scale visual understanding tasks such as activity recognition and image captioning.

6. Testing and Training Lifeguard Visual Search

Lifeguards play a crucial role in drowning prevention. However, current U.K. lifeguard qualifications are limited in training and assessing visual surveillance skills, and little is known about how lifeguards successfully detect drowning swimmers. To improve our understanding of lifeguard visual search skill, and explore the potential for improving this skill through training, this thesis had the following aims: (a) to identify whether visual skills for drowning detection improve with lifeguardexperience, (b) to understand why such differences occur, and (c) design and valid a visual training intervention to improve drowning detection on the basis of these results. The first two studies investigated drowning-detection skills of participantswith differing levels of lifeguard experience in a dynamic search task with simulated drownings. Lifeguards were found to detect drownings faster and more often than non-lifeguards. In three follow-up studies these results were replicated with morenaturalistic stimuli. Video footage from an American wave pool was extracted, which

showed genuine instances of swimmer distress. Results again demonstrated lifeguard superiority in detecting the drowning targets.

7. Automated vision-based swimming pool surveillance system

Automated vision based surveillance for a real time human behaviour analysis provides an efficient way of detecting the occurrence of any abnormal events amid our surroundings. The technical challenges faced encompass the need to reliably detect and track moving targets within possibly dynamic background and inference module that interprets targets behaviour patterns as events with semantic meaning. This research presents an automated vision based surveillance system to detect drowning incidents in swimming pools. The Swimmers in the pool are detected and tracked by using pixy camera. This study provides new information ,collected in a systematic and reproducible way with maximum avoidance of bias.[3]In this research they proposed a novel camera based detection algorithm. An inter frame DE-noising scheme is employed to remove the reflections interference efficiently.

8. Automated drowning detection and security in swimming pool

Video surveillance can be used a tool for monitoring and security. Observing public and private sites has increasingly become a very sensitive issue. Video-based surveillance systems are designed and installed in places such as railways, airports and even dangerous environments. Image processing patterns recognition and machine learning based methods are efficient ways for real time intelligent monitoring of the objects or events of interest. Applying intelligence in video surveillance systems allows real-time monitoring of places,people and their activities. The tracking approach can change with varying targets and can change with varying targets and change from a single camera to multiple camera configurations. The tracking must be robust and overcome occlusion and noise which are common problems in monitoring. Automated vision based surveillance for a real time human behaviour analysis provides an efficient way of detecting the occurrence of any abnormal events amid our surroundings. The technical challenges faced encompass the need to reliably detect and track moving targets within possibly dynamic background and inference module that interprets targets behaviour patterns as events with semantic meaning

9. A novel drowningdetection method for safety of swimmers

Life safety in water has been a concern for many centuries. Latest technology advancements has enabled us to come up with effective drowning detection systems. However many of those solutions are costly and limited to few. Survey reports show us that highest numbers of deaths are reported in low and middle income countries. The survey report also mentions the children have the largest death ratio compared to adults. Also the deaths reported in these incidents are more from open water bodies than closed water bodies like swimming pools. The solution described above will be able to address these issues. The swimming goggles with drowning detection unit canbe economically viable solution. The range of the alarms transmission can be improved by using underwater acoustics. Any age groups will be comfortable wearing the goggles, without hampering the recreational joy while swimming. The goggles can be useful even in sea. The alarm receivers can be placed at different locations in the water bodies which is having high chance of drowning. Another major advantage ofthis approach unlike other approach is the ease of use in all atmospheric conditions, like rain or wind to day or night. This solution is also a reliable solution where the life guards have difficulty to monitor the swimmers like a highly crowded sea.

10. An Automatic Video-based Drowning Detection System for Swimming Pools Using Active Contours

This provided a method to robust human tracking and semantic event detection within the context of video surveillance system capable of automatically detecting drowning incidents in a swimming pool. In the current work, an effective background detection that incorporates prior knowledge using HSV color space and contour detection enables swimmers to be reliably detected and tracked despite the significant presence of water ripples. The system has been tested on several instances of simulated water conditions such as water reflection, lightening condition and false alarms. Our algorithm was able to detect all the drowning conditions along with the exact position of the drowning person in the swimming pool and had an average detection delay of 1.53 seconds, which is relatively low compared to the neededrescue time for a lifeguard operation. Our results show that the proposed method canbe used as a reliable multimedia video-based surveillance system.

2.2 REFERENCE

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

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

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

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

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

[9] An Automatic video-based drowning detection system for swimming pools using active contours, International journal of image, Graphics and signal processing, Nasrin Salehi, 2021.

2.3 PROBLEM STATEMENT DEFINITION

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1 Hard to focus on huge people while training them.	Trainers	Focus on all the Budding Swimmers.	I can't focus huge people at the time.	It hard for human ability	Difficult when this situation goes beyondmy control
PS-2 Lack of close supervision in budding Swimmers.	Budding Swimmers	Learn Swimming	Trainer has less supervision on my activity	There are huge crowd	Loss my courage of learning Swimming
PS-3 To detect alcoholic people near the water if their activity are strange or rude	Visitor	understand Rules and Training of the institution	Trainer can't manage all the work	Crowd is beyond thecontrol	Anxiety of Joining the Institution
PS-4 To resolve Seizure disorders (Hypoxic brain injury) .	Doctor	Resolve this issues	This problem is hard to resolve	The problem is critical	Frustration to functionthe brain

Problem Statement:

The person who is swimming in a pool needs to be rescued as soon as possible ifhe/she is drowning so that he/she does not die and swim without thefear of drowning.

Who does the problem affect?

The problem affects a lot of people than we think it does. It affects,

- The person who drowns loses his life.
- The person's kin and kith become traumatized by the loss oftheirloved one.
- The fellow swimmers who used to practice along with

theperson who drowned get their confidence and passion towards swimminglowered.

What is the issue?

Though Swimming is a healthy exercise and popular sport there is alwaysa risk ofpeople drowning. More than the fear of losing a swimming competitionthe fear of drowning affects a lot of people making them refrain from practicing.

When does the issue occur?

The issue may occur during the following scenarios:

- When a person learns swimming.
- When a person goes unconscious in a swimming pool.
- When a person gets exhausted in a swimming pool.

Where is the issue occurring?

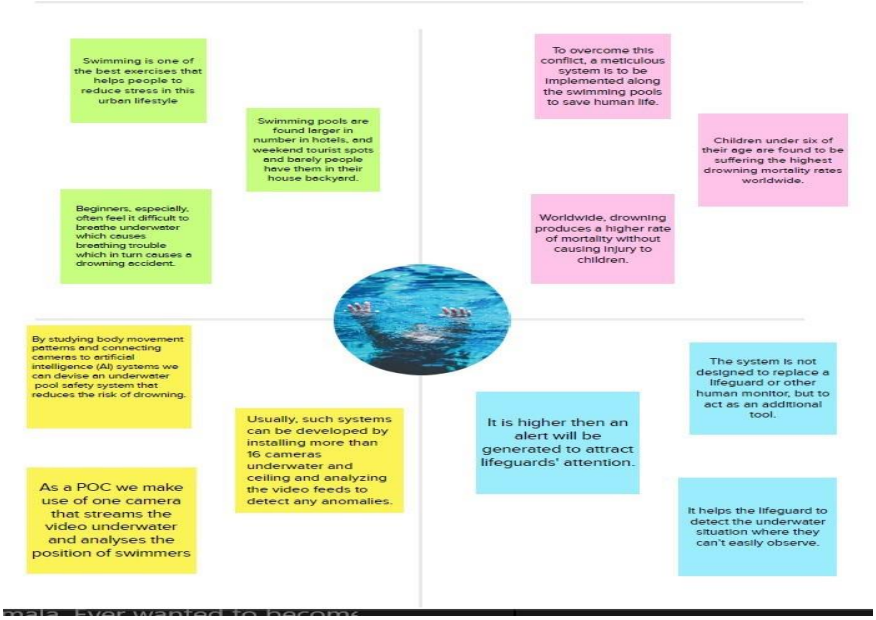
The issue usually occurs in a swimming pool.

Why is it important that we fix the problem?

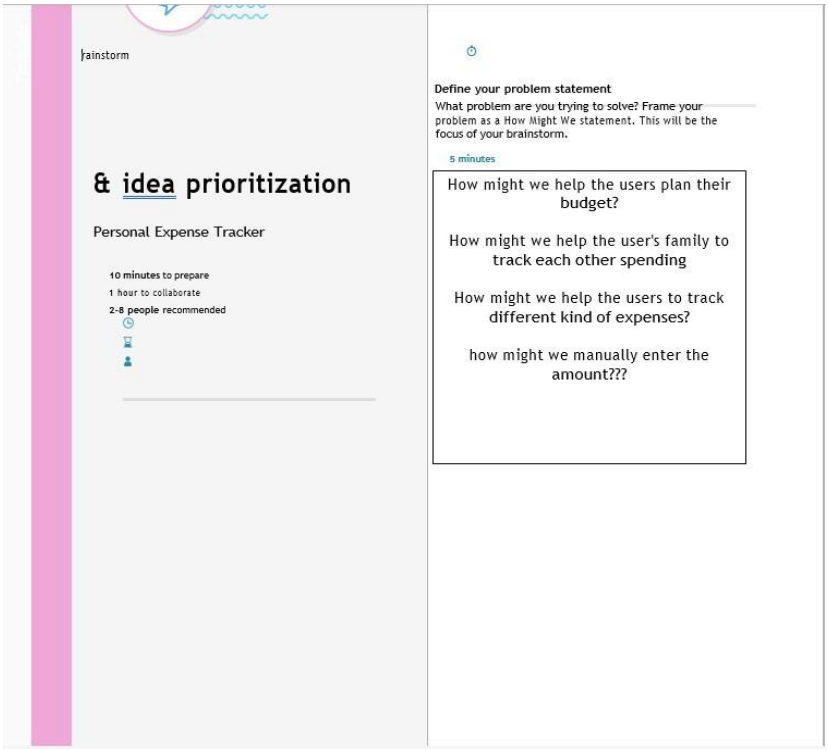
According to the U.S. Consumer Product Safety Commission, 390 deathsa year on average are attributed to drowning in a swimming pool. If we can fix this problem then it directly saves around 400 lives a year, this is why it is important.

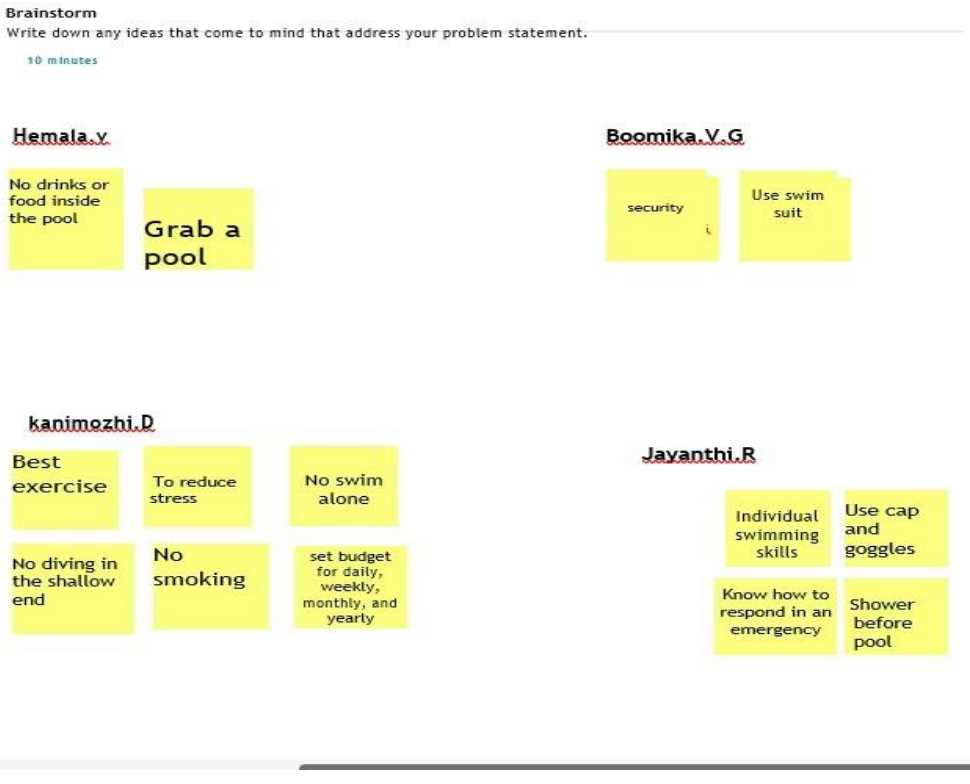
3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 BRAIN STROMMING

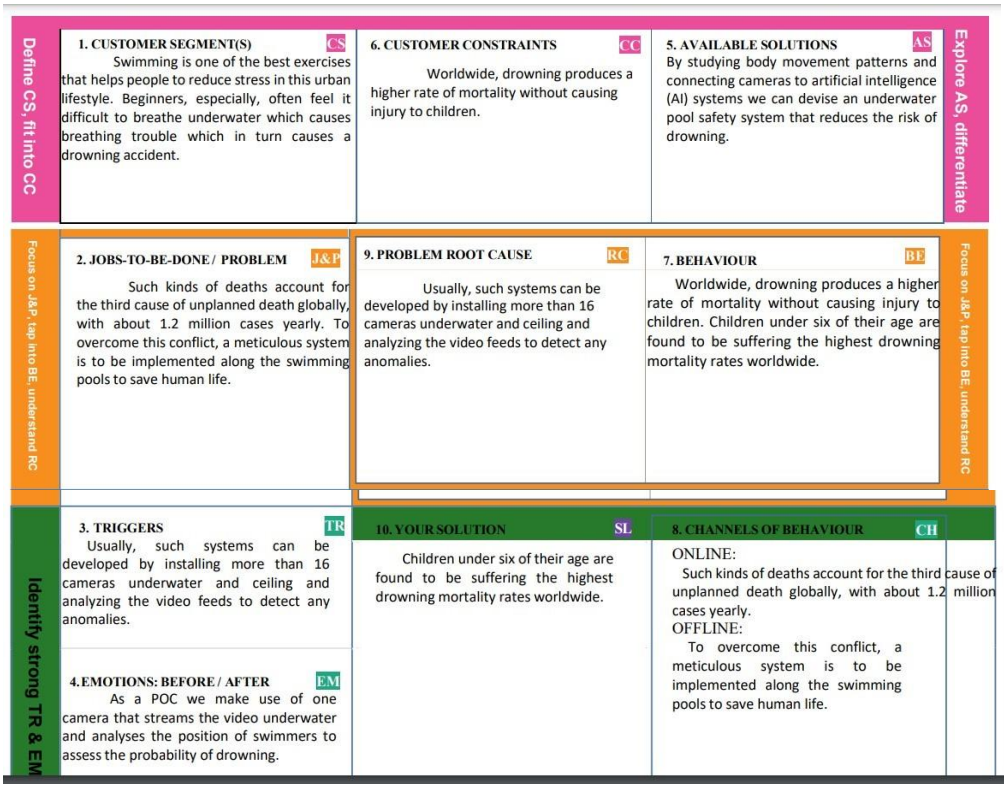




3.3 PROPOSED SOLUION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	**Beginners feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident. Drowning produces a higher rate of mortality without causing injury to children.**
2.	Idea / Solution description	**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.**
3.	Novelty / Uniqueness	**Such systems can be developed by installing more than 16 cameras underwater and ceiling and analysing the video feeds to detect any anomalies.**
4.	Social Impact / Customer Satisfaction	**To overcome this conflict, a meticulous system is to be implemented along theswimming pools to save human life.**
5.	Business Model (Revenue Model)	**As a POC we make use of one camera that streams the video underwater and analyses the position of swimmers to assess theprobability of drowning, if it is higher than an alert will be generated to attract lifeguards' attention.**
6.	Scalability of the Solution	**The system is not designed to replace a lifeguard or other human monitor, but to act as an additional tool. "It helps the lifeguard todetect the underwater situation where they can't easily observe.**

3.4 PROBLEM SOLUTION FIT



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

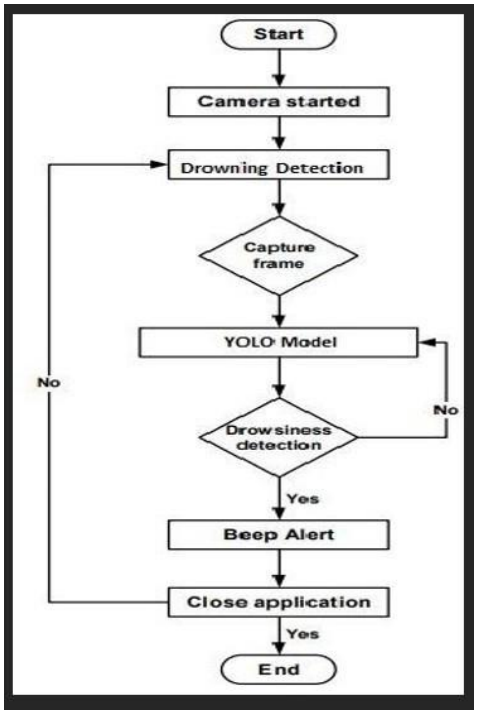
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Installation	Needed to be fixed under the water without creating any disturbance to the people in the swimming pool.
FR-2	Deduction	Either horrified or in unconscious
FR-3	Audio	Ask for help or stay quiet if the person is unconscious
FR-4	Support	Take swim tubes or take the help of rescuer
FR-5	Pulse rate sensor	Detect the pulse rate of a swimmer
FR-6	Prior Alert	Send alert message to the lifeguard

4.2 NON-FUNCTIONAL REQUIREMENT

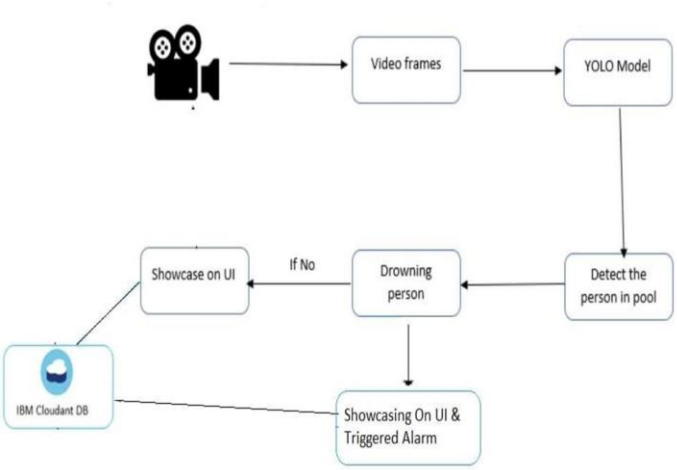
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	To ensure the safety of each and every person present in the pool. A Lifeguard should be present all the time in the pool.
NFR-2	**Security**	Lifeguards should be aware of the alert message to save the life of the swimmer
NFR-3	**Reliability**	Virtual eye lifeguard triggers an immediate prior alarm if a swimmer is in peril, helping to avoid paniceven in critical situations.
NFR-4	**Performance**	The alarm is triggered when the swimmer's pulse rate is decreasing
NFR-5	**Availability**	Equipment and accessories include lifesaver rings, inflatable vests, a Shepherd's Crook, life hooks, spine boards, rescue tubes, and a first aid kit. Remember to keep them accessible 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

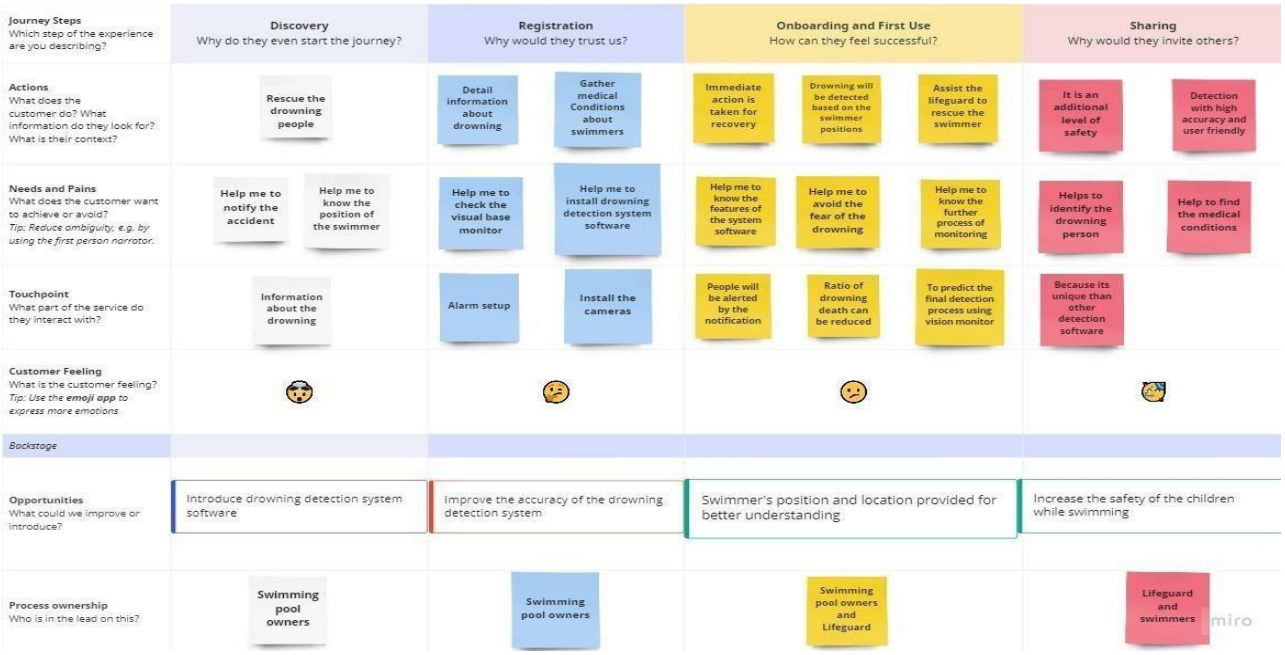
5.1 DATA FLOW DIAGRAM



5.2 SOLUTION AND ARCHITECTURE



5.3 USER STORIES



6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

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	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

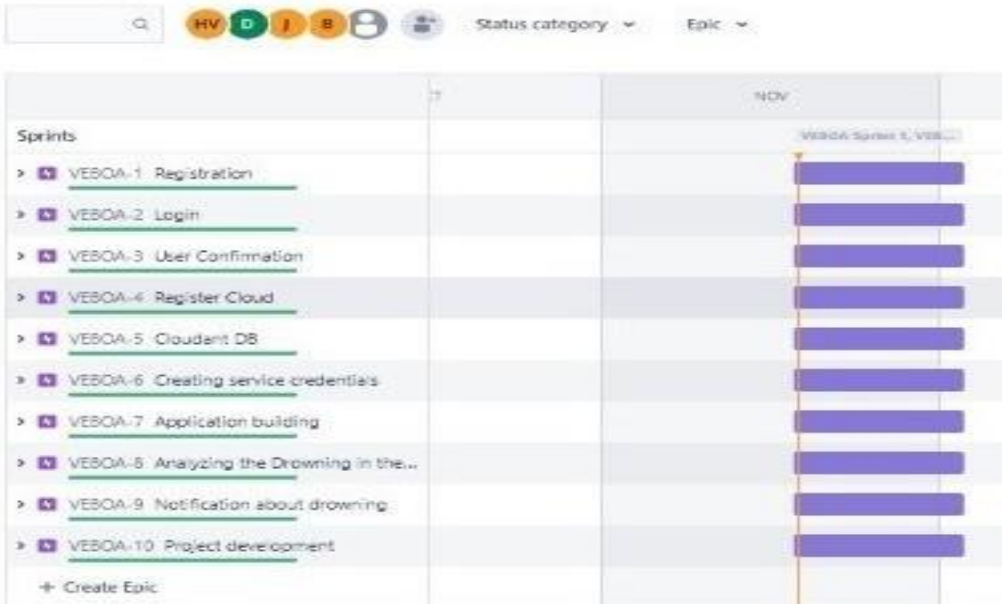
6.2 SPRINT DELIVERY SCHEDULE

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a User , I can register for the application by entering my email, password, and confirming my password.	2	High	Hemala V
Sprint-1	Login	USN-2	As a User I can register for the application through Gmail	2	High	Kanimozhi D

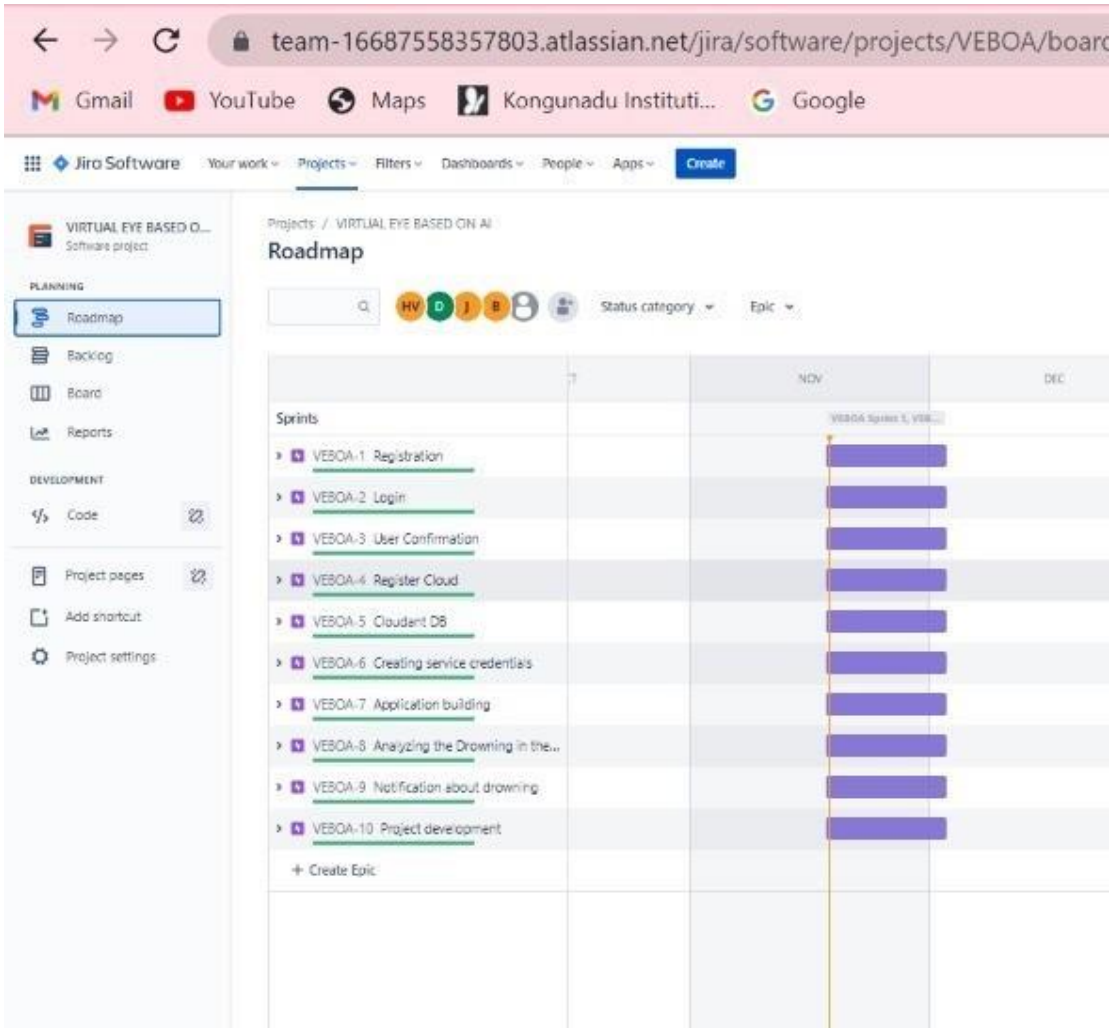
Sprint-1	User Confirmation	USN-3	As a User, I will receive confirmation email once I have registered for the application	2	Medium	Boomika V.G
Sprint -2	Cloudant DB	USN-4	Creating DB	2	High	Hemala V
Sprint -2	Creating service credentials	USN-4	Creating cloud service	2	Medium	Boomika V.G
Sprint-3	Application building	USN-5	As a User, I can install the virtual eye system in pool	2	Medium	Jayanthi R
Sprint- 3	Analyzing the Drowning in the Swimming pool	USN-5	As a User, I can analysis drowningin pool	2	High	Kanimozhi D
Sprint- 4	Notification about drowning	USN-6	As a User, I can get the notification about Drowning	2	Medium	Hemala V
Sprit -4	Project development	USN-6	As a user, I can get the notification	2	High	Kanimozhi D

6.3 REPORT FROM JIRA

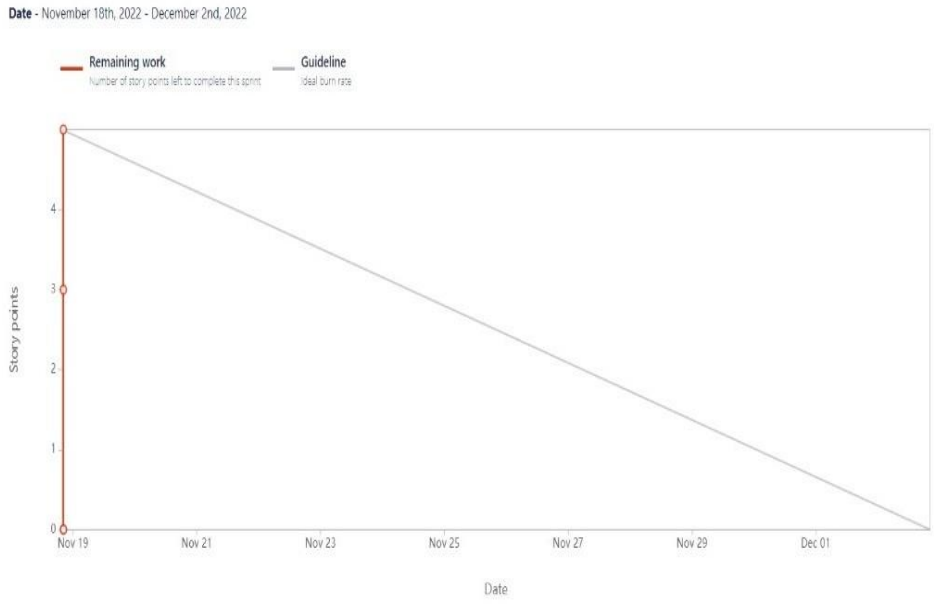
BACKLOG(SCURM)



ROADMAP



SPRIT BURNOUT CHART



CHAPTER-7

7. CODING & SOLUTION

7.1 FEATURE 1

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burn_in=1000
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# Downsample

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activation=linear

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activation=le
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activation=le
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activation=linear

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pad=1
activation=le
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batch_normaliz
e=1filters=256
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=128
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=256
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=128
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=256
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear#

Downsample

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=2

pad=1 activation=leaky

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=1

pad=1 activation=leaky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

batch_normaliz
e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=256
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz

e=1filters=512
size=3 stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=line

ar#

Downsample

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

stride
=2
pad=1

activation=leaky

[convolutional]
batch_normaliz
e=1filters=512
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=1024
size=3stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz

e=1filters=512
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=1024
size=3stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=512
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=1024
size=3stride=1

pad=1

activation=leaky

[shortcut]fro
m=-3

activation=linear

[convolutional]
batch_normaliz
e=1filters=512
size=1 stride=1

pad=1
activation=le
aky

[convolutional]
batch_normaliz
e=1filters=1024
size=3stride=1

pad=1
activation=le
aky

[shortcut]fro
m=-3

activation=linear

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

####

[convolutional]
batch_normaliz
e=1filters=512
size=1 stride=1

pad=1
activation=le
aky

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

[convolutional]
batch_normaliz
e=1filters=512
size=1 stride=1

pad=1
activation=l
eaky

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

activation=leaky

[convolution
al]
batch_norma
lize=1
filters=512
size=1
stride=1
pad=1
activation=l
eaky

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

[convolutional]
size=1stride=1
pad=1
filters=255
activation=linea
r

[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_thres
h = .7
truth_thresh = 1random=1

[route] layers = -4

[convolution
al]
batch_norma
lize=1
filters=256
size=1
stride=1
pad=1
activation=l
eaky

[upsam
ple]
stride=
2

[route]
layers = -1, 61

[convolutional]

batch_norma
lize=1
filters=256
size=1
stride=1
pad=1
activation=l
eaky

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

[convolution
al]
batch_norma
lize=1
filters=256
size=1
stride=1

pad=1
activation=l
eaky

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

[convolution
al]
batch_norma
lize=1
filters=256
size=1
stride=1

pad=1
activation=l
eaky

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

[convolutional]
size=1stride=1

pad=1
filters=255
activation=linea
r

[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_thres
h = .7

truth_thresh = 1random=1

[route] layers = -4

[convolution
al]
batch_norma
lize=1
filters=128
size=1
stride=1

pad=1
activation=l
eaky

[upsam
ple]
stride=
2

[route]

layers = -1, 36

[convolution
al]
batch_norma
lize=1

filters=128
size=1
stride=1

pad=1
activation=l
eaky

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

[convolution
al]
batch_norma
lize=1
filters=128
size=1
stride=1

pad=1
activation=l
eaky

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

pad=1
filters=256
activation=l
eaky

[convolution
al]
batch_norma
lize=1
filters=128
size=1
stride=1

pad=1
activation=l
eaky

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

[convolutional]
size=1stride=1

pad=1
filters=255
activation=line
ar

[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_thres
h = .7

truth_thre
sh = 1
random=1

7.2 FEATURE 2

```
#import necessary

packagesimportcv2

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 makeusing 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 networkcan 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 thevariable 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
= []
confidenc
es = []
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:

8. TESTING

8.1 TESTCASES

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 URL 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

9. RESULT

9.1 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" >
    <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/bootstrap.min.css"
                                                                    integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/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/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q"
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>
```



```
</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 sixof their age are foundto besuffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned deathglobally, 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 theswimming pools to save the human life. Bystudying body movement patterns andconnecting 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 positionof swimmers to assess the probability of drowning ,if it is higher thanan alert will begenerated 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/bootstrap.min.css"
                                                                integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">
    <script                         src="https://code.jquery.com/jquery-3.2.1.slim.min.js"
integrity="sha384-
```

```
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN"
crossorigin="anonymous"></script>
    <script                src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/ popper.min.js"
                           integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q"
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 toDetect Active
Drowning</h1>
            <div class="line" style="width: 900px;"></div>
                          </section>
                          </br>
                <section id="about">
```

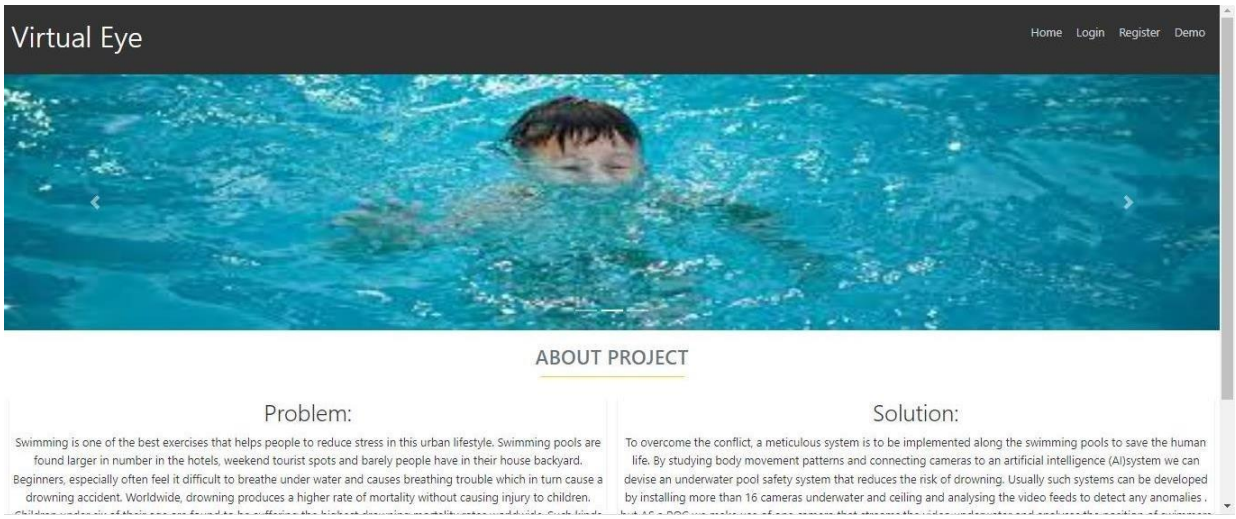
```
<div class="body">
<div class="left">
        <p>
    Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in the hotels, weekend tourist spots and barelypeople have in their house backyard. Beginners, especially 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 sixof their age are foundto besuffering the highest drowning mortality rates worldwide..Such kinds of deaths account for the third cause of unplanned deathglobally, 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>
</body>
</html>
```


Virtual Eye
Home
Login
Register
Enter registered email ID
Enter Password
Login


Virtual Eye
Home
Login
Register
Demo
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.
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 .

Virtual Eye

Home Logout

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.

Click Me! For a Demo

Virtual Eye

Home Logout

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.

Click Me! For a Demo

Emergency !!! The Person is drowining

10. 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 theSwimming 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

11. 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 areasof ‘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 to consider are given, outlining the variables that make each pool unique such as 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 the requirements 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 setoff 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 where detection is disabled, to manage specific activities such as rescue drills.

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 alifeguard. The system is accessible to its primary user, presumably a pool owneror 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 system is 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 Nanoboard, 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 applicationboth in Androidand 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.

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

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]

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=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

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

Source code(ii)

```
#import necessary

packagesimportcv2

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

    makeusing 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

    notos.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
networkcan 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
    thevariable 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
```

PROJECT DEMO LINK
https://youtu.be/YxpDckWyCq8