Final Documentation

VirtualEye –Life Guard for Swimming Pools to Detect Active Drowning

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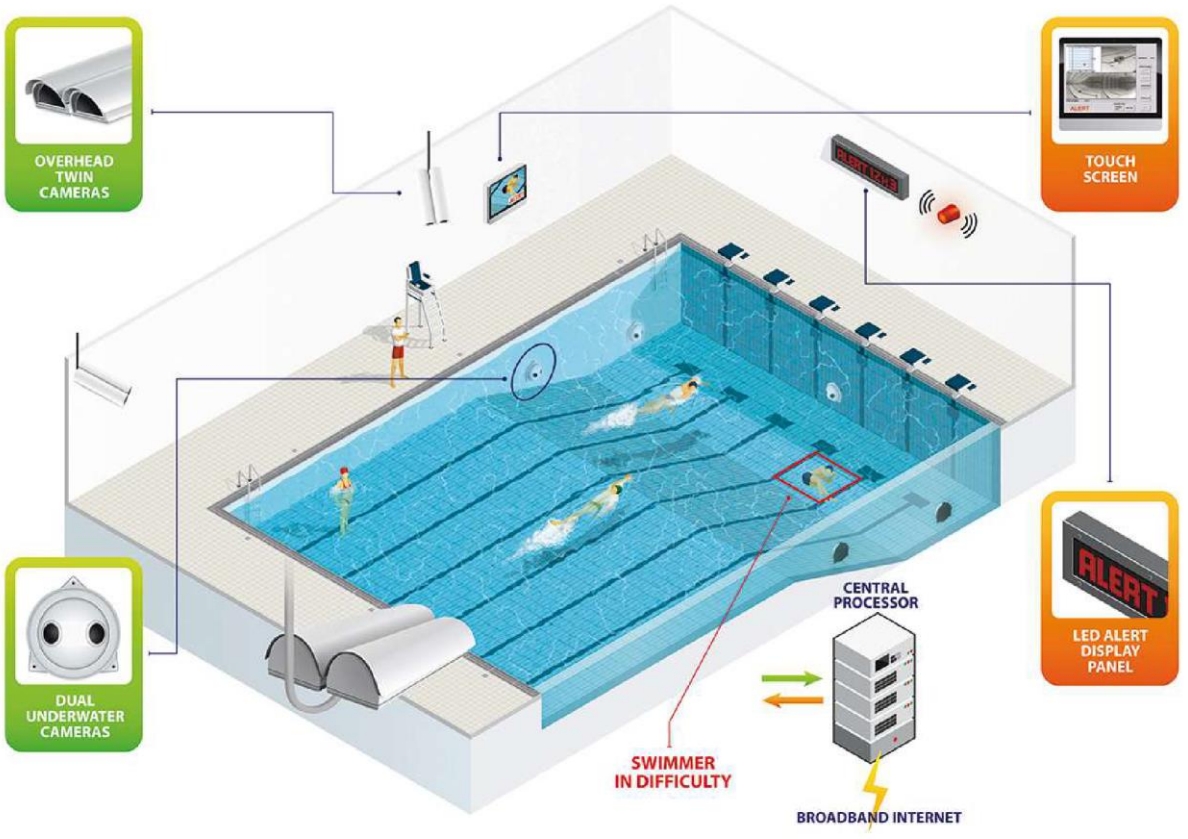
1. INTRODUCTION

1.1 Project overview:



1.2

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.

2. LITERATURE SURVEY

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 change the 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 with technology 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

✓ AngelEye.(2019).AngelEye–Distributors.Retrievedfrom: https://www.angeleye.it/news. php?id=28&newscat=10

✓ 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

✓ 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

✓ 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

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

✓ 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).

✓ 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

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

2.3 Problem Statement 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.

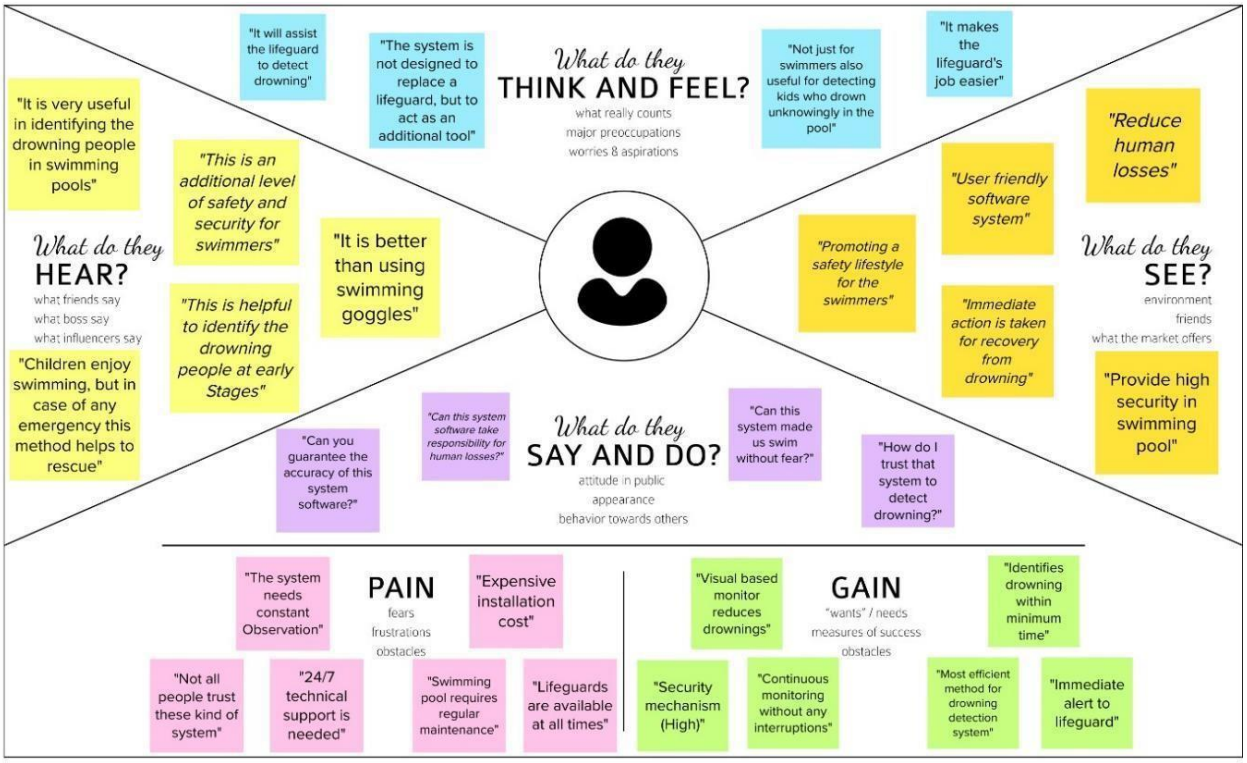
3.To overcome this conflict, a meticulous system is to be implemented along theswimming pools to save human life.

3. IDEATION & PROPOSED SOLUTION

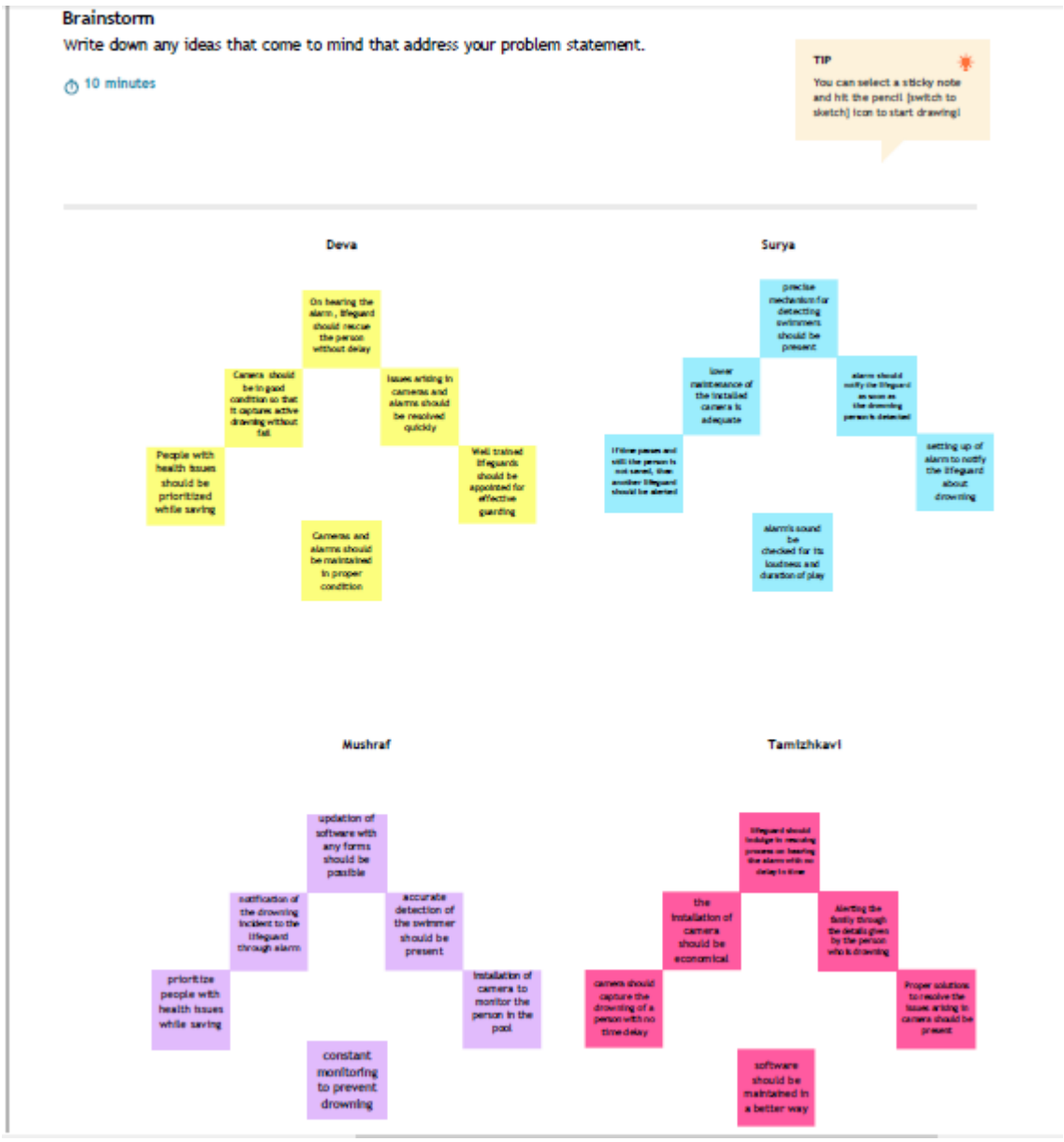
In this paper we have proposed a method for automatic real-time detection of a person drowning in the swimming pools. The overview of the proposed algorithm in this paper is presented.

Our system is based on real time video analysis of the cameras installed around the swimming pool in a way which the entire swimming pool can be covered. Each camera is mounted on pool walls oriented downwards with a sharp angle, so that it can minimize the effect of lightening system which causes occlusions and foreshadowing. In this work, a ODROID-XU as a distributed system is installed in the swimming pool to collect all the video signals collected from cameras and process them using computer vision methods. The used hardware including the distributing system known as ODROID-XU, and our Logitech HD Pro C920 webcam used to record all the video sequences in this paper is illustrated in. The system is used to firstly detect the background of the pool and then decide to send an alarm to rescue team if a previously detected person is missing in video frames for an specific and defined
period of time. In the next sections of this paper, we try to explain the concepts we used to detect and track
individuals in swimming pools.

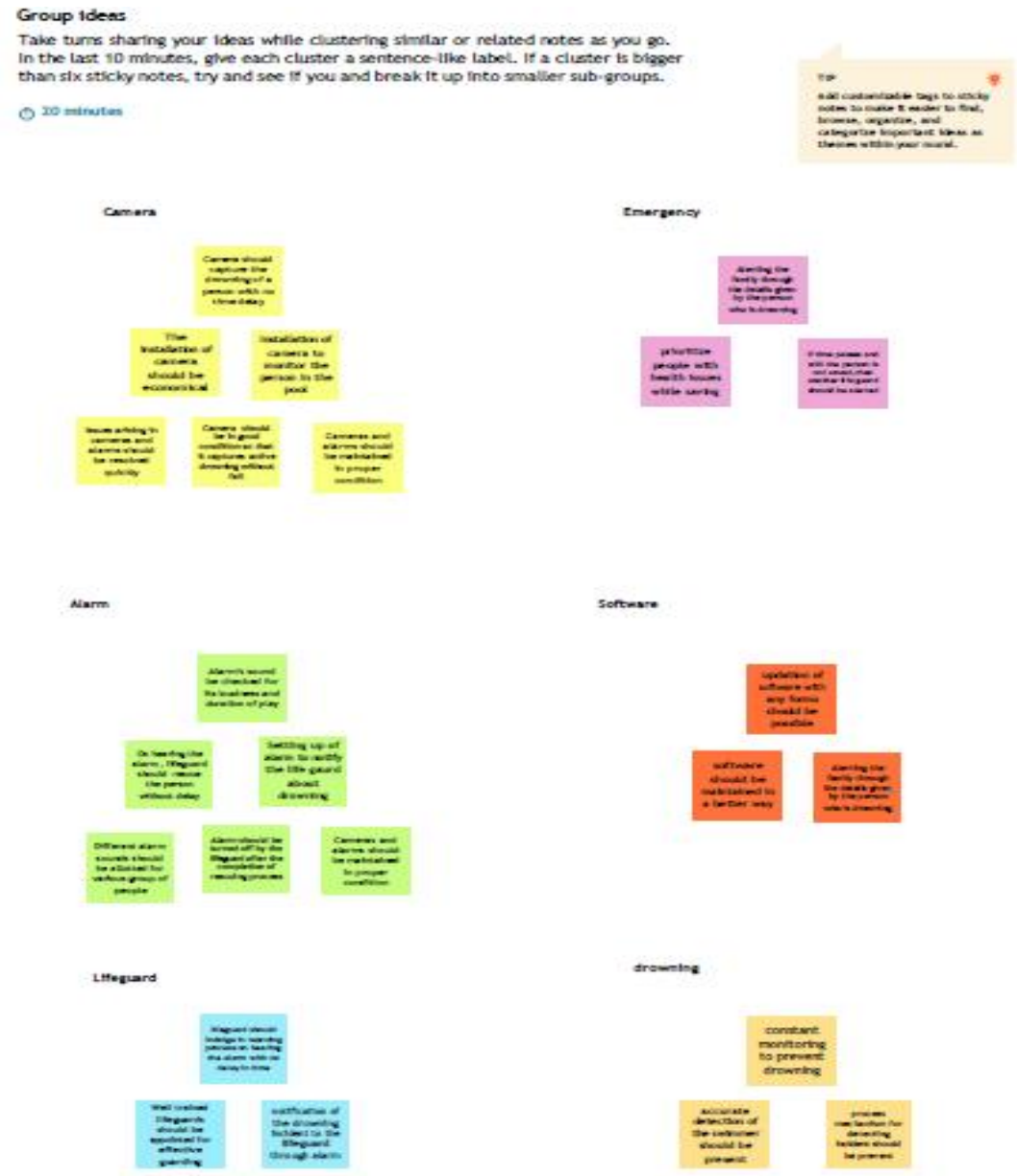
3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



Ideations

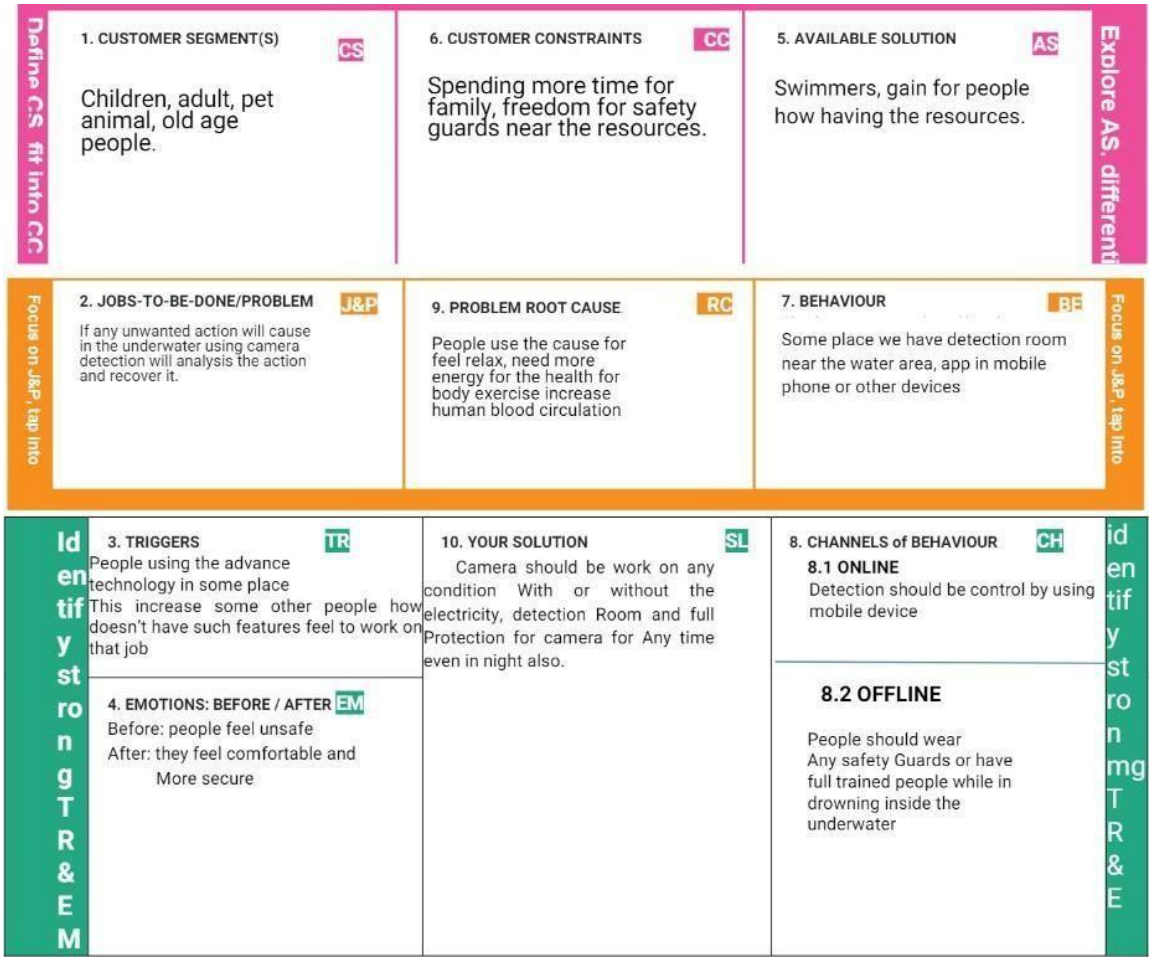

Group ideas
Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.
20 minutes
Tip
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your board.
Camera
The installation of camera should be economical
Installation of camera to monitor the person in the pool
Emergency
prioritize people with health issues while saving
Alarm
Setting up of alarm to notify the life guard about drowning
Different alarm sounds should be allotted for various group of people
Cameras and alarms should be maintained in proper condition
Software
updation of software with any bugs should be possible
software should be maintained in a better way
Lifeguard
Well trained lifeguards should be appointed for effective guarding
drowning
constant monitoring to prevent drowning
accurate detection of the swimmer should be present

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	People use the swimming for enjoyment, health Exercise but for all age of the people pool is really dangerous we need lifeguard, in duty swimming pools are very dangerous in the underwater.
2.	Idea / Solution description	In this project, using Artificial intelligence technology, using the camera help we can detect the people action and positions and also we check breathing level of the people inside the underwater and use of any alarms system we can detect the some of them are in the problem
3.	Novelty / Uniqueness	The uniqueness of the our system is track the people position and body condition in the drowning using YOLO Algorithm. It is fast and very speed in the detection
4.	Social Impact / Customer Satisfaction	In world most of them are unexcepted cause very serious death in the underwater not only in the city but most occurs in the rural area in the public places (well, lakes) we should avoid the accident in the underwater drowning
5.	Business Model (Revenue Model)	In the software field this well increase good income. Safety innovation in the swimming related issues this makes attractive for end users to use

		our software product
6.	Scalability of the Solution	IBM cloud server will collect all the data and stored in the server. This will more safe and secure

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

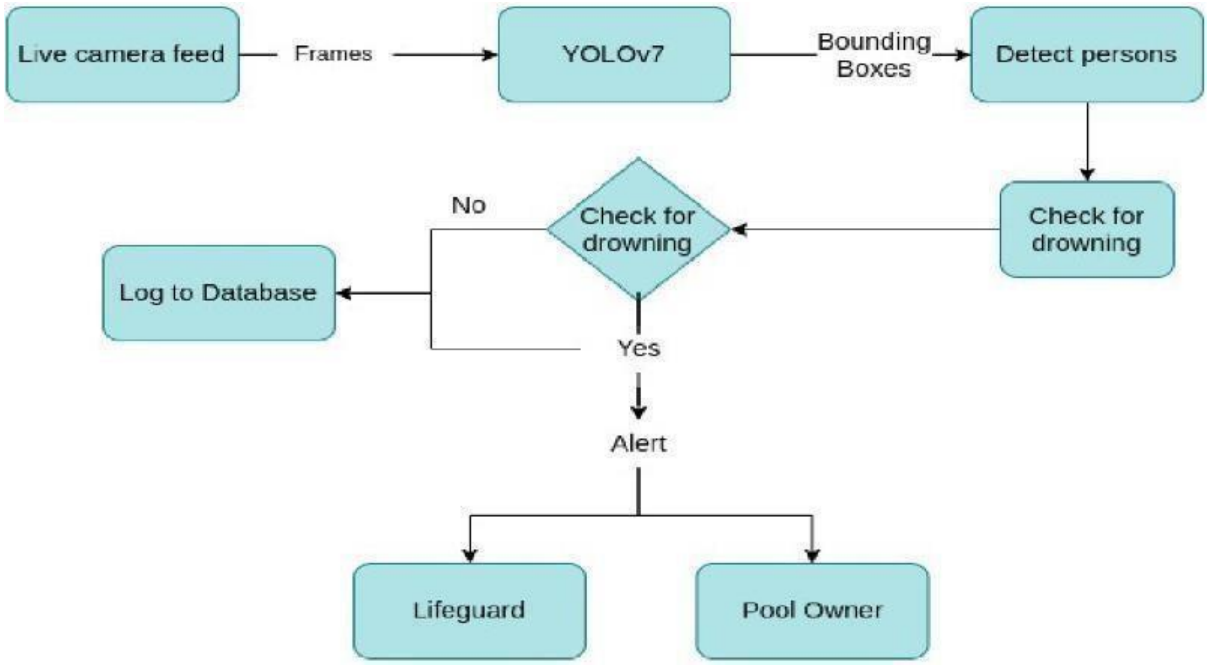
FR No.	**Functional Requirement (Epic)**	**Sub Requirement (Story / Sub-Task)**
FR-1	Installation	Install the camera inside the underwater, connect necessary app in the phone orotherdevice
FR-2	Detection	Near swimming pool area use detectionroom for monitor or use IBM cloud forstorage purpose of the details
FR-3	Audio	Give the alert signal for the people enterinto the underwater and leavinginto underwater
FR-4	Support	Extra support from the lifeguard if any person pulse rate will decrease inside thewater
FR-5	Prior alert	Extreme level problem should be occursgive the alert signal for theentire pool

4.2 Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	A Lifeguard should be present in all the time near pool
NFR-2	**Security**	Alert message or signal should be give by the lifeguard of swimmer
NFR-3	**Reliability**	Triggers if any immediate needs of the swimmer inside the pool
NFR-4	**Performance**	If any unwanted position changes and the pulse rate will decrease this will detect it.
NFR-5	**Availability**	Equipment and other requirement should be checked by the lifeguards
NFR-6	**Scalability**	Virtual eye lifeguard detects potential drownings and it should be notifies you.

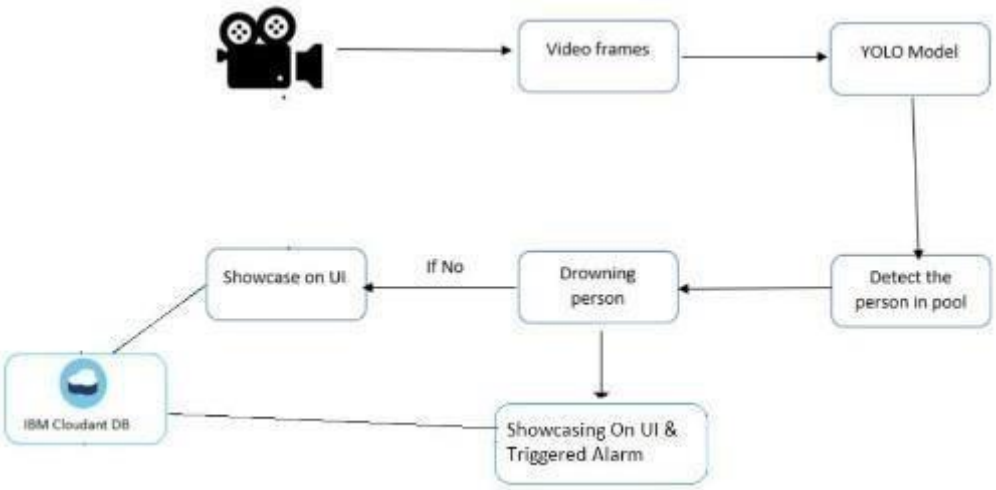
5.Project Design

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

- To find underwater movement while person in drowning they have any Problem or anything else we will find the solution using the Artificial Intelligence (AI) detection technology.
- Usually, such systems can be developed by installing more than 16 cameras underwater and ceiling and analyzing the video feeds to detect any anomalies. 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 then an alert will be generated to attract lifeguards' attention.



5.3Users Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Pool owner)	Installation	USN-1	Install the camera inside the underwater, connect necessary app in the phone or other device	I can cameras to the IBM cloud DB	High	Sprint-1
Customer (Lifeguard	Secure thepeople	USN-2	As a user, I can secure the drowning personsfrom the pool	I can save the drowning person	High	Sprint-1
Customer (swimmers)	safety	USN-3	As a user, I can swim inside the underwater without fear of the Drowning	I can swim safely	medium	Sprint-2
Customer care (Executive)	Contact	USN-4	As a user, I Can resolve if any problem occurswith any device technically	I can contact the customer care executiveto resolve any issues	Medium	Sprint-3
Administrator	Dashboard	USN-5	Management of the drowning detection systemand database management	I can access the system's logs and any other data instantly	High	Sprint-4

6.PROJECT PLANNING & SCHEDULING

6.1SPRINT PLANNING & ESTIMATION

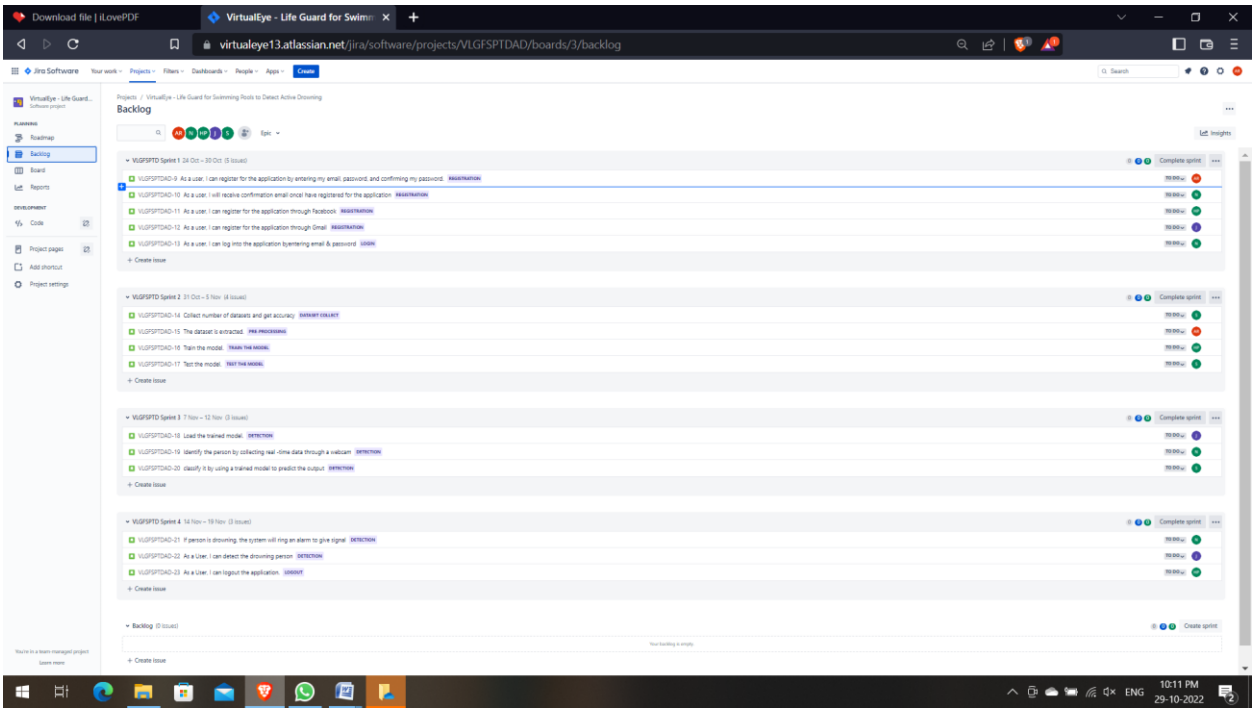
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	8	6 Days	24 Oct 2022	29 Oct 2022	6	29 Oct 2022
Sprint-2	14	6 Days	31 Oct 2022	05 Nov 2022	12	05 Nov 2022
Sprint-3	16	6 Days	07 Nov 2022	12 Nov 2022	11	12 Nov 2022
Sprint-4	12	6 Days	14 Nov 2022	19 Nov 2022	12	19 Nov 2022

6.2 Sprint Delivery Schedule

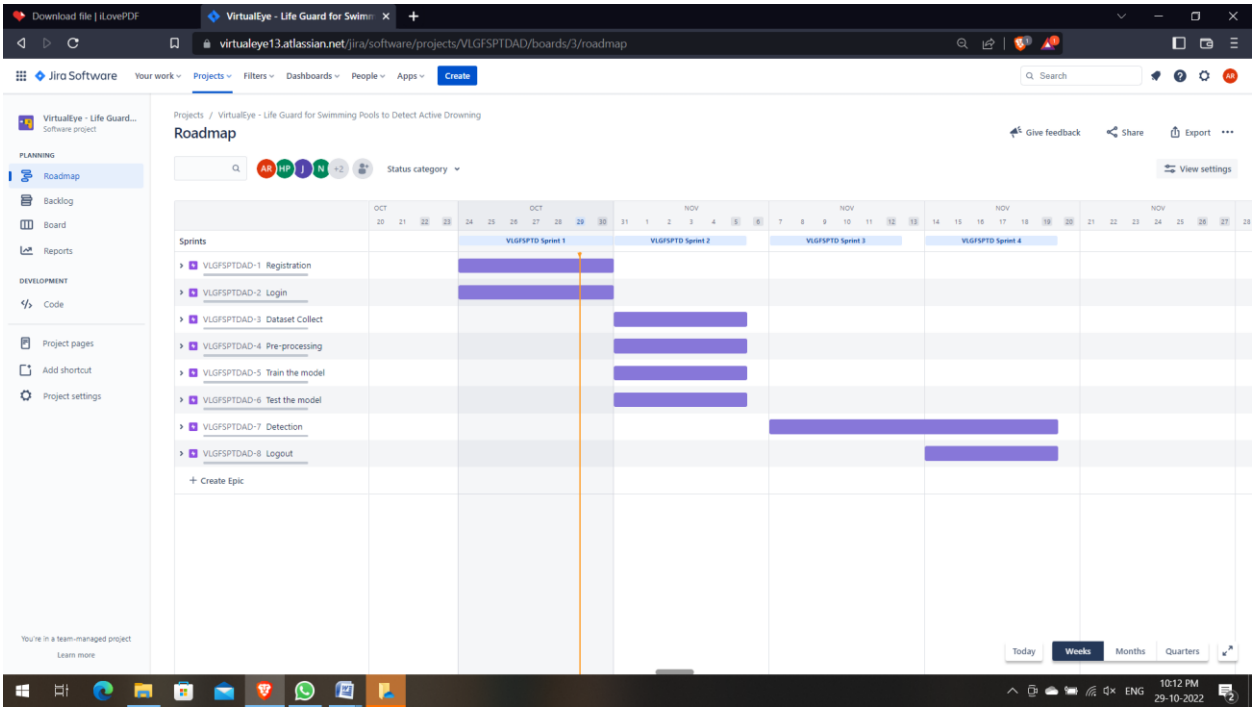
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Devaprasth R, surya B, Mohamed mushraf S, Tamizhkavi K
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email oncel have registered for the application	1	High	Devaprasth R, surya B, Mohamed mushraf S, Tamizhkavi K
Sprint-1	Registration	USN-3	As a user, I can register for the applicationthrough Facebook	2	Low	Devaprasth R, surya B, Mohamed mushraf S, Tamizhkavi K
Sprint-1	Registration	USN-4	As a user, I can register for the applicationthrough Gmail	2	Medium	Devaprasth R, surya B, Mohamed mushraf S, Tamizhkavi K
Sprint-1	Login	USN-5	As a user, I can log into the application byentering email & password	1	High	Devaprasth R, surya B, Mohamed mushraf S, Tamizhkavi K

6.3 Reports from JIRA

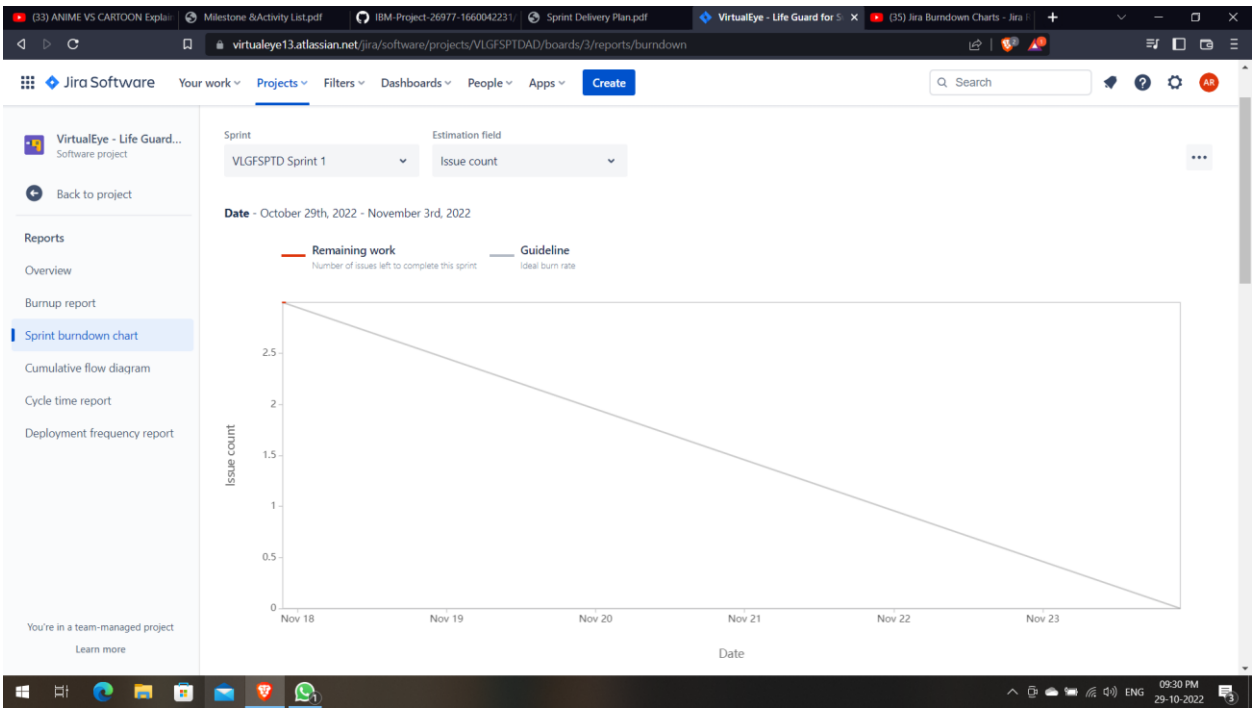
Backlog



Roadmap



Burndown Chart



7. CODING

```
import time

import cv2
import numpy as np
from cloudant.client import Cloudant
from flask import Flask, request, render_template, redirect, url_for
from playsound import playsound

import cvlib as cv
from cvlib.object_detection import draw_bbox

# Loading the model

# Authenticate using an IAM API key
client = Cloudant.iam('8780b82a-5a3b-4da0-a180-a0e1516479f9-bluemix',
'TzYs8u0Q5eoj204gDo2eOEDAuGRhj0fG_9rlZr5SsJUH',
                      connect=True)

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

app = Flask(__name__)


# default home page or route
@app.route('/')
def index():
    return render_template('index.html')


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


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


@app.route('/afterreg', methods=['POST'])
def afterreg():
    x = [x for x in request.form.values()]
    print(x)
    data = {
        '_id': x[1],  # Setting _id is optional
        'name': x[0],
        'psw': x[2]
    }
    print(data)

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

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

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

```
    if (len(docs.all()) == 0):
        url = my_database.create_document(data)
        # response = requests.get(url)
        return render_template('register.html', pred="Registration Successful,
please login using your details")
    else:
        return render_template('register.html', pred="You are already a member,
please login using your details")


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


@app.route('/afterlogin', methods=['POST'])
def afterlogin():
    user = request.form['_id']
    passw = request.form['psw']
    print(user, passw)

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

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

    print(len(docs.all()))

    if (len(docs.all()) == 0):
        return render_template('login.html', pred="The username is not found.")
    else:
        if ((user == docs[0][0]['_id'] and passw == docs[0][0]['psw'])):
            return redirect(url_for('prediction'))
        else:
            print('Invalid User')


@app.route('/logout')
def logout():
    return render_template('logout.html')


@app.route('/prediction')
def prediction():
    return render_template('prediction.html')


@app.route('/result', methods=["GET", "POST"])
def res():
    webcam = cv2.VideoCapture('drowning.mp4')

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

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

    # variable dcount stands for how many seconds the person has been standing
still for
    centre0 = np.zeros(2)
```

```
    isDrowning = False

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

    # loop through frames
    while webcam.isOpened():
        # read frame from webcam
        status, frame = webcam.read()

        if not status:
            print("Could not read frame")
            exit()
        # apply object detection
        bbox, label, conf = cv.detect_common_objects(frame)
        # simplifying for only 1 person

        # s = (len(bbox), 2)
        if (len(bbox) > 0):
            bbox0 = bbox[0]
            # centre = np.zeros(s)
            centre = [0, 0]
            # for i in range(0, len(bbox)):
            # centre[i] =[(bbox[i][0]+bbox[i][2])/2,(bbox[i][1]+bbox[i][3])/2 ]

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

            # make vertical and horizontal movement variables
            hmov = abs(centre[0] - centre0[0])
            vmov = abs(centre[1] - centre0[1])

            # there is still need to tweek the threshold
            # this threshold is for checking how much the centre has moved

            x = time.time()

            threshold = 10
            if (hmov > threshold or vmov > threshold):
                print(x - t0, 's')
                t0 = time.time()
                isDrowning = False

            else:

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

            # print('bounding box: ', bbox, 'label: ' label ,'confidence: '
conf[0], 'centre: ', centre)
            # print(bbox,label ,conf, centre)
            print('bbox: ', bbox, 'centre:', centre, 'centre0:', centre0)
            print('Is he drowning: ', isDrowning)

            centre0 = centre
            # draw bounding box over detected objects

        out = draw_bbox(frame, bbox, label, conf, isDrowning)

        # print('Seconds since last epoch: ', time.time()-t0)

        # display output
```

```
        cv2.imshow("Real-time object detection", out)
        if (isDrowning == True):
            playsound('alarm.mp3')
            webcam.release()
            cv2.destroyAllWindows()
            return render_template('prediction.html', prediction="Emergency !!! The
Person is drowining")
            # return render_template('base.html')

        # press "Q" to stop
        if cv2.waitKey(1) & 0xFF == ord('q'):
            break

    # release resources
    webcam.release()
    cv2.destroyAllWindows()
    # return render_template('prediction.html',)


""" Running our application """
if __name__ == "__main__":
    app.run(debug=True)
```

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 click 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. L3in 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 •. 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 click 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 dropdown button 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_OIO5	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

Defect analysis

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

Test analysis

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

9. RESULTS
9.1Performance 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>
```

<h2>Problem:</h2>

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.

<h2>Solution:</h2>

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-
```

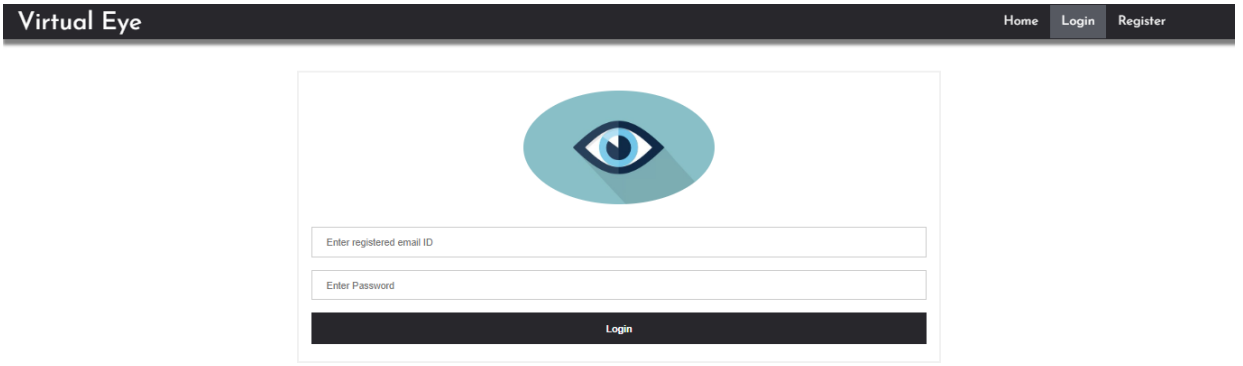
```
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpG
FF93hXpG5KkN" crossorigin="anonymous"></script>
   <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.12.9/umd/
popper.min.js" integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPsk
vXusvfa0b4Q" crossorigin="anonymous"></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>
```

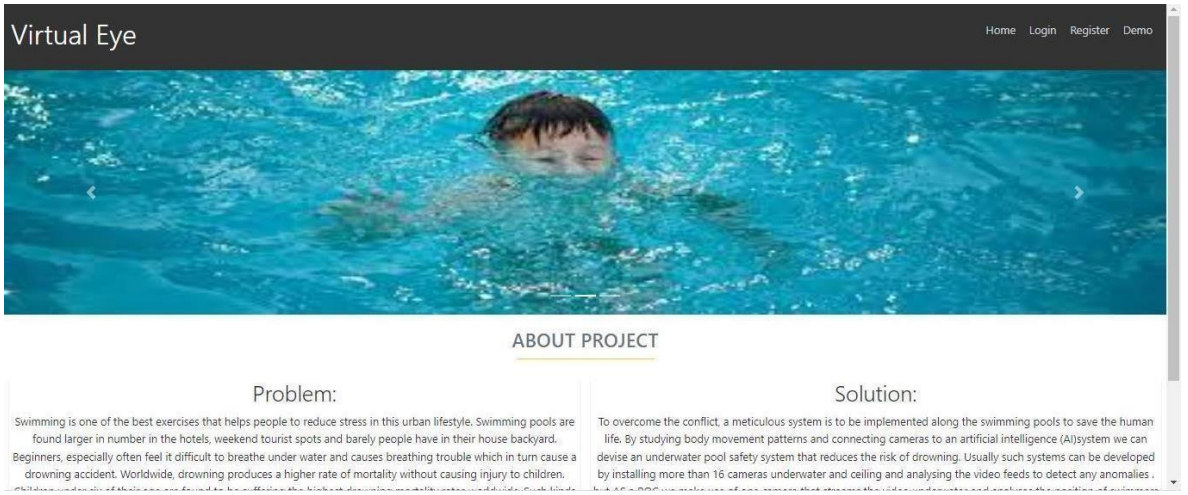
```
                                    <li><a
href="{{ url_for('logout')}}">Logout</a></li>
                    <!-- <li><a href="#about">About</a></li>
                    <li><a href="#services">Services</a></li> -->

        </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>
```





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 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

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 thismeans 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 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, and forms 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 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 trained staff 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 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 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 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.

13.Appendix

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 =
1random=1

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
```

Github link

https://github.com/IBM-EPBL/IBM-Project-42896-1660710969

Demo link

https://drive.google.com/drive/folders/1S8QFmMeKThA8H03btPe1unMV5Fgz5Keq