Configuration Manual

MSc Research Project
Industry Internship

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MSc Project Submission Sheet

School of Computing

Student Name:	Vaibhav Ratan Gaikwad		
Student ID:	20129173		
Programme:	MSc Cyber Security	**Year:**	2021-22
Module:	Industry Internship		
Lecturer:	Vikas Sahni		
Submission Due Date:	07/01/2022		
Project Title:	A Novel Unsupervised AI/ML based proctored system		
Word Count:	1100 **Page Count:** 14		

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.
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Signature: Vaibhav Ratan Gaikwad

Date: 05/01/2022

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Configuration Manual

Vaibhav Gaikwad
Student ID: 20129173

1 Introduction

This configuration manual contains the detailed description of implementation steps and the evaluation details which has been carried out the check the performance of the implemented project.

2 System Configuration

The hardware and software configurations used to implement the research was private and personal as the internship was remote.

2.1 Hardware Configuration

Parameter	**Specification**
Operating System	Windows 10
Processor	Intel Core i7
RAM	16GB
HDD	1 TB

2.2 Software Configuration

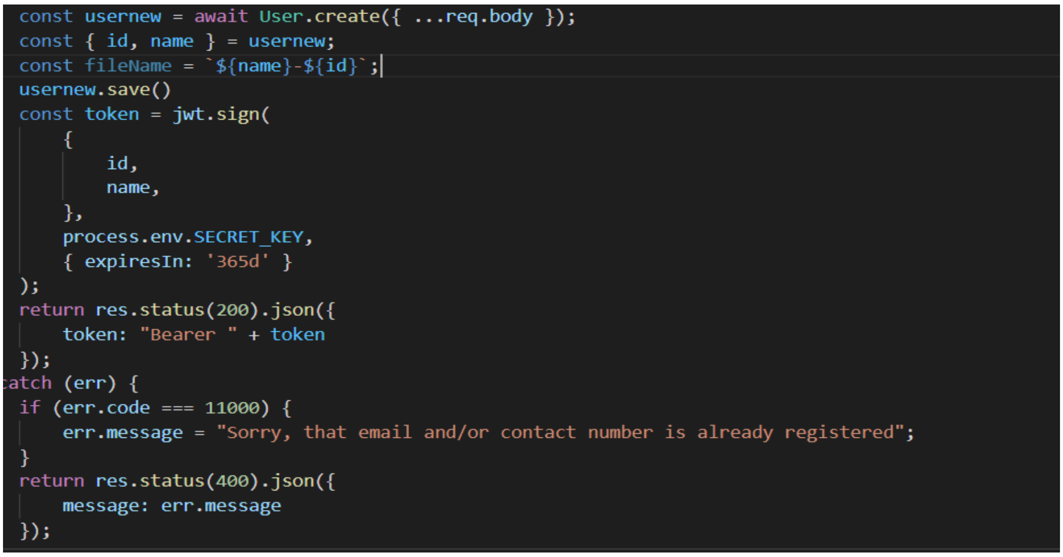
For the implementation of project various tools and libraries are used which are listed below

Software/Tool/Packages	**Version**	**Description**
Visual Studio Code	1.63.2	Visual studio is a source code editor use for developing various applications
Vue	3.2.20	Vue.js is open source light weight JavaScript framework use for developing user interfaces and single page applications
tensorflow	2.6.1	Tesnerflow is a javacript module used for face recognition
cocossd	2.2.2	Cocossd is a famous javascrit library used to detect 71+ objects

3 Implementation

3.1 Secured Sign UP for organization

Below code describes the sign up procedure for the organization where JWT is used for secure authentication and new organization credentials are stored to the database, which are process by the database credentials present in the envirnoment file.

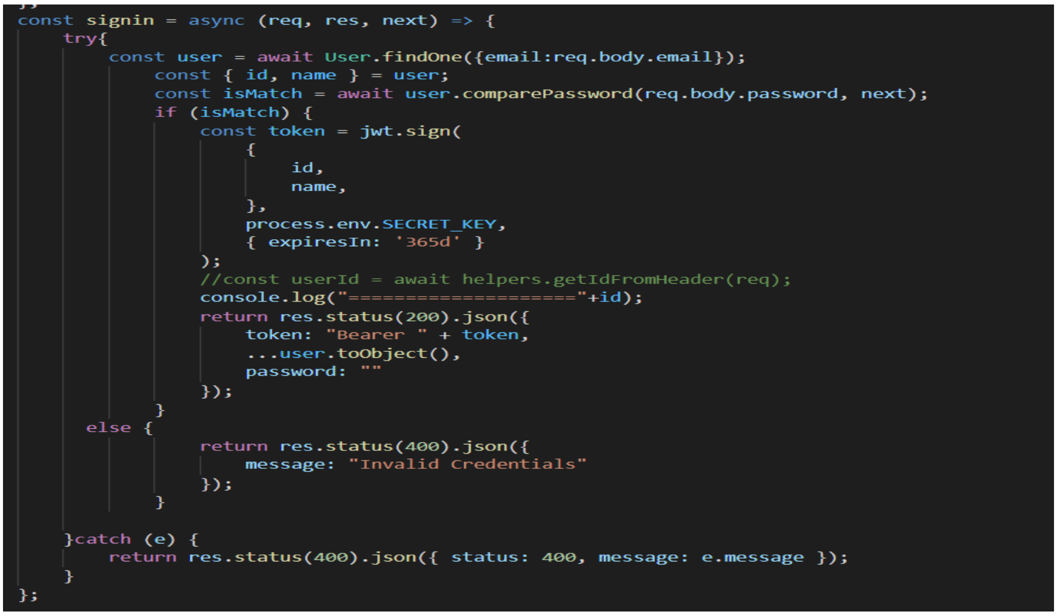


```
const usernew = await User.create({ ...req.body });
const { id, name } = usernew;
const fileName = `${name}-${id}`;
usernew.save()
const token = jwt.sign(
    {
        id,
        name,
    },
    process.env.SECRET_KEY,
    { expiresIn: '365d' }
);
return res.status(200).json({
    token: "Bearer " + token
});
atch (err) {
if (err.code === 11000) {
    err.message = "Sorry, that email and/or contact number is already registered";
}
return res.status(400).json({
    message: err.message
});
```

Figure 1: Organization Sign Up

3.2 Sign in procedure for organization

As you can see in below code the credentails entered by the organizatio are verified using JWT with credentials present in the database and then if match sign in successful otherswird error will be displayed

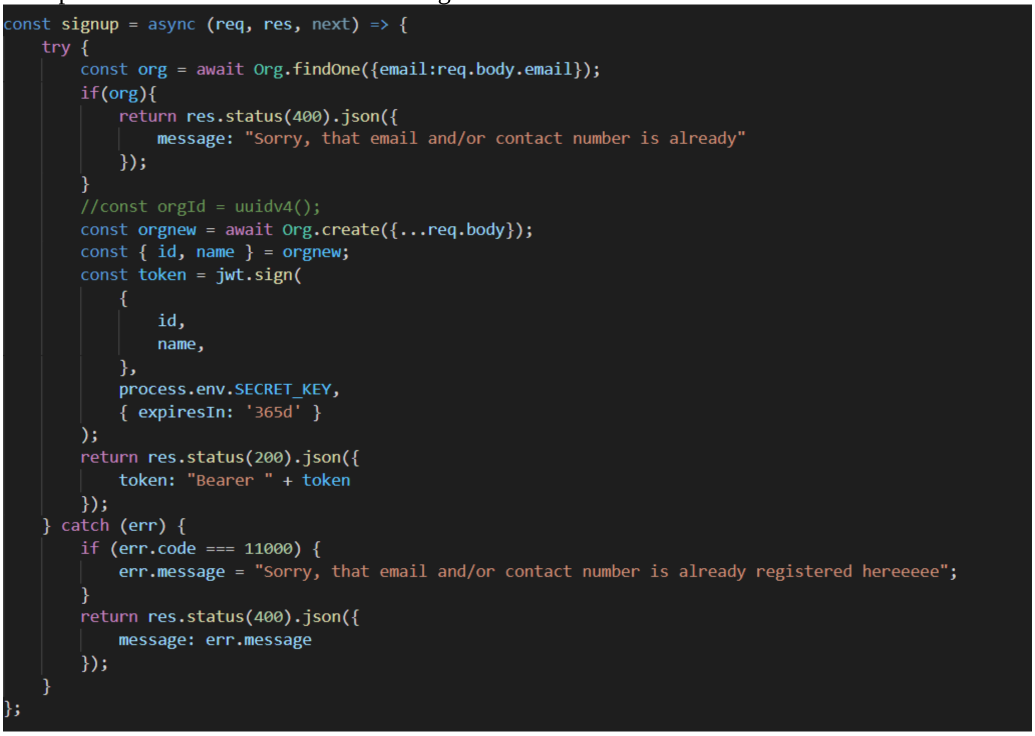


```
const signin = async (req, res, next) => {
    try{
        const user = await User.findOne({email:req.body.email});
            const { id, name } = user;
            const isMatch = await user.comparePassword(req.body.password, next);
            if (isMatch) {
                const token = jwt.sign(
                    {
                        id,
                        name,
                    },
                    process.env.SECRET_KEY,
                    { expiresIn: '365d' }
                );
                //const userId = await helpers.getIdFromHeader(req);
                console.log("===================="+id);
                return res.status(200).json({
                    token: "Bearer " + token,
                    ...user.toObject(),
                    password: ""
                });
            }
      else {
                return res.status(400).json({
                    message: "Invalid Credentials"
                });
            }

    }catch (e) {
        return res.status(400).json({ status: 400, message: e.message });
    }
};
```

Figure 2: Organization Sign in

3.3 Sign up for user

Same procedure is followed for user as organization

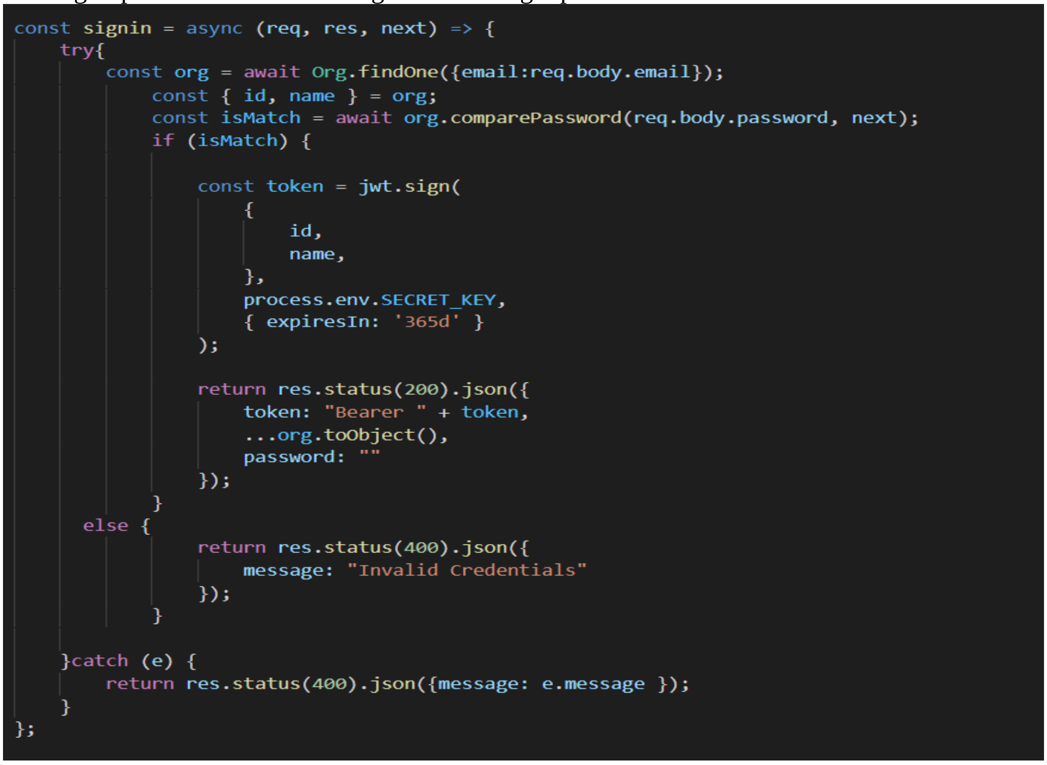


```
const signup = async (req, res, next) => {
    try {
        const org = await Org.findOne({email:req.body.email});
        if(org){
            return res.status(400).json({
                message: "Sorry, that email and/or contact number is already"
            });
        }
        //const orgId = uuidv4();
        const orgnew = await Org.create({...req.body});
        const { id, name } = orgnew;
        const token = jwt.sign(
            {
                id,
                name,
            },
            process.env.SECRET_KEY,
            { expiresIn: '365d' }
        );
        return res.status(200).json({
            token: "Bearer " + token
        });
    } catch (err) {
        if (err.code === 11000) {
            err.message = "Sorry, that email and/or contact number is already registered hereeeee";
        }
        return res.status(400).json({
            message: err.message
        });
    }
};
```

Figure 3: User Sign Up

3.4 Sign In for user

This log in procedure is same as organizations login procedure

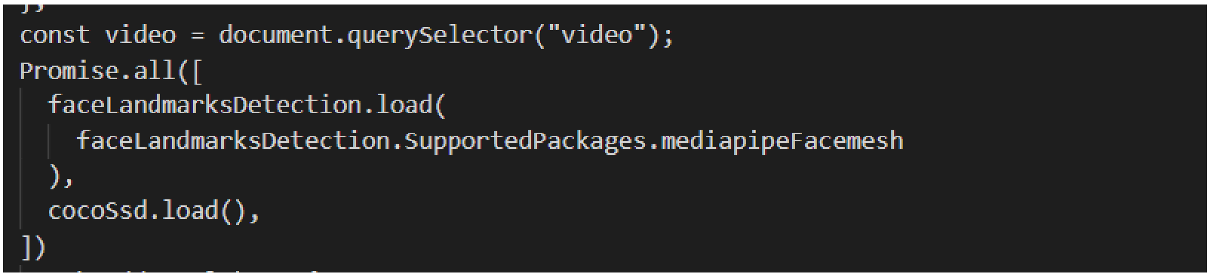


```
const signin = async (req, res, next) => {
    try{
        const org = await Org.findOne({email:req.body.email});
            const { id, name } = org;
            const isMatch = await org.comparePassword(req.body.password, next);
            if (isMatch) {

                const token = jwt.sign(
                    {
                        id,
                        name,
                    },
                    process.env.SECRET_KEY,
                    { expiresIn: '365d' }
                );

                return res.status(200).json({
                    token: "Bearer " + token,
                    ...org.toObject(),
                    password: ""
                });
            }
      else {
                return res.status(400).json({
                    message: "Invalid Credentials"
                });
            }

    }catch (e) {
        return res.status(400).json({message: e.message });
    }
};
```

Figure 4: User Sign In

3.5 Loading Libraries for Face recognition and Object detection-

In the below code libraries required for detecting misconducts are loaded i.e. facelandmark detection from tensorflow and cocossd

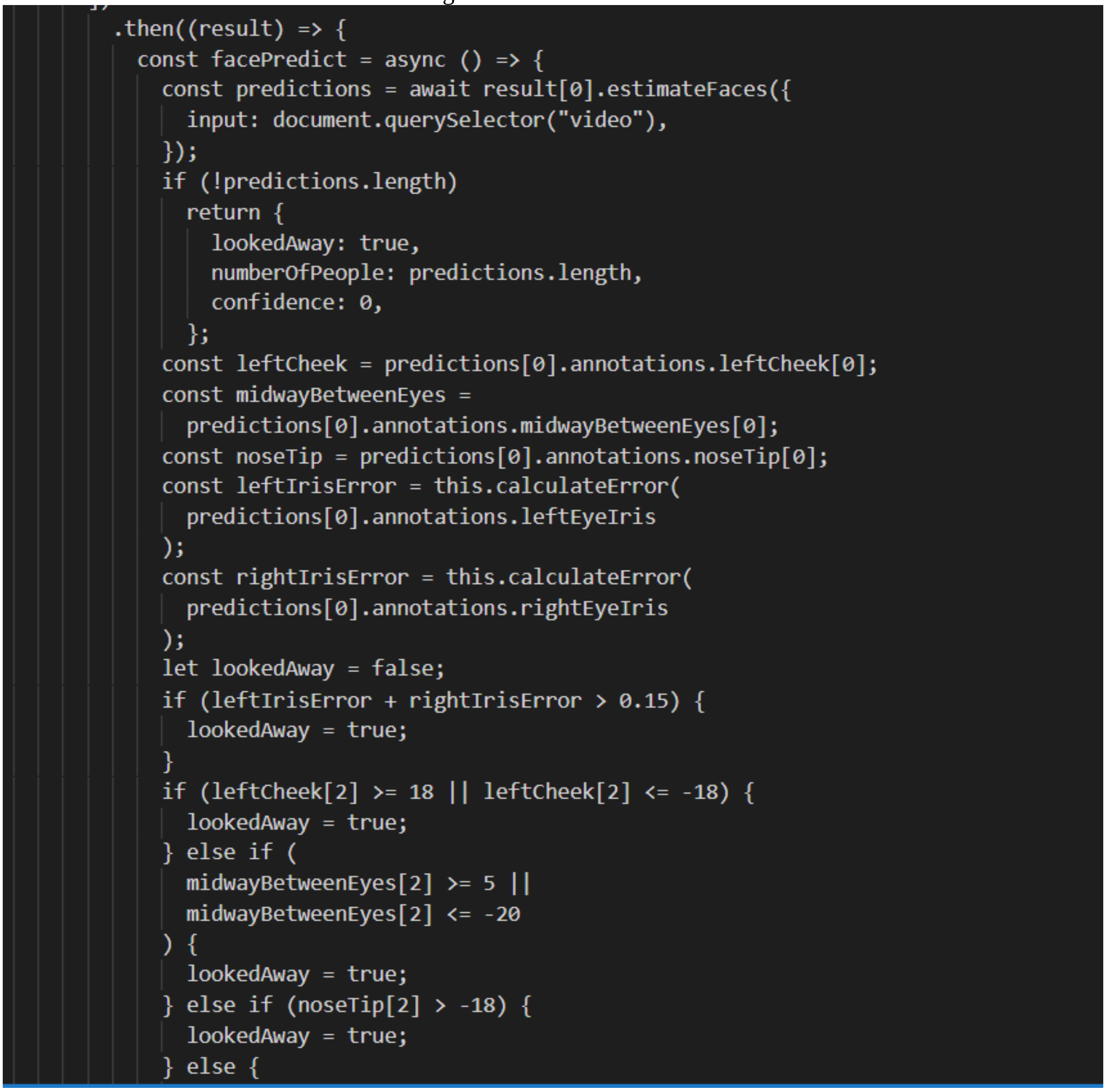


```
const video = document.querySelector("video");
Promise.all([
  faceLandmarksDetection.load(
    faceLandmarksDetection.SupportedPackages.mediapipeFacemesh
  ),
  cocoSsd.load(),
])
```

Figure 5: Loading Libraries

3.6 Neck movement detection

IN the below code certain parametes are set through which the movements are tracked. If the movement of the the nect is oustside the set matrix then the flag is set.

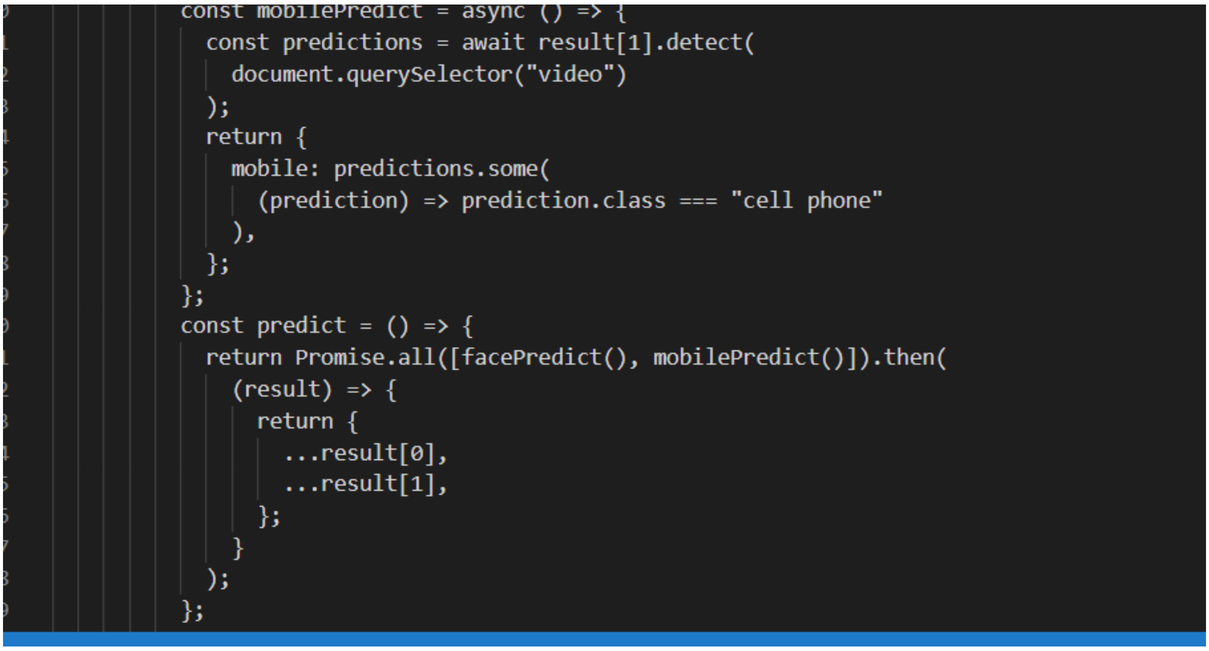


```
.then((result) => {
  const facePredict = async () => {
    const predictions = await result[0].estimateFaces({
      input: document.querySelector("video"),
    });
    if (!predictions.length)
      return {
        lookedAway: true,
        numberOfPeople: predictions.length,
        confidence: 0,
      };
    const leftCheek = predictions[0].annotations.leftCheek[0];
    const midwayBetweenEyes =
      predictions[0].annotations.midwayBetweenEyes[0];
    const noseTip = predictions[0].annotations.noseTip[0];
    const leftIrisError = this.calculateError(
      predictions[0].annotations.leftEyeIris
    );
    const rightIrisError = this.calculateError(
      predictions[0].annotations.rightEyeIris
    );
    let lookedAway = false;
    if (leftIrisError + rightIrisError > 0.15) {
      lookedAway = true;
    }
    if (leftCheek[2] >= 18 || leftCheek[2] <= -18) {
      lookedAway = true;
    } else if (
      midwayBetweenEyes[2] >= 5 ||
      midwayBetweenEyes[2] <= -20
    ) {
      lookedAway = true;
    } else if (noseTip[2] > -18) {
      lookedAway = true;
    } else {
```

Figure 6: Face recognition logic

3.7 Mobile Detection

The below code shows the mobile detection logic in which if cell phone is identified during the exam then the flag is set and miscondut is logged.

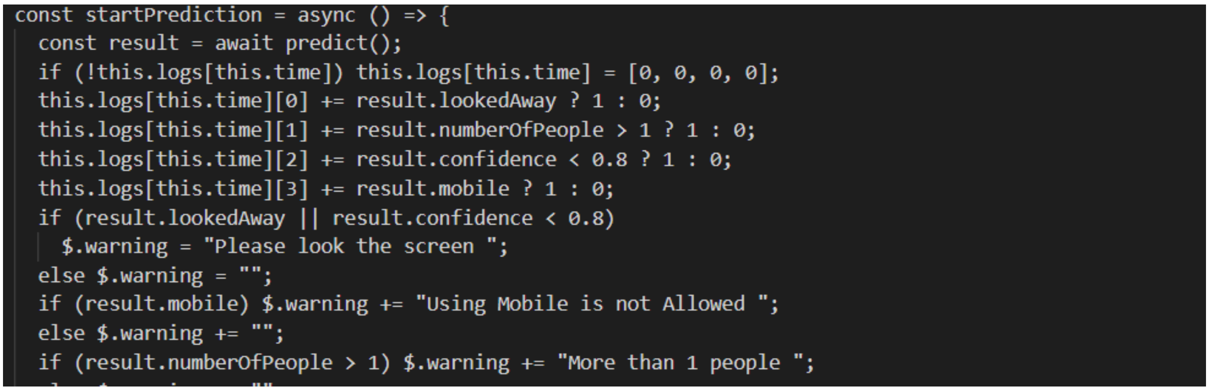


```
const mobilePredict = async () => {
  const predictions = await result[1].detect(
    document.querySelector("video")
  );
  return {
    mobile: predictions.some(
      (prediction) => prediction.class === "cell phone"
    ),
  };
};
const predict = () => {
  return Promise.all([facePredict(), mobilePredict()]).then(
    (result) => {
      return {
        ...result[0],
        ...result[1],
      };
    }
  );
};
```

Figure 7: Mobile detection logic

3.8 Warning For Misconducts

The below code contains the warning message which is been logged when any misconduct is done during the exam.

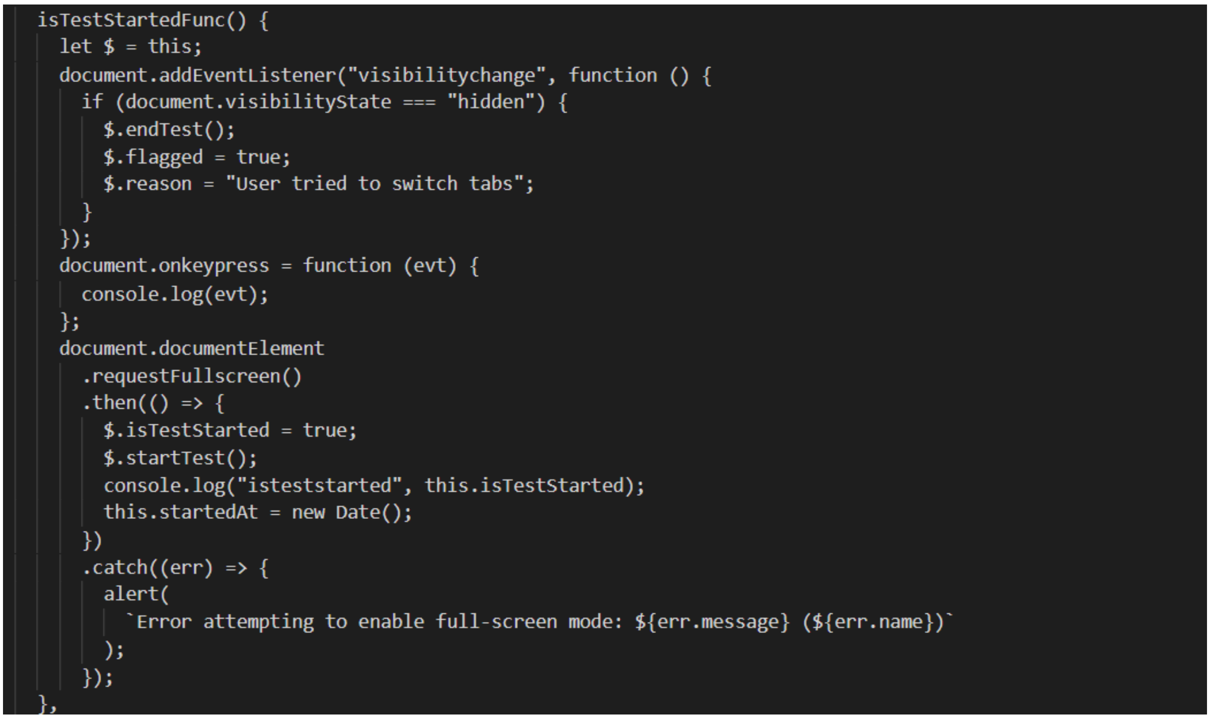


```
const startPrediction = async () => {
  const result = await predict();
  if (!this.logs[this.time]) this.logs[this.time] = [0, 0, 0, 0];
  this.logs[this.time][0] += result.lookedAway ? 1 : 0;
  this.logs[this.time][1] += result.numberOfPeople > 1 ? 1 : 0;
  this.logs[this.time][2] += result.confidence < 0.8 ? 1 : 0;
  this.logs[this.time][3] += result.mobile ? 1 : 0;
  if (result.lookedAway || result.confidence < 0.8)
    $.warning = "Please look the screen ";
  else $.warning = "";
  if (result.mobile) $.warning += "Using Mobile is not Allowed ";
  else $.warning += "";
  if (result.numberOfPeople > 1) $.warning += "More than 1 people ";
```

Figure 8: Warning Flaggs

3.9 Tab restriction

The below contatins the event handeler i.e visibility change which enters the browser in full sreen and end the exams upon tab change.



```
isTestStartedFunc() {
  let $ = this;
  document.addEventListener("visibilitychange", function () {
    if (document.visibilityState === "hidden") {
      $.endTest();
      $.flagged = true;
      $.reason = "User tried to switch tabs";
    }
  });
  document.onkeypress = function (evt) {
    console.log(evt);
  };
  document.documentElement
    .requestFullscreen()
    .then(() => {
      $.isTestStarted = true;
      $.startTest();
      console.log("isteststarted", this.isTestStarted);
      this.startedAt = new Date();
    })
    .catch((err) => {
      alert(
        `Error attempting to enable full-screen mode: ${err.message} (${err.name})`
      );
    });
},
```

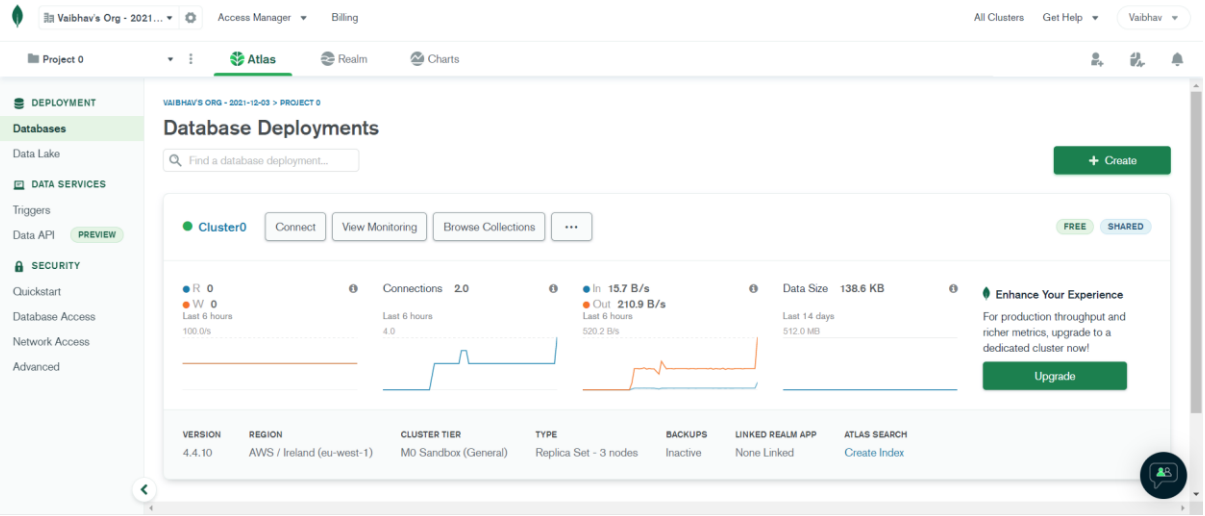
Figure 9: Tab Restriction

3.10 Database Setup –

For implementation of this project, Cluster on mongoDB atlas is created in which database is created automatically as connection is establised using credentials.

3.11 Database Deployment –

As shown in the bwlow image, one cluster is created in mongoDB atlas naming Cluster0



Database Deployments

Cluster0

R 0
W 0
Last 6 hours
100.0/s

Connections 2.0
Last 6 hours
4.0

In 15.7 B/s
Out 210.9 B/s
Last 6 hours
520.2 B/s

Data Size 138.6 KB
Last 14 days
512.0 MB

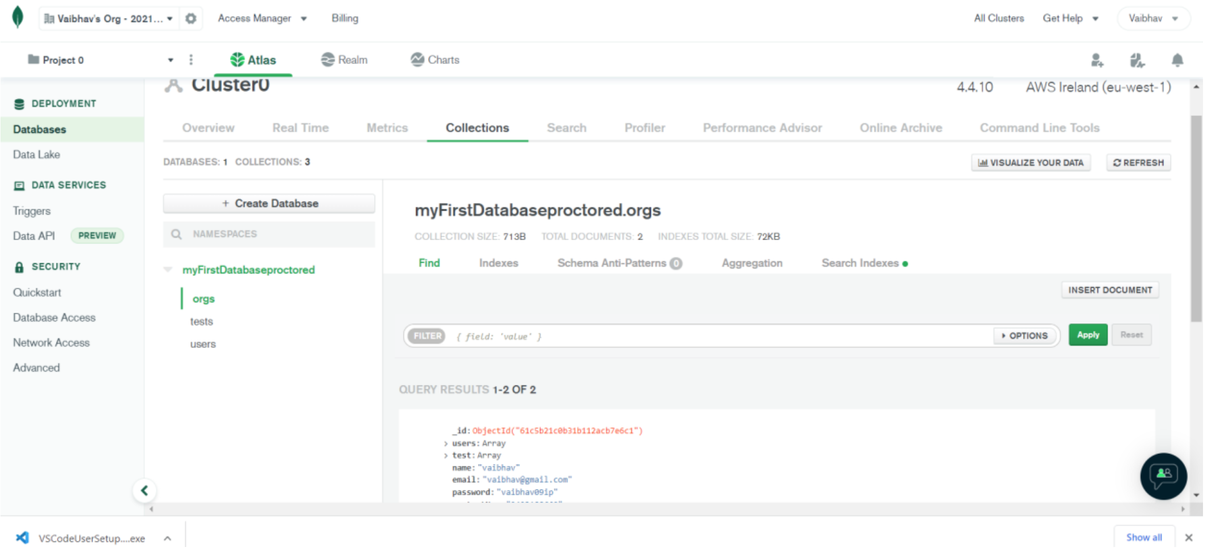
Enhance Your Experience

For production throughput and richer metrics, upgrade to a dedicated cluster now!

VERSION	REGION	CLUSTER TIER	TYPE	BACKUPS	LINKED REALM APP	ATLAS SEARCH
4.4.10	AWS / Ireland (eu-west-1)	M0 Sandbox (General)	Replica Set - 3 nodes	Inactive	None Linked	Create Index

Figure 10: Cluster Overview

Database –
As shown in the below image three collection got created i.e orgs, tests and users upon connection.



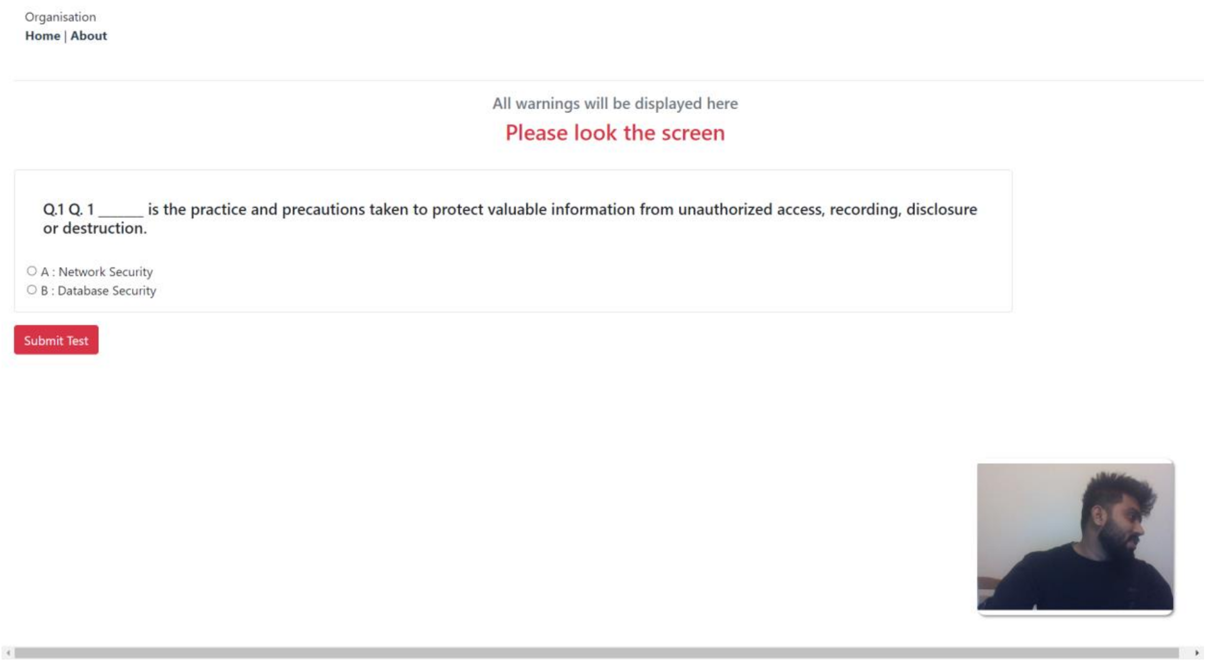
```
  _id: ObjectId("61c5b21c0b31b112acb7e6c1")
> users: Array
> test: Array
  name: "vaibhav"
  email: "vaibhav@gmail.com"
  password: "vaibhav09ip"
```

Figure 11: Database Collection

4 Evaluation

The evaluation is carried out to analyse the implementation accuracy of detecting misconducts during the online examination.

Case 1: Candidate trying to talk with other person by looking at him.
As shown in the below images whenever candidate look away from screen then the warning is displayed to the candidate and even it is logged in the system



Organisation
Home | About

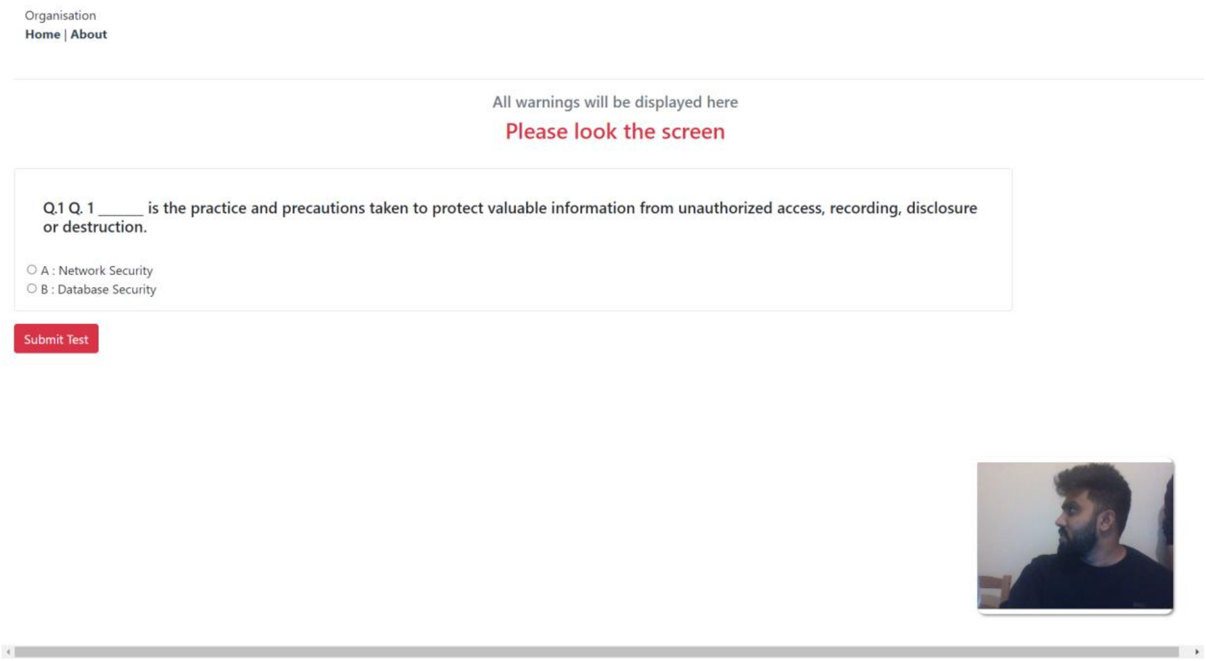
All warnings will be displayed here

Please look the screen

Q.1 Q. 1 ______ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.

○ A : Network Security
○ B : Database Security

Figure 12: User looking away from the camera towards right



Organisation
Home | About

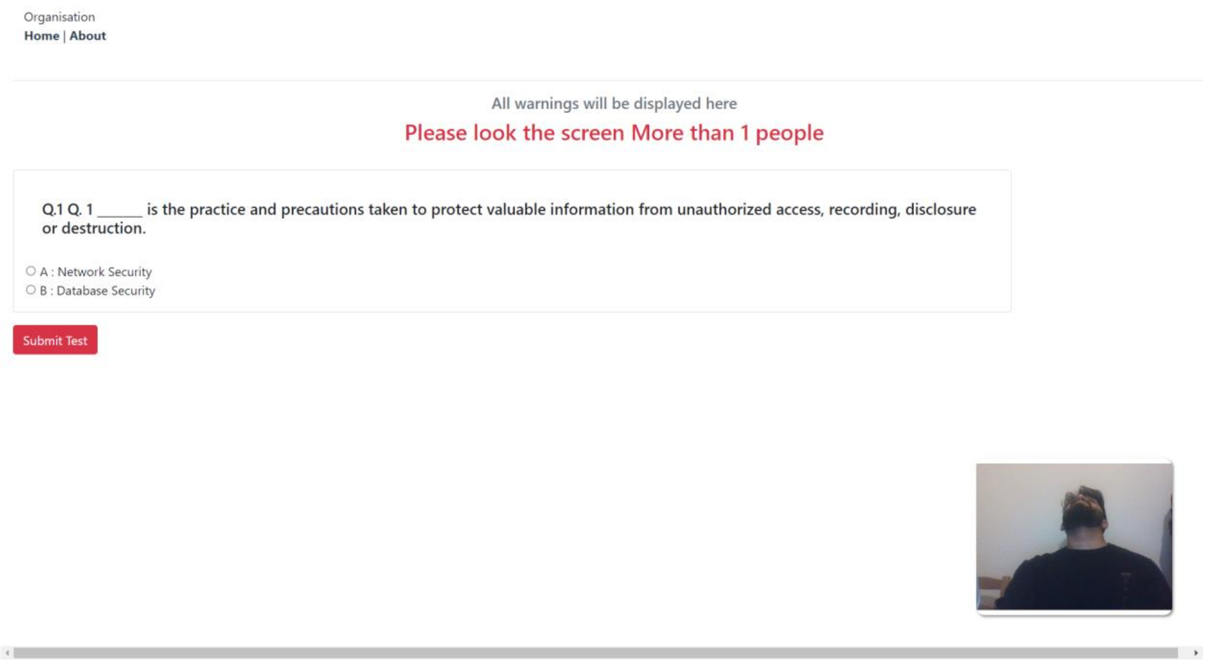
All warnings will be displayed here

Please look the screen

Q.1 Q. 1 ______ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.

○ A : Network Security
○ B : Database Security

Figure 13: User looking away from the camera towards left


Organisation
Home | About

All warnings will be displayed here

Please look the screen More than 1 people

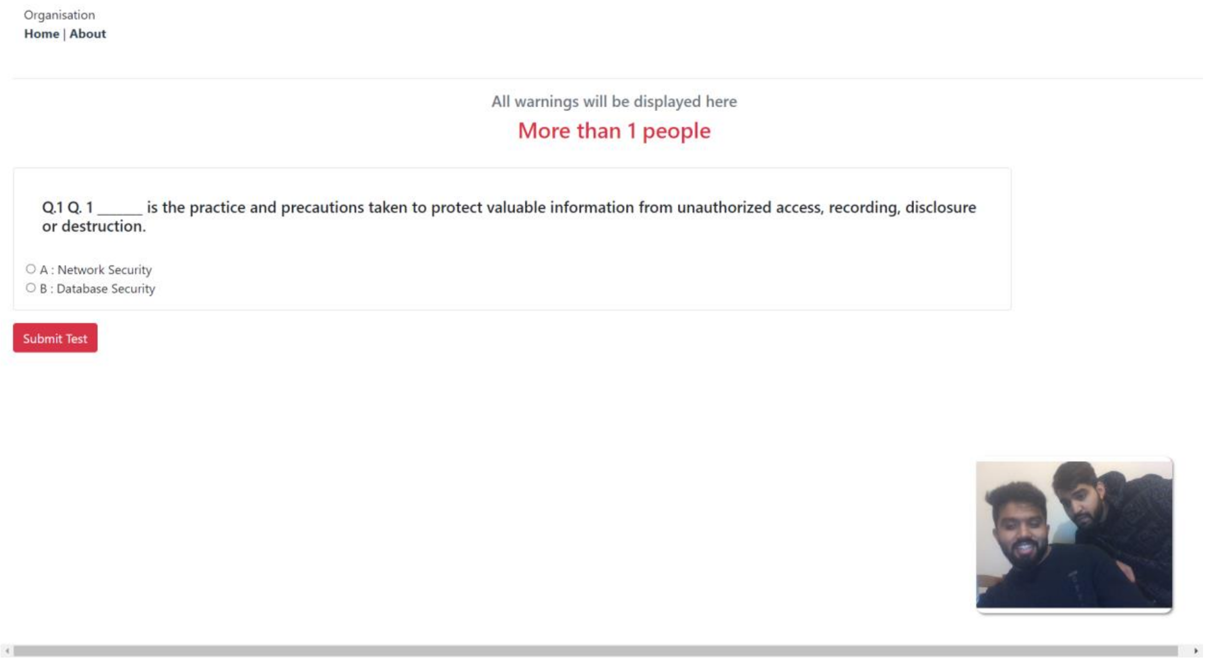
Q.1 Q. 1 ______ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.

○ A : Network Security
○ B : Database Security

Figure 14: User looking away from the camera

Case 2: More than 1 people

As shown in the below image whenever the second person tried helping the candidate it is flagged by the system with warning i.e. More than 1 People


Organisation
Home | About

All warnings will be displayed here

More than 1 people

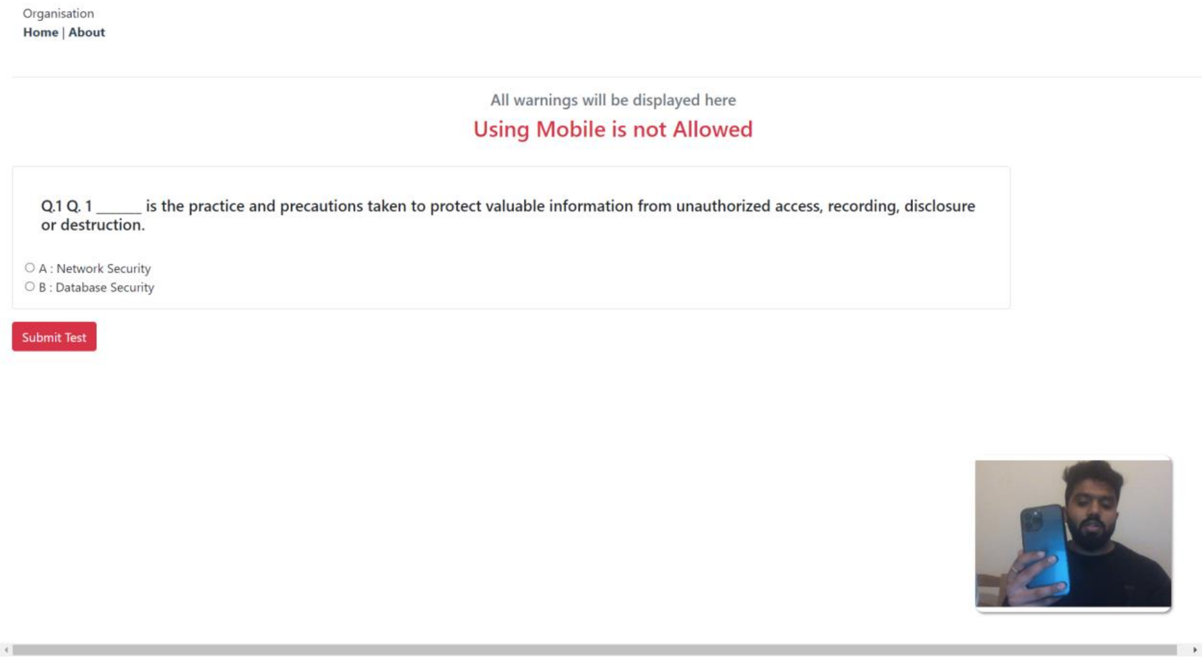
Q.1 Q. 1 ______ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.

○ A : Network Security
○ B : Database Security

Figure 15: More than 1 people in the frame

Case 3 – Object detection

As shown in the below image, during exam we tried to use mobile phone and smart watch which has been detected by the system and warning has been flagged i.e. Using mobile is not allowed.



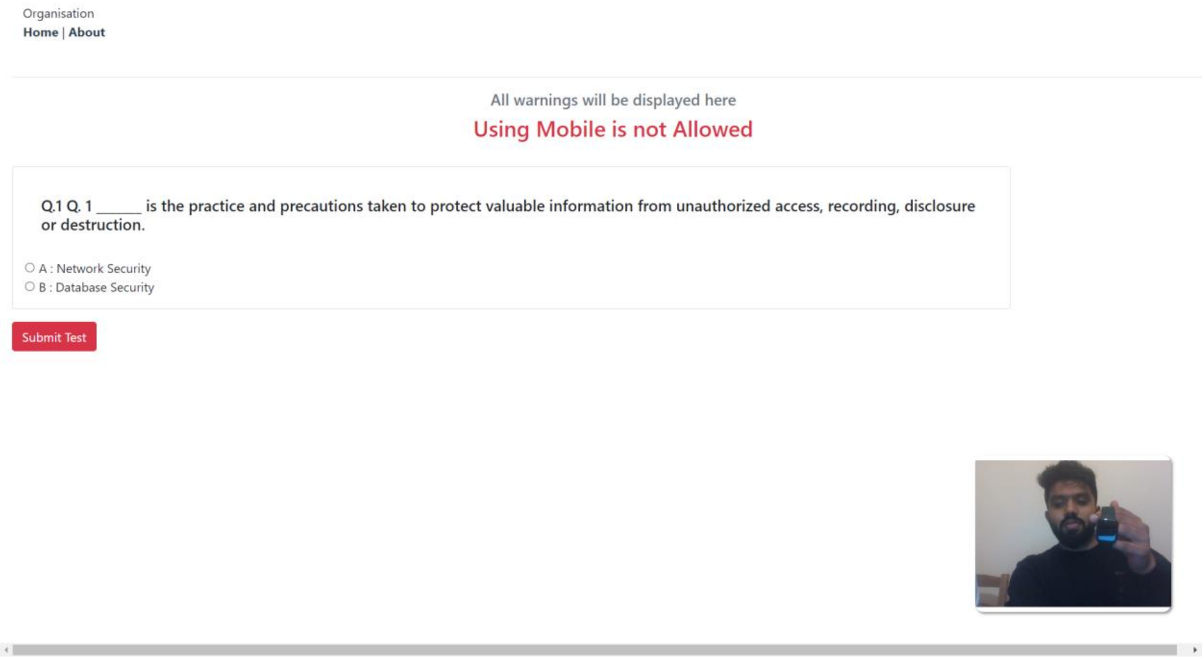
All warnings will be displayed here

Using Mobile is not Allowed

Q.1 Q. 1 ______ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.

○ A : Network Security
○ B : Database Security

Figure 16: Candidate Using Mobile Phone



All warnings will be displayed here

Using Mobile is not Allowed

Q.1 Q. 1 ______ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.

○ A : Network Security
○ B : Database Security

Figure 17: Candidate Using Smart Watch

5 Internship Task Report

The Internship Activity Report is a 1-page monthly summary of the activities performed by you and what you have learned during that month. The Internship Activity Report must be signed off by your Company and included in the configuration manual as part of the portfolio submission.

Student Name: Vaibhav Gaikwad Student number: x20129173

Company: GenioBits Month Commencing: September-2021

Role Description:
The aim of the internship was to study and research on the developing secured unsupervised examination platform. The task performed are:

1. Analyses of real time face recognition techniques.
2. Doing research on secure authentication mechanism
3. Research object detection mechanism for online examination.
4. Doing research based on browser restriction capabilities.

Employer comments

During these period of internship programme with us we found him hardworking, consistent and inquisitive. He constantly communicated for guidance regarding the assigned research.

Student Signature: ____________Date: 05/01/2022

Industry Supervisor Signature: ______________________Date: 01.04.2022

References

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"TensorFlow.js | Machine Learning for JavaScript Developers", *TensorFlow*, 2022. [Online]. Available: https://www.tensorflow.org/js. [Accessed: 04- Jan- 2022].

"tfjs-models/coco-ssd at master · tensorflow/tfjs-models", *GitHub*, 2020. [Online]. Available: https://github.com/tensorflow/tfjs-models/tree/master/coco-ssd. [Accessed: 04- Jan- 2022].