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يُونَيْتِي إِسْلَامُ، أَنْتَ أَرَبُّنَا مَلِكُنَا

**KULLIYAH OF INFORMATION AND  
COMMUNICATION TECHNOLOGY  
DEPARTMENT OF COMPUTER SCIENCE**

**FINAL YEAR PROJECT REPORT**

**SRC VOTING SYSTEM WITH FACE AUTHENTICATION**

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# **FINAL YEAR PROJECT REPORT**

**PROJECT ID: 529D**

**PROJECT TITLE: SRC VOTING SYSTEM WITH FACE  
AUTHENTICATION**

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## **ABSTRACT**

The aim of this study is to develop an online voting system with functions for holding elections, taking surveys and facial authentication. In-person voting has many downsides of being inaccessible to many people and in many circumstances. To develop the online voting system, Laravel was used, which is a PHP framework. For the face authentication, python deep CNN 'face-recognition' library and 'opencv' library was used. The developed system can be used to hold elections properly, take surveys, make announcements and make use of face authentication for identification before ballot is cast.

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## **LIST OF ABBREVIATIONS**

DCT	Discrete Cosine Transform
DWT	Discrete Wavelet Transform
HFR	Human face recognition
SRC	Student Representative Council

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Overview**

In the university, International Islamic University Malaysia, holds a lot of elections related to different things in different departments and for different positions. Any improvement to the current in-person voting is sorely needed, especially when everyone is experiencing a pandemic.

Elections are an integral part of any democratic society. Making sure the process of holding elections are secure and accessible is highly important to preserve a transparent and working democracy. In International Islamic University Malaysia, there are various elections that are held, either in specific departments/kuliyahs or in the whole university. This online voting system is tailor made for holding elections for positions among students in IIUM and for students to participate and vote for their preferred candidates, all through a web application.

IIUM campuses and kuliyahs hold elections every so often to elect students for certain positions such as the Student Representative Council (SRC). Generally, these elections are pretty grand in the sense that the university heavily encourages these types of activities and participations. There are leaflets, voter outreach and so on, to let the voters know about the candidates' policies and goals. Here, the system aims to allow students and staffs to vote and participate in these elections at their own convenience,

remotely and securely. It will have secure face authentication as security for casting votes.

## **1.2 Problem Statement**

Elections being in-person creates a lot of issues but here are a range of issue that students potentially face or issues with current system in general.

1. Low voter participation rate in elections.
2. Physical or offline voting can be very inconvenient because of -
  - Specific venue for ballot casting
  - Long queues
  - Odd timing
  - Not being present at the kulliyah for any reason
3. Might clash with class timings.
4. They might have exams later, leaving them no time to vote physically.
5. Sees time wasted voting offline, as not worth it to bother to vote.

## **1.3 Project Objectives**

This projects objectives encompass all works related to developing the web application and the primary ones are –

1. Building a voting system with all the functionalities needed for holding elections and voters to vote in said elections.
2. Having built in survey system for users to voice their preferences.
3. Building secure face authentication using python deep learning.

Adding in admin panel functionalities that can control all the elections, surveys, announcements and all the modifying students' data.

## **1.4 Project Scope**

This project scope includes all functions of holding elections and casting ballots by the user. It has to also include face authentication for extra verification when casting ballot in an election. There has to be a survey function where questions can be asked as a poll and answers can be taken in the form of agreement or disagreement.

## **1.5 Project Significance**

Regarding IIUM students, they currently don't engage in student politics all that much. It's inconvenient and often times untimely. Students have classes to attend, assignments to do and so on. Election voting is generally held in kulliyah during daytime with long queues. Meaning the students that are either busy with coursework or don't find it convenient to stand in line and use a lot of time to vote, end up not voting.

It is also the fact that students who do vote, most of them don't even have any ideas about the candidates or their policies. It's generally gets down to name recognition or popularity contest, rather than policy differences.

This system will help students avoid queues, inconvenient timings and actually participate in the elections and have a voice in what happens onwards. They can engage in fruitful discussions with their fellow students about the candidates or the policies and the needs of everyone. Students' user information will be taken from IIUM database and with that the students can securely, in their convenience and comfort, vote for their preferred candidates. This could increase voter participation a lot.

## **CHAPTER TWO**

### **REVIEW OF PREVIOUS WORK**

There have been many research papers published related to online voting or remote voting. There are countries like Estonia that have been using online voting system since their past national elections. Those papers were looked at and what their findings was, what types of functions their systems used, results and other notable information and was picked out.

In the study (Clarke, D., & Martens, T., 2016, p.5), Estonian online voting system that has been in place for a long time, was researched. They thoroughly researched about all the elections held after the introduction of internet voting and how their voting system works. The research concludes that the method of internet voting has been very successful. Estonian government made strict, unique, highly secure and reliable voting system. It is well done and through research and with well put together report providing all the necessary information on Estonia's Internet voting.

In the research paper (Serdült, 2014, p.197), the case for internet voting in Switzerland was looked into and found to be quite effective. The contrast can be easily seen between this study on Switzerland and the previous one on Estonia. Here the swiss are ahead in doing referendums using internet voting while Estonia fully generalized it. This literature shows the difference in implementation, their methods and such pretty well.



In the paper (Vazquez-Fernandez, E., & Gonzalez-Jimenez, D., 2016), There is discussion on the requirements of biometric systems, their advantages and disadvantages of different type of face authentication, using different sensors and specialized chips for better and more secure authentication et cetera. They come to the conclusion that if enough specialized methods or chips are used then it can be very secure and scarce to vulnerabilities.

In the research paper (Heiberg, S., & Willemson, J., 2015, p.3), the voting scheme of Estonia is discussed, where voters can check the cast-as-intended and recorded-as-cast properties of their vote. It discusses the behind-the-scenes mathematics and system calculations and how the system operates to do all the things securely and without leaving any means for breach. It shows possible manipulation for votes and such in great length.

In the study (Spada, P., Mellon, J., Peixoto, T., & Sjoberg, F. M. 2016, p.3), effect on voter turnout or voter participation with internet voting availability in an election is researched on data from a referendum and related surveys in Brazil. They also try to find out the demographics of the online only voters. Result shows, voter participation is higher and generally, those who previously voted offline, continue to do so and those who voted online this time, have not participated previously. This research using data and survey shows favorable results for online voting systems.

The paper (Lukas, Mitra, Desanti, & Krisnadi, 2016, p.1032), covers DWT – Discrete Wavelet Transform – and DCT – Discrete Cosine Transform – in HFR – Human face recognition. It has in depth analysis of these in face recognition and discussion about the results. The analysis on the methods and the results are all given for relatively easy understanding.

The research paper (Vassil, Solvak, Vinkel, Trechsel, & Alvarez, 2016, p.456). This research looks to find out the changing of e-voting over time by using Rogers' theory of the diffusion of innovations. The result is, there was age difference in usage, but it gradually narrowed because of widespread use among all age groups in consequent elections.

In the research paper (Lin, Wang, & Tsai, 2016, p.18), support vector model classifier and its use are discussed and then presents face recognition model with distributed facial features. They conducted experiments for its effectiveness. They produced accuracy of 89%.

## CHAPTER THREE

### METHODOLOGY

Hybrid-agile methodology is used to manage this project. Since this is a software development project and within a small group of 2 person, using agile methodology seemed to be the best course of plan.

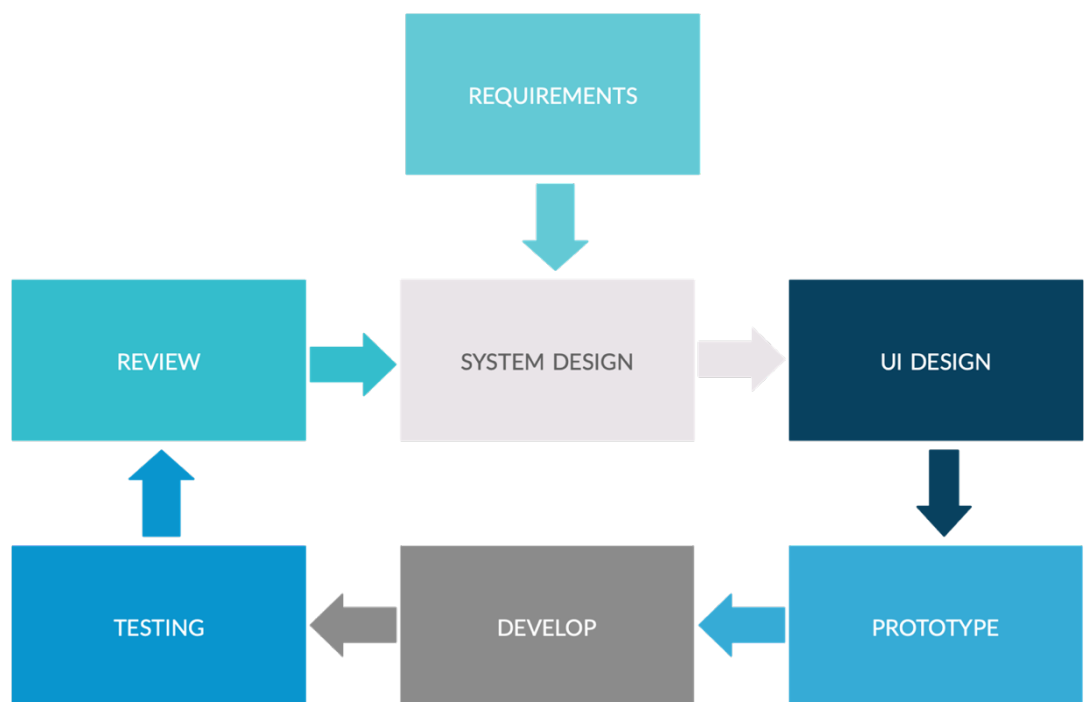


Figure 1: System development cycle

Started with gathering all the requirements, designing the system was planned. Then, moved on to UI design and prototyping using HTML and CSS directly instead of prototype builders. After that, the PHP framework Laravel and SQL database was used to develop the system. Further, all the

functionalities were tested to see if they work properly. Finally, everything was reviewed, and changes were made wherever needed.

### 3.1 System Design

System would include different types of users and with different privileges. Users are admin and students.

Class Diagram –

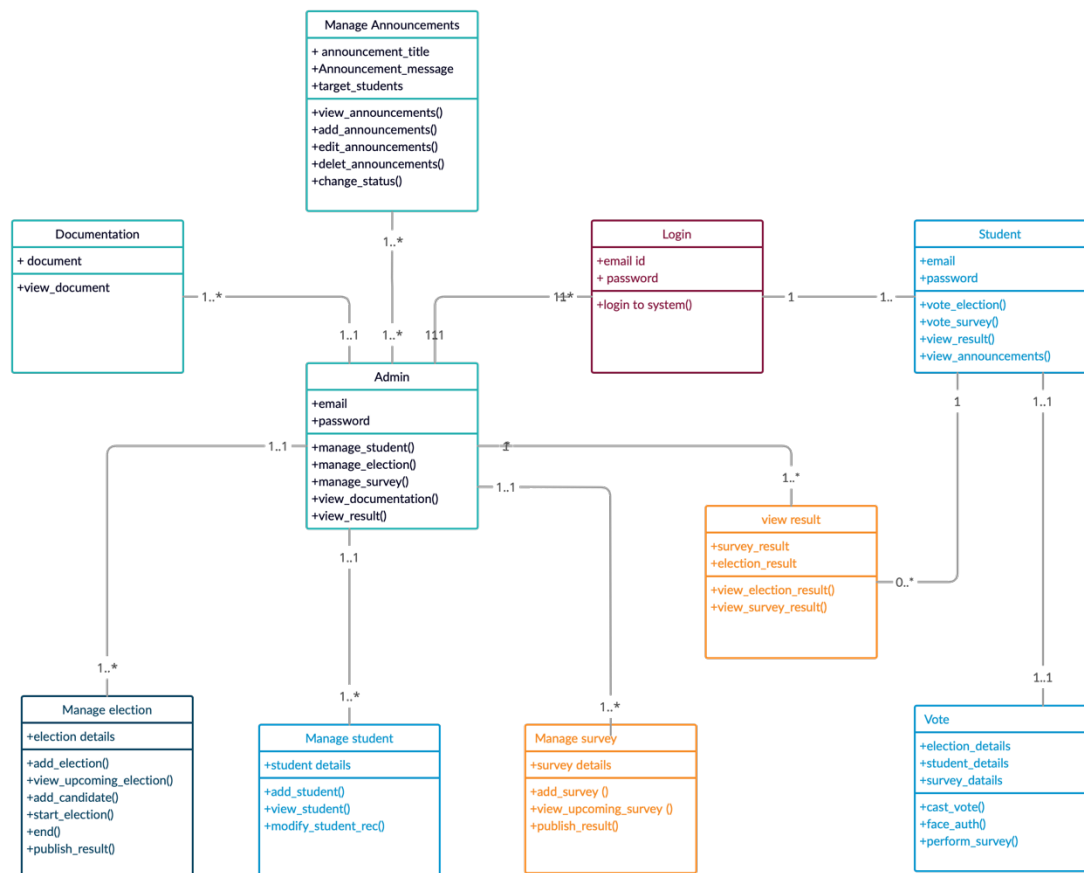


Figure 2: Class diagram

## Use case diagram –

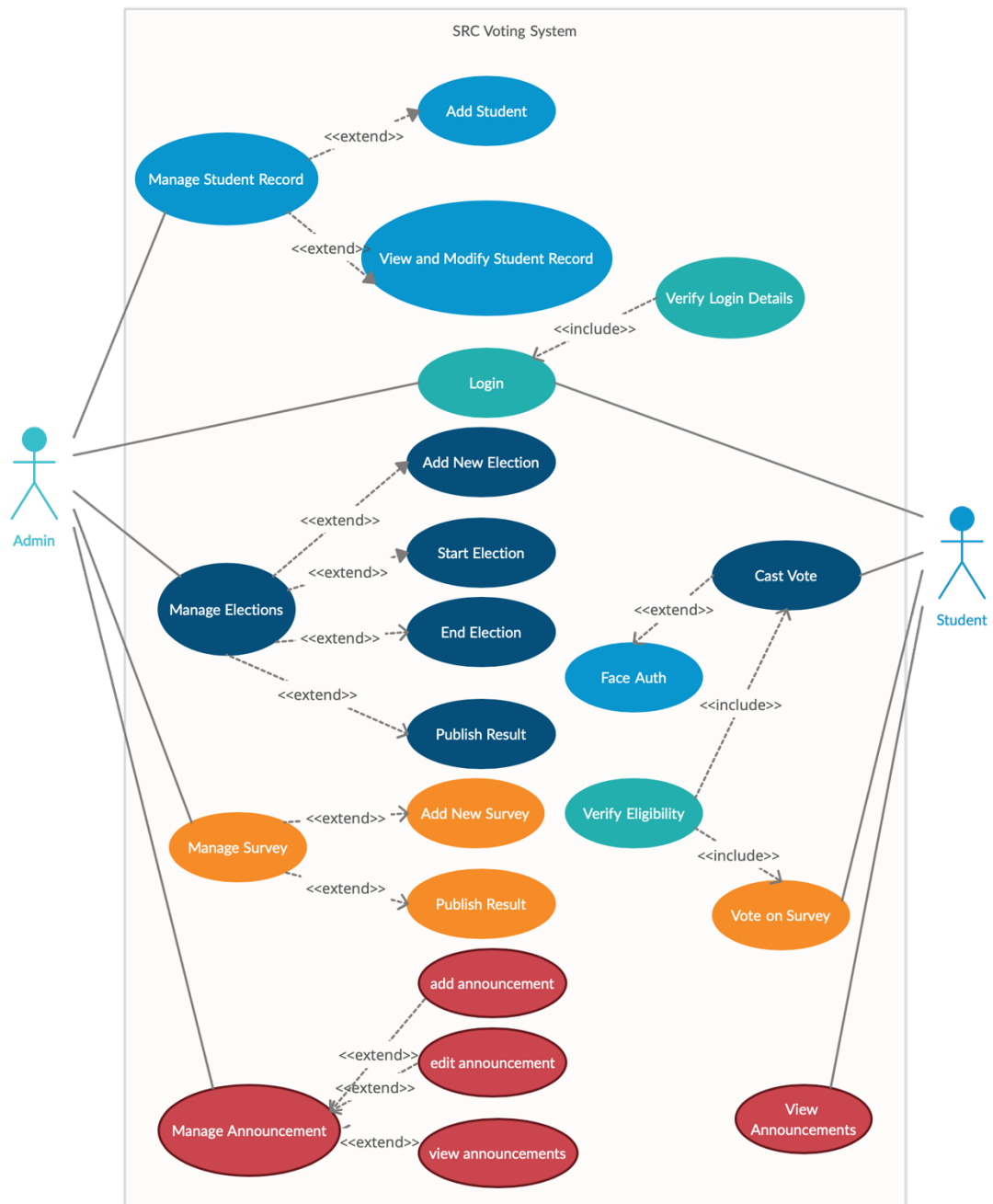


Figure 3: Use case diagram

## Activity Diagram –

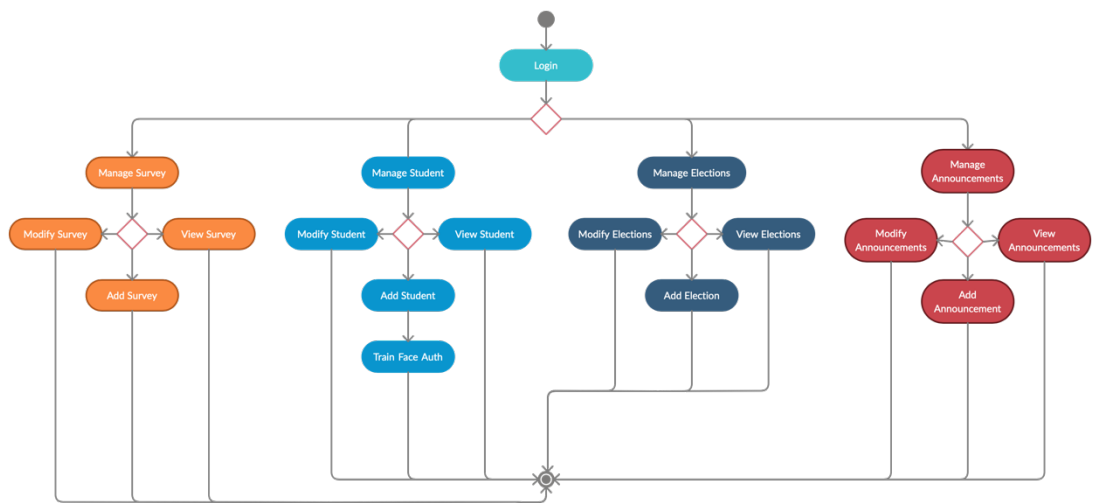


Figure 4: Activity diagram for admin

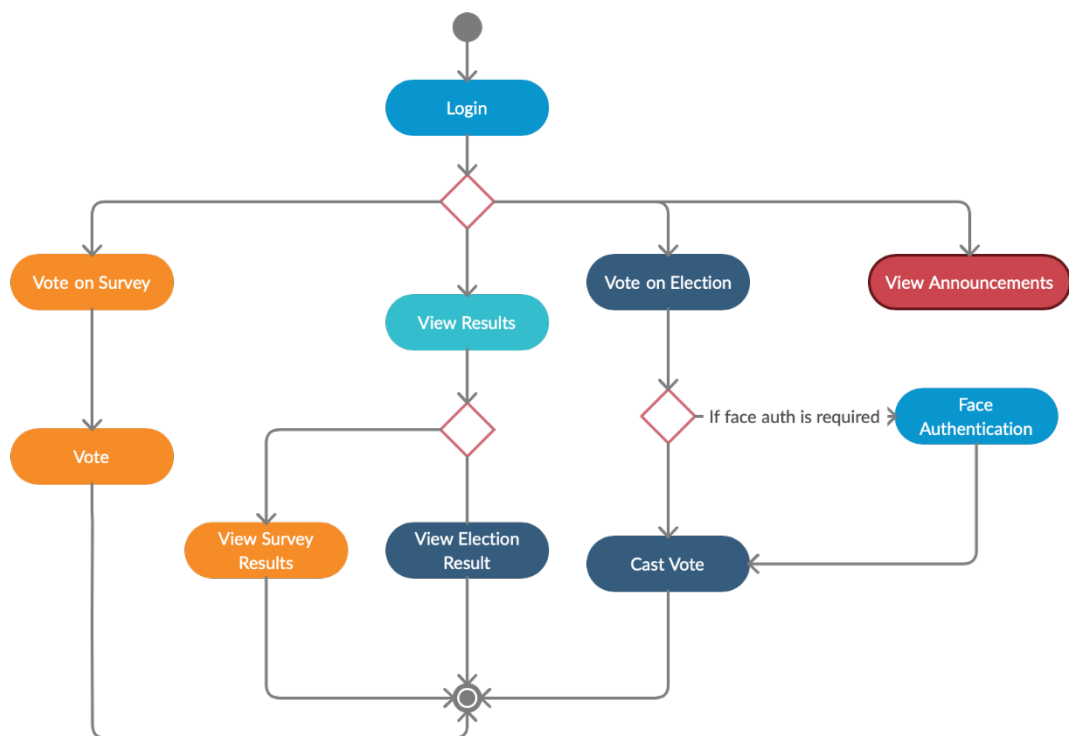


Figure 5: Activity diagram for students

Process flow –

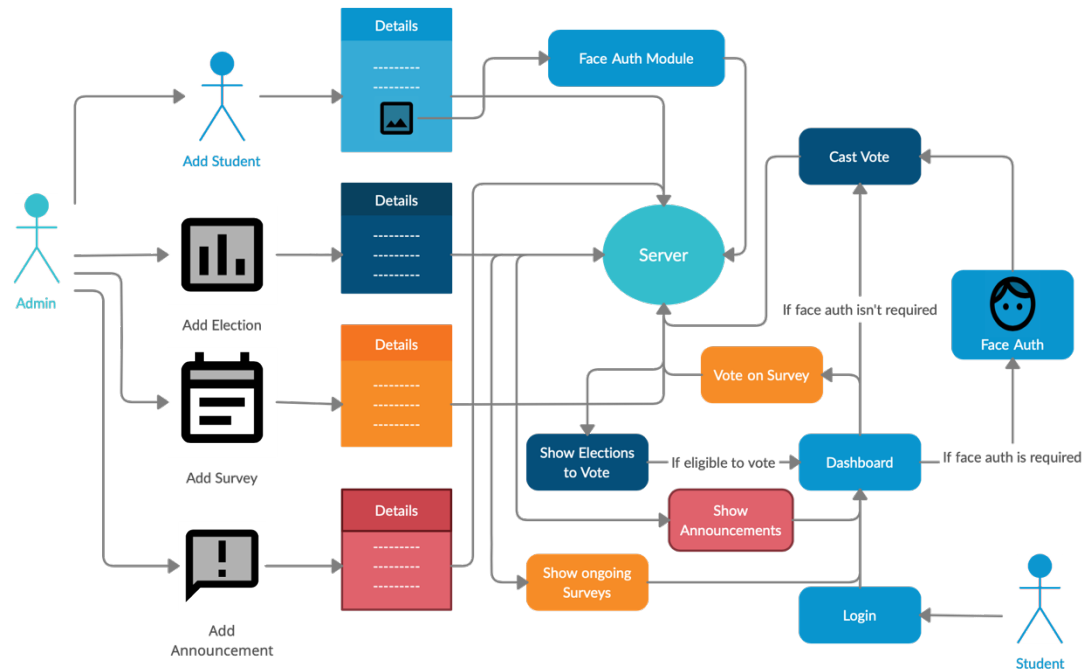


Figure 6: Application process flow

### 3.2 Implementation

To implement Voting system, Laravel, a PHP framework was used. And alongside Laravel, phpMyAdmin have been used for database. The user interfaces were also taken from the prototype interface that was made in designing phase using markup language HTML and Bootstrap. Laravel is a proper framework and a very popular one for web-development. It's clean, organized, well supported and very intuitive to use. Which is this framework was chosen for the project implementation.

For face authentication, python 'face-recognition' library was used along with 'opencv' library , to build and then implement on the website.

Features implementation –

Table 1: Features & functions

NO	FEATURES	FUNCTIONS
1	Log In/ Log Out	Enable users to log in using his/her Email ID and password
2	Add Student	Enable admin to add student in the system
3	View registered students	Enable admin to view currently registered students in the system
4	Add election	Enable admin to add new election by providing required details
5	View upcoming election	Enable admin to view and manage the upcoming elections
6	Add new candidate to election	Enable admin to add candidates in a registered election
7	Start/end election	Enable admin to start or end the election
8	Publish election result	Enable admin to publish the result when the election is completed successfully
9	View result	Enable admin and students to view the result once it is published



10	Add survey	Enable admin to add survey
11	Publish survey result	Enable admin to publish the survey result
12	View system documentation	Enable admin to view the system documentation
13	View profile	Enable the user to view their profile details
14	Cast vote	Enable student to cast vote only one time if they are eligible for that specific election
15	Face authentication	Enable student to authenticate their face before casting vote if face authentication is required for that election
16	Perform survey	Enable student to perform survey if that student eligible for it
17	Add announcement	Enable admin to add new announcement by providing required details

18	Modify announcement	Enable admin to modify existing announcement to either change details, change online or offline state, and delete.
----	---------------------	--

### Database implementation

Database Name: Laravel

Tables: announcement, epositions, elections, face\_id, migrations, vote\_casts, survey, survey\_check, users,

Table 2.1: Database – epositions

Column	Type
id	bigint(20)
election_num	longtext
position_tag	varchar(255 )
position	varchar(255 )
name	varchar(255 )
m_num	varchar(100 )
vote	int(11)
result	varchar(255 )
created_at	timestamp
updated_at	timestamp

Table 2.2: Database - elections

Column	Type
id	bigint(20)
election_num	longtext
ename	varchar(255 )
date	varchar(20)
start_time	time
end_time	time
fid	varchar(255 )
voters	varchar(255 )
switch	varchar(255 )
p1	varchar(255 )
p2	varchar(255 )
p3	varchar(255 )
p4	varchar(255 )
p5	varchar(255 )
p6	varchar(255 )
p7	varchar(255 )

p8	varchar(255 )
p9	varchar(255 )
p10	varchar(255 )
created_at	timestamp
updated_at	timestamp

Table 2.3: Database - vote\_casts

Column	Type
matric_number	varchar(255 )
e_num	varchar(255 )
id	bigint(20)
created_at	timestamp
updated_at	timestamp

Table 2.4: Database – migrations

Column	Type
id	int(10)

migration	varchar(255 )
batch	int(11)

Table 2.5: Database - announcement

Column	Type
id	bigint(20)
title	varchar(255 )
status	varchar(255 )
target_stu	varchar(255 )
date	date
message	varchar(255 )
created_at	timestamp
updated_at	timestamp

Table 2.6: Database – face\_id

Column	Type
id	bigint(20)
encode	longtext
created_at	timestamp
updated_at	timestamp

Table 2.7: Database – survey

Column	Type
id	bigint(20)
survey_number	text
survey_ques	text
pic	varchar(255 )
target_stu	varchar(255 )
start_day	varchar(255 )
end_day	varchar(255 )
start_time	time
end_time	time
status	varchar(255 )
yes	int(11)
no	int(11)
report	int(11)
from	varchar(255 )
support	int(11)
created_at	timestamp
updated_at	timestamp

Table 2.8: Database – users

Column	Type
id	bigint(20)
name	varchar(255) )
role	int(11)
avatar	varchar(255) )
mnum	int(11)
pnum	int(11)
gender	varchar(255) )
kulliyyah	varchar(255) )
email	varchar(255) )
number	varchar(255) )
email_verified_at	timestamp
password	varchar(255) )

remember_token	varchar(100)
created_at	timestamp
updated_at	timestamp

Table 2.9: Database – survey\_check

Column	Type
id	bigint(20)
matric_number	varchar(255 )
s_num	varchar(255 )
created_at	timestamp
updated_at	timestamp

### 3.3 Testing

After implementation, testing phase would include all the functional testing of the system such as holding elections, selecting candidates, voting by dummy accounts and getting results to see if they are accurate. Testing out survey and authentications to see if they properly function and has adequate security. Each module of the whole system would be tested to see if they work in different environment.

Six Testing that we will be doing –



Table 3.1: Test Case Feature ID F001

<b>Test Case ID</b>	TC-01-001		
<b>Related Feature ID</b>	F001		
<b>Objective</b>	Verify login to the system		
<b>Covered Test Coverage Items</b>	TCOV-01-001, TCOV-01-002		
<b>Input</b>	<b>Expected Result</b>	<b>Special Procedural Requirements</b>	<b>Intercase Dependency</b>
User email and password	System redirects to src voting system website home page.	None	None

Table 3.2: Test Case Feature ID F002

<b>Test Case ID</b>	TC-02-002		
<b>Related Feature ID</b>	F002		
<b>Objective</b>	Verify registering new student		
<b>Covered Test Coverage Items</b>	TCOV-02-001, TCOV-02-002, TCOV-02-003		
<b>Input</b>	<b>Expected Result</b>	<b>Special Procedural Requirements</b>	<b>Intercase Dependency</b>
Student details	New student successfully added	None	None

Table 3.3: Test Case Feature ID F003

<b>Test Case ID</b>	TC-03-003		
<b>Related Feature ID</b>	F003		
<b>Objective</b>	View current student record		
<b>Covered Test Coverage Items</b>	TCOV-03-001, TCOV-03-002		
<b>Input</b>	<b>Expected Result</b>	<b>Special Procedural Requirements</b>	<b>Intercase Dependency</b>
Click on 'View student' button	Showing currently registered student record	None	None

Table 3.4: Test Case Feature ID F004

<b>Test Case ID</b>	TC-04-004		
<b>Related Feature ID</b>	F004		
<b>Objective</b>	Adding new election		
<b>Covered Test Coverage Items</b>	TCOV-04-001, TCOV-04-002		
<b>Input</b>	<b>Expected Result</b>	<b>Special Procedural Requirements</b>	<b>Intercase Dependency</b>
New Election details	New election added to the system	None	None

Table 3.5: Test Case Feature ID F005

<b>Test Case ID</b>	TC-05-005		
<b>Related Feature ID</b>	F005		
<b>Objective</b>	Adding new candidate		
<b>Covered Test Coverage Items</b>	TCOV-05-001, TCOV-05-002, TCOV-05-003		
<b>Input</b>	<b>Expected Result</b>	<b>Special Procedural Requirements</b>	<b>Intercase Dependency</b>
Candidate Matric Number	Candidate added to election	1. Candidate must be a registered student in the system.  2. Election status must be "New".	TCOV-04-004

Table 3.6: Test Case Feature ID F006

<b>Test Case ID</b>	TC-06-006		
<b>Related Feature ID</b>	F006		
<b>Objective</b>	Publish election result		
<b>Covered Test Coverage Items</b>	TCOV-06-001, TCOV-06-002		
<b>Input</b>	<b>Expected Result</b>	<b>Special Procedural Requirements</b>	<b>Intercase Dependency</b>
New election details	New election added to the system	None	None

### 3.3 Security

#### Password Hashing and Authentication Middleware –

When it comes to a secure system, it is very important to protect sensitive information even from the authorized hands of the system. For example, database administrator or system admin. The hashing technique is implemented in this project to develop a successful voting system that is enabled to secure the voters' password. Secure Bcrypt and Argon2 hashing algorithms are used in the system.



Figure 7: Hashing

After the application of the hash function, the password is stored as a hashed value in the database. While the user attempts to log in to the system, the hashed value is compared with the input password. If the values match, then the user gets access to the system.

For URL security three different middleware is used, which ensures that only the right person can access the right URL based on their role.

1. Auth: This is to get access to any page of the system, all the users need to pass this middleware, which verifies whether the user has logged in or not.

2. Admin: This middleware is similar to a group middleware to verify that only admin can get access to any URL for administration site. No regular user will be able to access them.
3. User: This middleware is used on user URLs so that no one including the admin will not get access to the user site for casting vote.

### **Voter Identity Hide –**

For a voting system, it is required to hide the vote casting details, for instance, which candidate was voted by the user and at the same time it is essential to keep records of the voters so that the same users are ineligible to vote for more than once for a particular election. To solve this issue, the user's ID and election number will be recorded in a separate table so that the user will not be able to vote multiple times and only the voter will know whom he voted for.

### **Face Authentication –**

Everyone is concerned about their security when it comes to using sensitive systems such as a voting system or banking system. But in this busy world, it is kind of expected for everyone to use these types of the digital platform so that people can save their time. A biometric authentication is a suitable approach in order to solve this problem.

In this system, only an authenticated person can access the vote casting page by using face authentication. This function is divided into two parts first;



the model is trained with a user image then the user is verified by using a webcam before the vote is cast.

## Training Data –

The users' real-time picture will be taken while the admin registers a new user to the system. The next task is to preprocess the image for face detection, which is a complicated process which includes resizing the image, converting BGR to RGB, etc.

However, with the help of the python OpenCV library, all these tasks can be done within a few lines of code. Face from the image will be detected by using a face recognition model (Geitgey, 2020). This model is trained with Deep Convolutional Neural Network with numerous images to detect the perfect match face and will give an output of “128 faces measurements”, which is called embedding in the machine learning world. The obtained measurement will be saved in the database with the username as known face details.

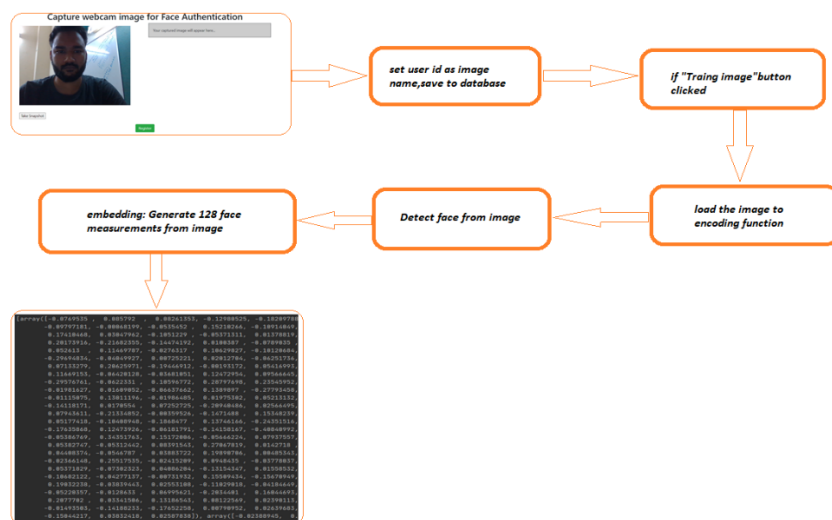


Figure 8: Model training process

### **Authentication process –**

This is the final and most exciting part where a user can vote after face authentication.

At first, the user image will be taken automatically using a webcam. The webcam will run until it detects any face. After detecting the face, the webcam will shut down and the taken image will go through the same process as the training process to get the 128 face measurement values. The value will be saved in a variable named unknown face.

The previously stored training data will be imported as known face details. The next step is to compare the unknown face details with all known face details to check if the user is registered in the system or not. If the user registered, then it will return the user id, or else it will return “no match found” for this comparing process, again face recognition model will be used.

The user will not be allowed to cast his vote if the model return “no match found” or if the returned id number does not match with the account owner id number. On the other hand, if the returned id matches with the account's owner id number then the user will be redirected to the vote casting page.

### **Email notification –**

To add one more step of security, email notification functionality is used in the system. This is a simple process where a user will be notified if any vote is casted from the user's account. The notification will be sent automatically to the users' email address which is taken during user registration.

## CHAPTER FOUR

### WEB APPLICATION

The layout, functions, look and feel, of the web application of online voting system include all parts of voting, authentication and surveys. There are many parts to the system that all have its intricacies

#### 4.1 User Interface

For designing user interface, HTML, CSS and bootstrap was used to design the UI. Ideas were taken from other websites to design for this system.

Here is how they look –

##### 4.1.1 Main Pages

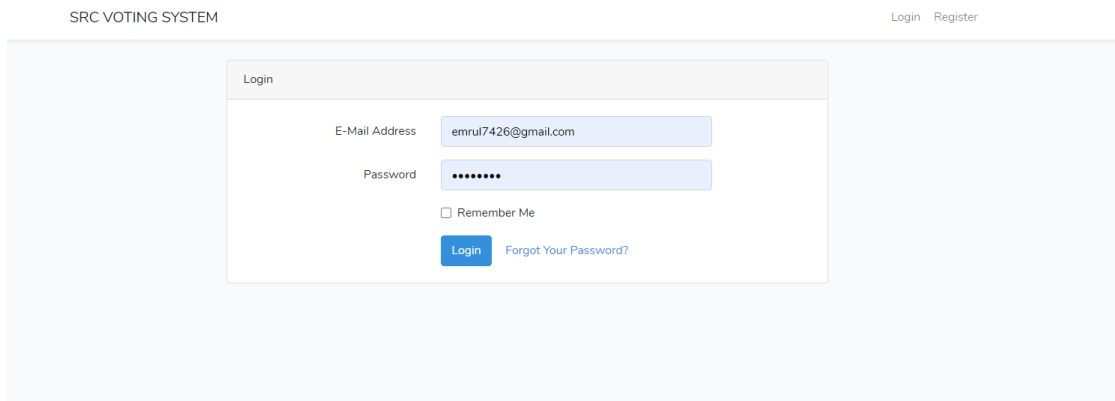
##### Landing Page



Figure 9: Landing page / Home

Once the user or the admin goes into the web link, this is the page that is shown. All of IIUM's important links are here for students to go to. They can go to login or register page from here.

## Login Page



The screenshot shows the login page of the SRC VOTING SYSTEM. At the top left, it says "SRC VOTING SYSTEM". At the top right, there are links for "Login" and "Register". The main content area is a light blue box containing a white login form. The form has a title "Login" at the top. It contains two input fields: "E-Mail Address" with the value "emrul7426@gmail.com" and "Password" with masked characters "\*\*\*\*\*". Below the password field is a checkbox labeled "Remember Me". At the bottom of the form are two buttons: a blue "Login" button and a blue link "Forgot Your Password?".

Figure 10: Login

To get into the website, users have can log in using their registered email address and passwords. Admin and user all use the same page to login to the site. Depending on the account authority, different part of the site will be shown and accessed after logging in. For example, a student login email and password will get the web page to load voter side of the website, while admin login email and password will get the web page to load admin side of the website.

### 4.1.2 Admin

Admin has its own dedicated part of the website and functionalities. Its functions are different from the users.

## Dashboard

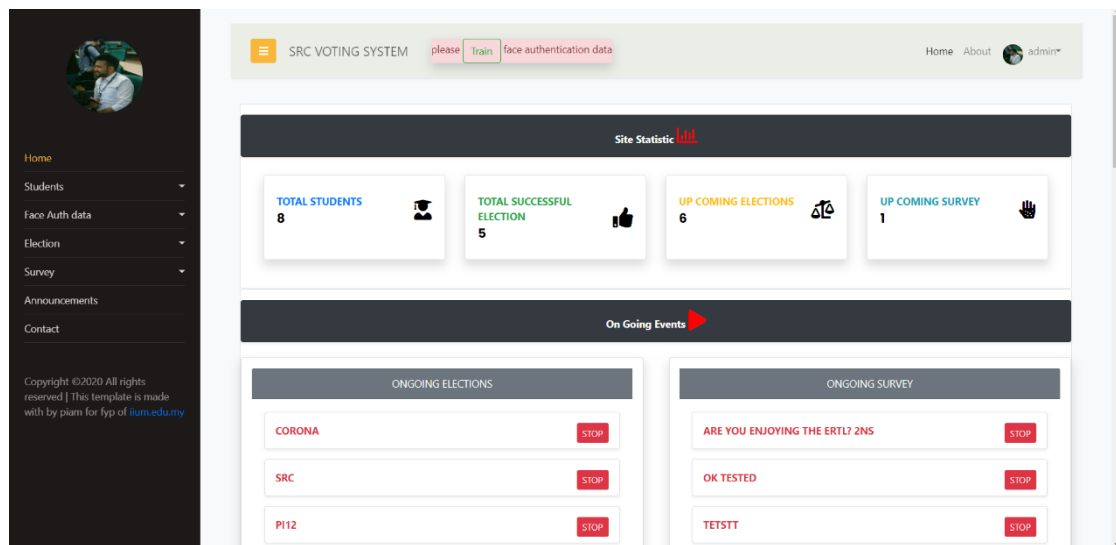


Figure 11: Admin dashboard

When the admin logs into the system with admin credentials, this is dashboard that opens up. There is sidebar on the left with students, face auth data, election, survey etc and on the right side, there are glanceable and interactable information on the dashboard. There is site statistics to look and ongoing events to interact with.

## Profile

The screenshot shows the Admin profile page. The top navigation bar is identical to the dashboard. The main content area features a profile section for 'admin's Profile'. It includes a profile picture, a link to 'Update Profile Image', and a 'Choose File' button. Below the profile section, there is a 'Change Password' section with a 'Change Password?' link. The 'Change Password' section contains three input fields: 'Current Password', 'New Password', and 'Confirm New Password'. The 'Current Password' field is pre-filled with 'current password...'. The 'New Password' and 'Confirm New Password' fields are empty.

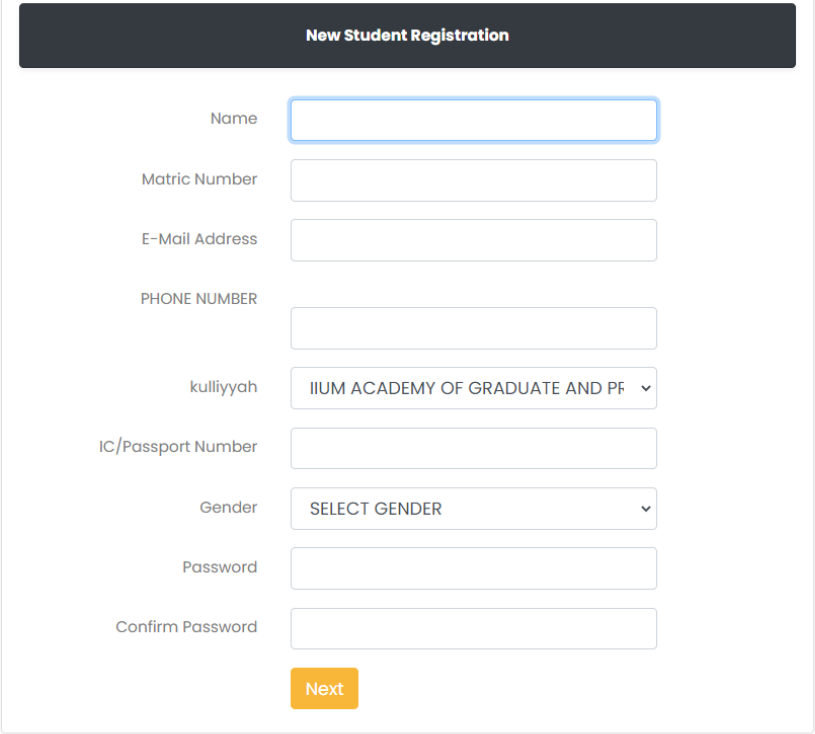
Figure 12: Admin profile

This is how the admin profile appears in the profile page. All personal information are here and the admin can change their password from this section.

## Student

In Student section, admin can add new student, view and mange students, and train their image model for face authentication.

### Add Student



The image shows a 'New Student Registration' form. It has a dark header with the title 'New Student Registration'. Below the header, there are several input fields: 'Name' (highlighted with a blue border), 'Matric Number', 'E-Mail Address', 'PHONE NUMBER', 'kulliyyah' (a dropdown menu showing 'IIUM ACADEMY OF GRADUATE AND PF'), 'IC/Passport Number', 'Gender' (a dropdown menu showing 'SELECT GENDER'), 'Password', and 'Confirm Password'. At the bottom of the form is an orange 'Next' button.

Figure 13: Adding student

Admin can add new student in this section by filling in all the student details like the student name, matric number, email address, phone number etc.

## Face Auth model train Alert

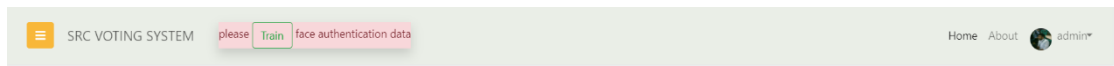


Figure 14: Facial authentication training alert

Admin gets alert after adding student to train the model with the student's picture for face authentication.

## Train model using Webcam Image

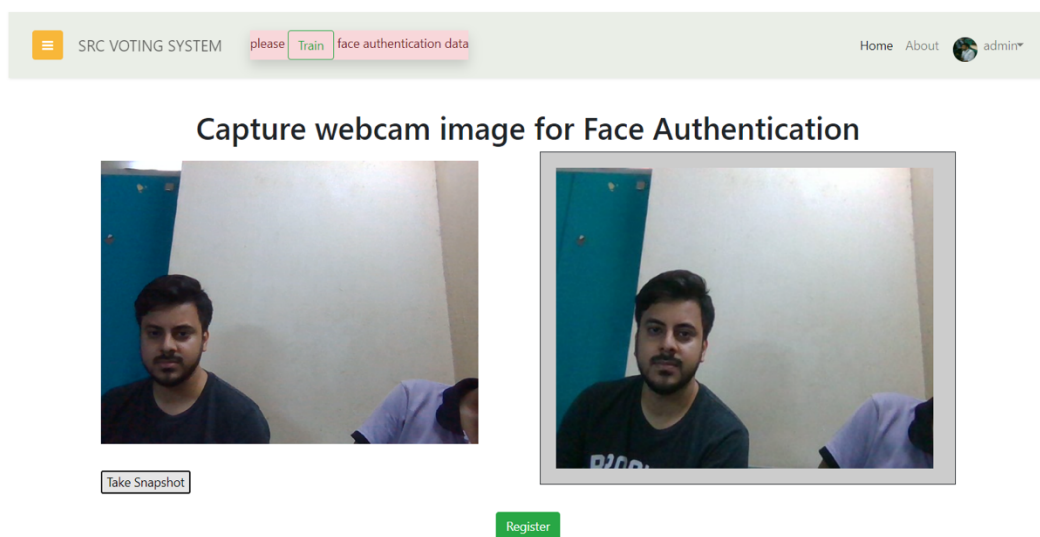




Figure 15: Capturing image for model training

Students pictures are taken for images and then model is trained based on the image.

## Manage Students

 SRC VOTING SYSTEM please [Train](#) face authentication dataHome [About](#)  admin

CURRENTLY REGISTERED STUDENTS

Search..

SL	NAME	MATRIC NUMBER	PASSPORT/IC NUMBER	PHONE	EMAIL	GENDER	KULLIYYAH	Action
2	Piam Emrul Hasan	182367	6492827	014235468	emrul7426@gmail.com	MALE	kict	<a href="#">Edit</a> <a href="#">Delete</a>
4	ashik muhammad	123123	123456	12225555857	ashik@gmail.com	SELECT GENDER	pg	<a href="#">Edit</a> <a href="#">Delete</a>
5	uuu	67567	1234	1234566766	piam@gmail.com	MALE	pg	<a href="#">Edit</a> <a href="#">Delete</a>
10	tahan	181	123123	+641163991147	tttt@gmail.com	SELECT GENDER	kict	<a href="#">Edit</a> <a href="#">Delete</a>
11	Piamta	1823649	1231278	0171856668	piamel0@gmail.com	FEMALE	kict	<a href="#">Edit</a> <a href="#">Delete</a>
20	wasique	1231237	12312345	+601168252	wa@gmail.com	FEMALE	kict	<a href="#">Edit</a> <a href="#">Delete</a>
24	kas	1478896	1231223	+601163991147	kass@gmail.com	FEMALE	pg	<a href="#">Edit</a> <a href="#">Delete</a>
25	antor	1465	12312369	31163991147	antor@gmail.com	MALE	kict	<a href="#">Edit</a> <a href="#">Delete</a>

Figure 16: Managing students

All the students' information can be seen in this page. Here the admin can edit the students' information or delete student from the system entirely. He can also add their face authentication in the edit section.



## Election

In the election section, admin can create, edit and view all the elections and have a lot more functionality.

### Election Details

SRC VOTING SYSTEM									
Home About admin*									
ON GOING ELECTION DETAILS									
Search Ongoing election..									
SL	ELECTION NUMBER	ELECTION NAME	FACE AUTH	START TIME	END TIME	VOTERS	STATUS	SWITCH	
43	23600323af8e815	test_fid_no	no	2021-01-17 01:38:00	2021-01-21 01:34:00	allstu	Election is live now	Pause	END VOTE
41	235fe589e21b53f	2121	yes	2021-01-11 18:28:00	2021-01-27 18:22:00	kict	Election is live now	Pause	END VOTE
33	235fdf793d4954f	222	no	2021-01-11 18:20:00	2021-01-22 18:15:00	kict	Election is live now	Pause	END VOTE
29	235f890bd8b0212	pi12	no	2021-01-14 18:38:00	2021-01-21 18:38:00	kict	Election is live now	Pause	END VOTE
28	235f890b77e0f76	pi12	yes	2021-01-20 18:03:00	2021-01-23 18:03:00	pg	waiting for election to start	Pause	Move to upcoming election zone
27	235f88f1a5ed89a	testing_up	yes	2021-01-11 16:35:00	2021-01-27 16:35:00	kict	Election is live now	Pause	END VOTE
UPCOMING ELECTION DETAILS									
Search upcoming election..									
SL	ELECTION NUMBER	ELECTION NAME	FACE AUTH	START TIME	END TIME	VOTERS	STATUS	SWITCH	Action
42	236003201204b9f	corona	yes	2021-01-21 01:18:00	2021-01-28 01:19:00	allstu	new	Move to ongoing zone EDIT	Delete Add Candidate
37	235fdf7a97d03bf	tt	no	2020-12-07 18:25:00	2020-12-31 18:25:00	kict	new	Move to ongoing zone EDIT	Delete Add Candidate

Figure 17: Election details

In this section, the admin can view all ongoing and upcoming elections. He can also interact with the elections from here. There are 'move to ongoing' and 'move to up coming' , 'pause' and 'end vote' switches for elections and he can also delete election or add candidate to an election that isn't ongoing. An election will automatically start and end according to the given time frame . The status column at "on going election details" will help the admin to track the election status .

## Add Election

ELECTION INFORMATION

Election Name

Start Date

End Date

FacelD

Yes

No

Target Voters

Positions

Please add how many Positions is there in election then select the names

#1

#2

#3

Add More Position

Submit

Figure 18: Add election

Admin can add new election in this section by filling in all the election details like the election name, commencement date and time, facial authentication requirement etc.

## Add candidate

ADD CANDIDATE

Election Number : 235fd7a97d03bf

Election Name : tt

Date :

Voter : pg

Status : new

Wednesday 23rd of December 2020 12:07:59 PM

POSITION	CANDIDATE	ACTION
President	<input type="text" value="Search for student id"/>	<input type="button" value="SAVE"/>
President	<input type="text" value="Search for student"/>	<input type="button" value="SAVE"/>
President	<input type="text" value="Search for student"/>	<input type="button" value="SAVE"/>

Candidate Details

POSITION	NAME	MATICR NUMBER	ACTION
President	Piamta	1823649	<input type="button" value="Delete"/>
President	anitor	1465	<input type="button" value="Delete"/>

Figure 19: Add candidate to election

Admin can add candidates to an election here. Election details are shown above and all the positions up for election are shown where candidate name can be filled in and saved to add the candidates for that specific position.

## Election Results – Control Panel

SRC VOTING SYSTEM
 

please
Train
face authentication data

[Home](#)
[About](#)
 admin

ELECTION RESULT PUBLISH CONTROL PANEL AND ALL SUCCESSFUL ELECTION

View Hidden Elections

View All Hidden Elections

Recently finished Elections

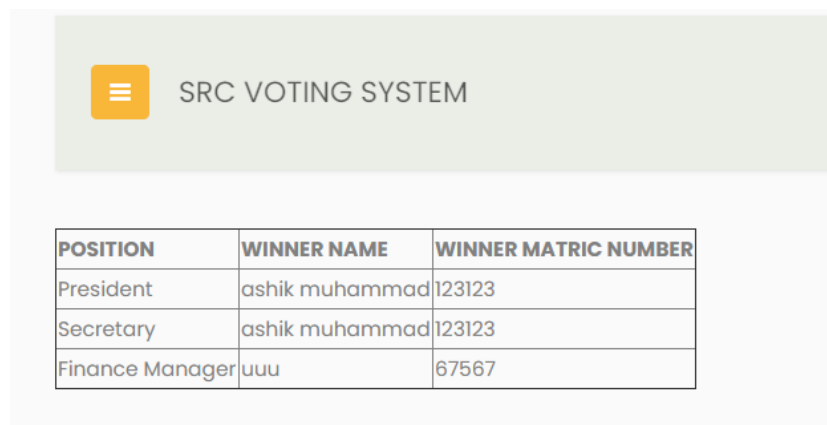
SL	ELECTION NUMBER	ELECTION NAME	FACE AUTH	START TIME	END TIME	VOTERS	STATUS	ACTION
32	235fd88cfe81530	result	on	2020-12-21 18:16:00	2020-12-21 18:17:00	kict	published	<input type="button" value="HIDE"/> <input type="button" value="VIEW RESULT"/> <input type="button" value="UNDO PUBLISH"/>
20	235f33acadb960	12	yes	2020-12-21 17:26:00	2020-12-21 15:18:00	kict	finished	<input type="button" value="HIDE"/> <input type="button" value="PUBLISH RESULT"/> <input type="button" value="VIEW RESULT"/>
19	235f327ffc7dda5	try	yes	2020-12-21 05:00:00	2020-12-21 15:18:00	kict	finished	<input type="button" value="HIDE"/> <input type="button" value="PUBLISH RESULT"/> <input type="button" value="VIEW RESULT"/>
18	235ed5f5a0dd001	corona	no	2020-12-21 05:00:00	2020-12-21 15:18:00	kict	finished	<input type="button" value="HIDE"/> <input type="button" value="PUBLISH RESULT"/> <input type="button" value="VIEW RESULT"/>
16	235e83521aba899	piam	no	2020-12-21 05:00:00	2020-12-21 15:18:00	pg	finished	<input type="button" value="HIDE"/> <input type="button" value="PUBLISH RESULT"/> <input type="button" value="VIEW RESULT"/>
15	235e83115c40ecc	ghr	yes	2020-12-21 05:00:00	2020-12-21 15:18:00	pg	finished	<input type="button" value="HIDE"/> <input type="button" value="PUBLISH RESULT"/> <input type="button" value="VIEW RESULT"/>

Figure 20: Control panel for election results

All the elections results information can be seen in this page. Here the admin can view the results, control publication of results or delete them. He can

publish a result while also retaining control to undo that action. The “hide” button will help the admin to move an old election details to hidden election zone to get a clean result dashboard, admin also can view or publish hidden election details from hidden zone when it's necessary

### Election Result – View



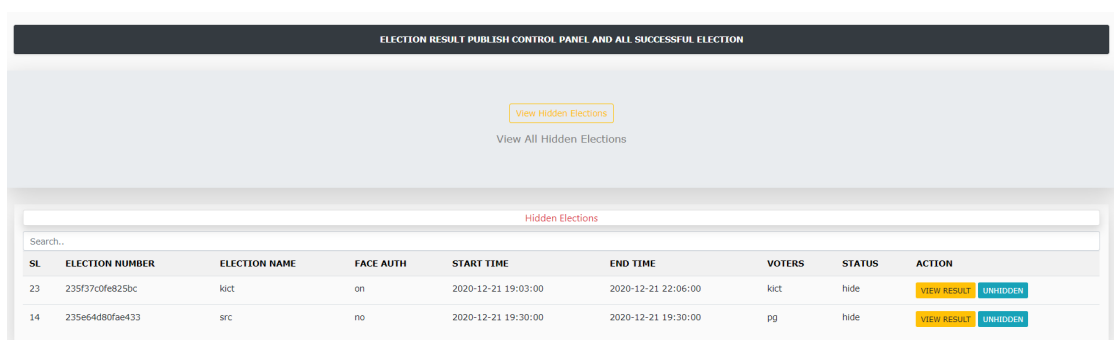
The screenshot shows a web interface for the SRC VOTING SYSTEM. It features a header with a menu icon and the system name. Below the header is a table displaying election results for three positions: President, Secretary, and Finance Manager. Each row shows the winner's name and their matric number.

POSITION	WINNER NAME	WINNER MATRIC NUMBER
President	ashik muhammad	123123
Secretary	ashik muhammad	123123
Finance Manager	uuu	67567

Figure 21: View election result

This is how election results are shown when viewed. The positions, winners' names and matric (identity) number can be seen.

### Election Result – Hide Function



The screenshot shows the 'Election Result Publish Control Panel AND ALL SUCCESSFUL ELECTION'. It includes a search bar, a table of hidden elections, and buttons to view or unhide elections. The table has columns for SL, Election Number, Election Name, Face Auth, Start Time, End Time, Voters, Status, and Action.

SL	ELECTION NUMBER	ELECTION NAME	FACE AUTH	START TIME	END TIME	VOTERS	STATUS	ACTION
23	235f37c0fe825bc	kict	on	2020-12-21 19:03:00	2020-12-21 22:06:00	kict	hide	<a href="#">VIEW RESULT</a> <a href="#">UNHIDDEN</a>
14	235e64d80fae433	src	no	2020-12-21 19:30:00	2020-12-21 19:30:00	pg	hide	<a href="#">VIEW RESULT</a> <a href="#">UNHIDDEN</a>

Figure 22: Hiding election result

Election results can be hiddent or published in this section

## Announcement

Announcements help students get important information at a glance and on top of the site in their dashboard. Which is why it is very important to have this functionality.

### Add new announcement

Announcement!

View and add new Announcement

Add New Announcement

Announcement

Write here

Please write what you want to Announce.

Expected off line date

mm/dd/yyyy

Expected date when the Announcement should be offline.

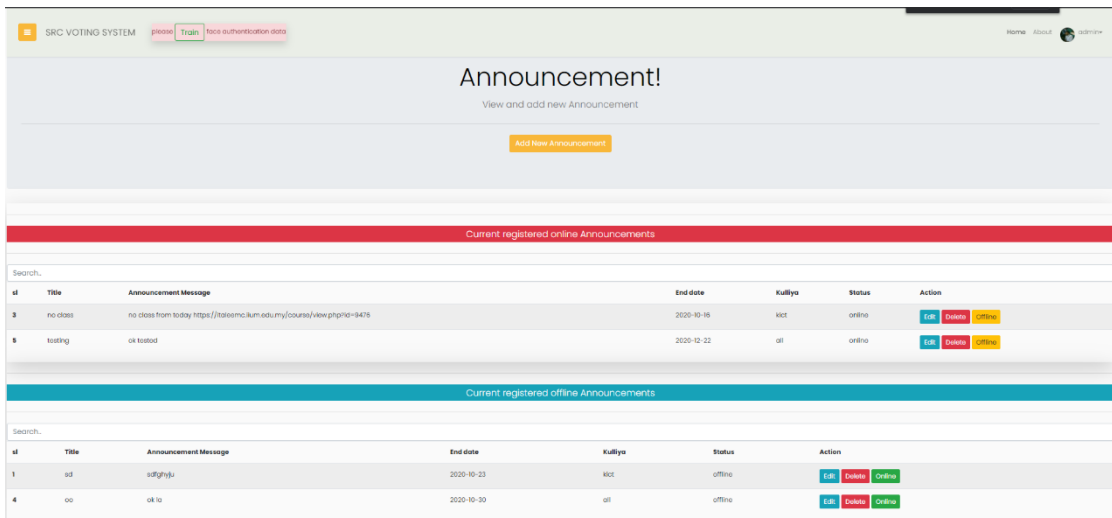
Select Target kulliyya

Submit

Figure 23: Add new announcement

Admin can make announcements by writing the announcement, selecting date and selecting target department/kulliyyah students to show the announcement to. Once filled in and submitted, the announcement will be saved and made at the time specified. With department/kulliyyah target, it ensures only the students that need to know, gets the announcement and not everyone gets overwhelmed with them.

## View announcements



The screenshot displays the 'View announcements' interface of the SRC VOTING SYSTEM. The page features a header with navigation links (Home, About, Admin) and a main heading 'Announcement!' with a subtext 'View and add new Announcement'. A button 'Add New Announcement' is visible. The main content area is divided into two sections: 'Current registered online Announcements' and 'Current registered offline Announcements'. Each section contains a table with columns for ID, Title, Announcement Message, End date, Kulliya, Status, and Action.

ID	Title	Announcement Message	End date	Kulliya	Status	Action
3	no class	no class from today <a href="https://tatemc.lum.edu.my/course/view.php?id=9475">https://tatemc.lum.edu.my/course/view.php?id=9475</a>	2020-10-18	kkt	online	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Offline</a>
5	testing	ok tested	2020-12-22	all	online	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Offline</a>

ID	Title	Announcement Message	End date	Kulliya	Status	Action
1	ad	adghyju	2020-10-23	kkt	offline	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Online</a>
4	oo	ok to	2020-10-30	all	offline	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Online</a>

Figure 24: View announcements

All the announcements that was added, can be viewed here. Announcements are shown with their end date and the department/kulliyyah that the announcement is for. Admin can edit or delete any announcement from here.

## Survey

This web application has the functionalities to poll the students' opinions on different matter through survey. It is a great addition as it can help the authorities gather students' opinion on different matters easily and without hassle.

## Add Survey

**SURVEY INFORMATION**

Survey Question #1

Question

Add Picture

Upload


Choose file

Browse


Target Segment

IIUM ACADEMY OF GRADUATE AND PROFESSIONAL STUDIES (ACADEMY ▾)

Start Date & Time

mm/dd/yyyy --:-- -- 

End Date & Time

mm/dd/yyyy --:-- -- 

Submit

Cancel

Figure 25: Add survey

Just as in add election page, here admin enters survey information like question, date etc and adds a survey into the system. He can also select the target students for the survey, so it only asks question to only the concerned students.

## Survey Details

SRC VOTING SYSTEM

Home About admin

SURVEY DETAILS

OnGoing Survey

Search...

SURVEY NUMBER	SURVEY QUESTION	POSTER	START DATE	END DAY	VOTERS	STATUS	Action
205ffc3af3da9d0	test number 5	NO AVAILABLE POSTER	2021-01-11 19:53:00	2021-01-29 19:47:00	all	Survey Is live now	END SURVEY
205ffc34caeb065	pi	NO AVAILABLE POSTER	2021-01-13 19:21:00	2021-01-21 19:21:00	all	Survey Is live now	END SURVEY

UpComing Survey

Search...

SURVEY NUMBER	SURVEY QUESTION	POSTER	START DATE	END DAY	VOTERS	STATUS	Action
2060045b33389d6	is mahalla service good enough ?	NO AVAILABLE POSTER	2021-01-29 23:43:00	2021-02-17 23:43:00	all	new	Delete Edit

Figure 26: Current survey details

Admin can look at all the submitted surveys and take actions if he wishes, like ending the survey or deleting it.

## Survey Result

SRC VOTING SYSTEM

please Train face authentication data

Home About admin

SURVEY RESULT PUBLISH CONTROL PANEL AND ALL SUCCESSFUL SURVEY

View Hidden Survey

View All Hidden Survey

CURRENT SURVEY RESULT

Search...

SURVEY NUMBER	SURVEY QUESTION	POSTER	START DATE	END DATE	VOTERS	STATUS	SWITCH	Action
205f9ba728a53bb	are you enjoying the ERTL?	NO AVAILABLE POSTER	2020-10-30 00:00:00	2020-10-31 00:00:00	all	finished	PUBLISH RESULT VIEW RESULT	Hide
205f9b51d2a72bf	testing	NO AVAILABLE POSTER	2020-10-30 00:00:00	2020-10-31 00:00:00	kict	published	VIEW RESULT UNDO PUBLISH RESULT	Hide

Figure 27: Survey results section



Survey results menu can be seen here by the admin. He can see individual results, publish the result or delete them. He can undo his action of publishing result if he needs to do so.

### **Survey Result – Hide**

**SURVEY RESULT PUBLISH CONTROL PANEL AND ALL SUCCESSFUL SURVEY**

Survey Question : are you enjoying the ERTL?

number of Yes : 1  
number of No : 1

[View Hidden Survey](#)

[View All Hidden Survey](#)

**HIDDEN SURVEY RESULT**

SURVEY NUMBER	SURVEY QUESTION	POSTER	START DATE	END DATE	VOTERS	STATUS	SWITCH	Action
205f339e1d17365	are you enjoying the ERTL?	NO AVAILABLE POSTER	2020-08-12 00:00:00	2020-08-13 00:00:00	kict	hidden	<a href="#">VIEW RESULT</a>	<a href="#">Unhidden</a>

Figure 28: Hiding survey result

Survey results can be hidden or published in this page.

### **Survey Result - View**

**SURVEY RESULT PUBLISH CONTROL PANEL AND ALL SUCCESSFUL SURVEY**

Survey Question : are you enjoying the ERTL?

number of Yes : 1  
number of No : 1

Figure 29: View result of a survey

Admin can view a result for any specific survey.

### **4.1.3 User**

Users, who are mostly students, have their own set of functions, web pages and the like. Their main parts like participating in the election by casting their ballots, looking at the results etc are done in the user side of the application.

## Dashboard

ONGOING						
ELECTIONS						
Election Name	FACE AUTH	Start Time	End Time	Status	Action	
src	yes	2020-12-23 20:22:00	2020-12-24 20:22:00	ongoing	<a href="#">VOTE NOW</a>	

Survey	
tetsit	survey will close at 2020-12-29 01:11:00 -- 2020-12-29 01:11:00. 👍👎
ok tested	survey will close at 2020-12-26 00:00:00 -- 2020-12-26 00:00:00. 👍👎
are you enjoying the ERTL? Zns	survey will close at 2020-10-30 00:00:00 -- 2020-10-30 00:00:00. 👍👎

UPCOMING ELECTIONS						
Election Name	FACE AUTH	Start Time	End Time	Status	Action	
ta	on	2020-12-21 03:21:00	2020-12-21 00:21:00	new	<a href="#">DETAILS</a>	
222	on	2021-01-20 00:11:00	2020-12-01 00:12:00	new	<a href="#">DETAILS</a>	
testing	on	2020-12-21 09:08:00	2020-12-21 09:09:00	new	<a href="#">DETAILS</a>	

Figure 30: User dashboard

Once a user logs into the system using their credentials, they will be shown this dashboard with their personalized information. At the top, there are the announcements that directly relates to them. Then there's the dashboard with relevant information.


## Election

### Election Details

SRC VOTING SYSTEM

Home

About

 Piam Emrul Hossain

Election Name : testing

Voters : kict

Election Start Time :2020-12-21 09:08:00

Election End Time :2020-12-21 09:09:00

Face Authentication :on

Candidates For Secretary Position.

Name	Matric
ashik muhammad	123123
Piam Emrul Hason	182367

Candidates For Cultural Promoter Position.

Name	Matric
Piamta	1823649
sharjil	14658

Candidates For Secretary Position.

Name	Matric
tahan	181
kas	1478896

Figure 31: Election details

In this section, user can see all the elections in the system that is related to them either by their department/kulliyah or campus. Each election shows the date and election timeframe with their status. If an election is on-going, they can directly vote from here. If it is an upcoming election, then they can see the details like candidates participating in the election and such.

## Election Ballot - Vote

The screenshot displays the 'SRC VOTING SYSTEM' interface. At the top, there is a header with a menu icon, the text 'SRC VOTING SYSTEM', and navigation links for 'Home', 'About', and a user profile 'Plam Emrul Hasan'. The main content area consists of three stacked ballot sections, each with an orange header bar indicating the position name. The first section is for 'Secretary' with candidates 'Plam Emrul Hasan' and 'ashik muhammad'. The second section is for 'President' with candidates 'sasi' and 'wasique'. The third section is for 'Finance Manager' with candidates 'sharji' and 'ashik muhammad'. Each section includes the instruction 'Please choose any one candidate for this position'. At the bottom of the interface is a yellow 'vote' button.

Figure 32: Casting election vote

Students can cast their allot in this page by seleting the candidates that they want to vote for, for different postions. All the postions are shown together, along with all the candidates.

## Election Result

The screenshot displays the 'Election Result' page of the SRC VOTING SYSTEM. The header includes a menu icon, 'SRC VOTING SYSTEM', and navigation links for 'Home', 'About', and a user profile 'Piam Emrul Hasan'. The main content area is titled 'Election Details' and shows the following information:

- Election Name : result
- Voters : kict
- Election Date :2020-12-16
- Face Authentication :on

Below this, the 'Winner Details' section contains a table with the following data:

Position	Winner Name	Matric	Total votes
President	Piam Emrul Hasan	182367	2
Finance Manager	uuu	67567	0
Cultural Promoter	ashik muhammad	123123	0

Figure 33: Viewing election result by student

## Face Authentication

When setting up an election or after, the admin can make it, so face authentication is required or not. Depending on whether it is required or not, will mean how the students can cast their vote. If facial authentication is not necessary, then the users will be redirected to vote casting page. If, however, it is mandatory, then users will be redirected to a warning page. After which, their face will be authenticated. Then they can cast their vote.

The screenshot shows a 'Warning!' page from the SRC VOTING SYSTEM. The header is identical to Figure 33. The main content area has a light blue background and displays the following text:

**Warning!**  
User will be verified with face Authentication  
Your webcam will be used for this purpose (Do not try to cheat, a short video will taken to prevent any form of cheat).

At the bottom, there is a large orange button labeled 'Continue'.

Figure 34: Warning page before facial authentication

If users continue, their face will be authenticated by a webcam.

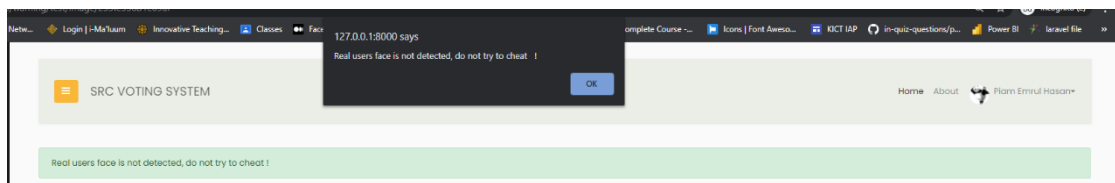


Figure 35: Face authentication does not match

If the face does not match, they will be redirected to this page with an error message.

## Survey

Students can view surveys, participate in them in the form of agreement or disagreement, and see the results of each of the surveys.

### Survey Dashboard

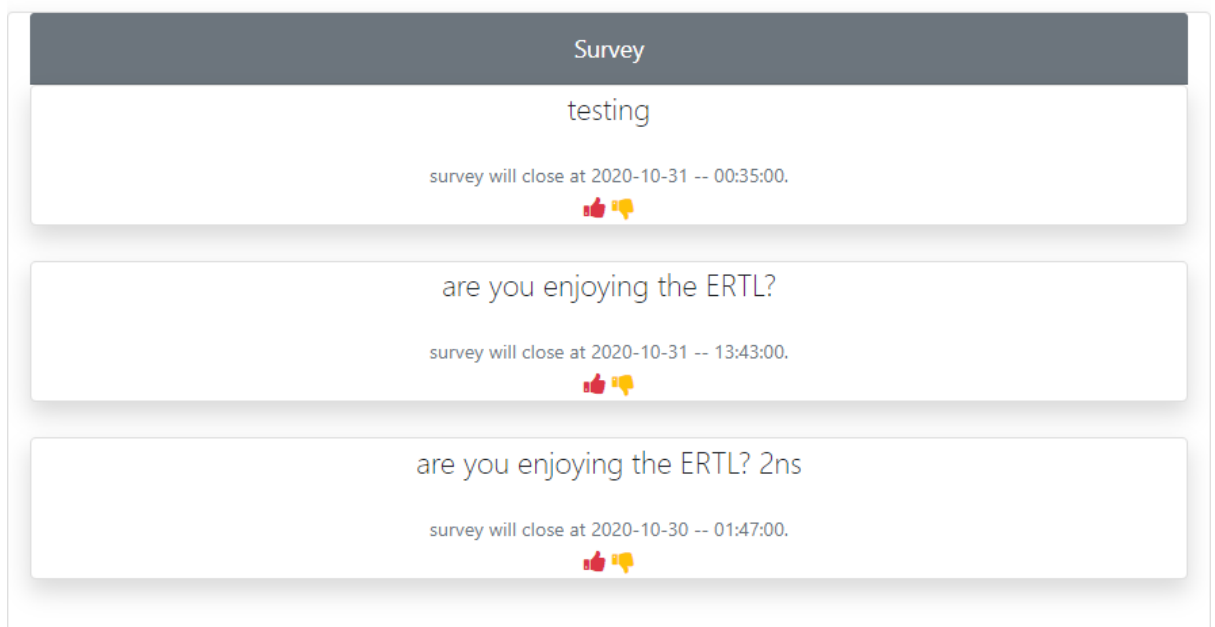



Figure 36: Survey dashboard

In the survey dashboard, the students can see the survey questions and their timeframe information. They can answer the survey by either agreeing or disagreeing with the question asked by the use of thumbs up and thumbs down icons.

### Survey Vote – Already casted



You already participated in this survey !

Figure 37: Survey vote already casted alert

### Survey Results

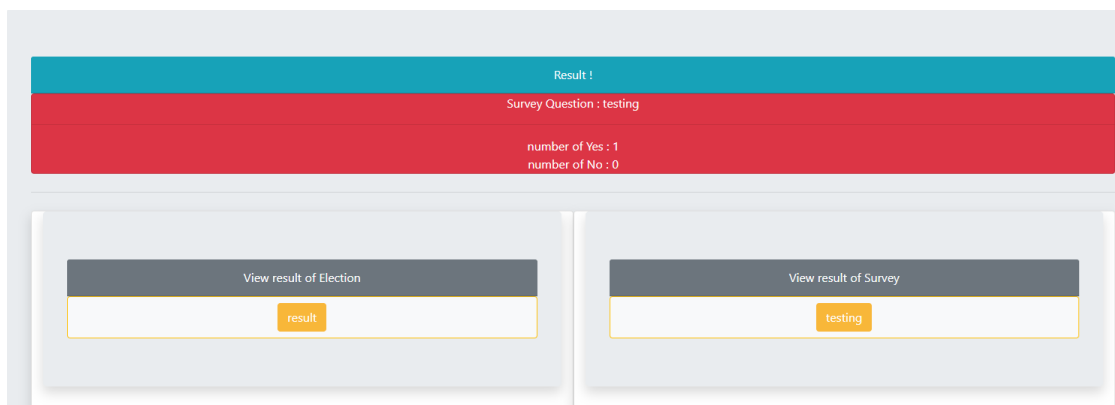


Figure 38: Survey results

Students can see the survey results from here.

## Announcement

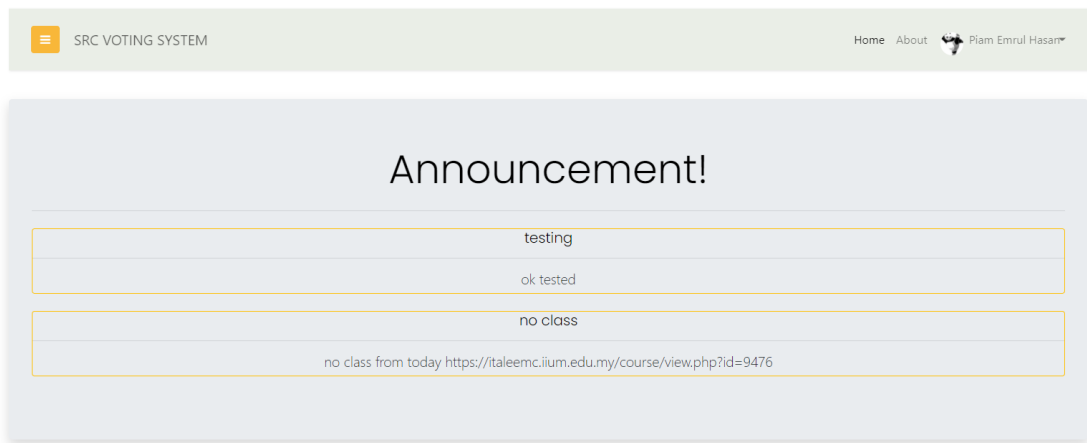


Figure 39: Announcemts – student

Student announcements can be seen in the top of the dashboard and also in its own section.

## Contact Page

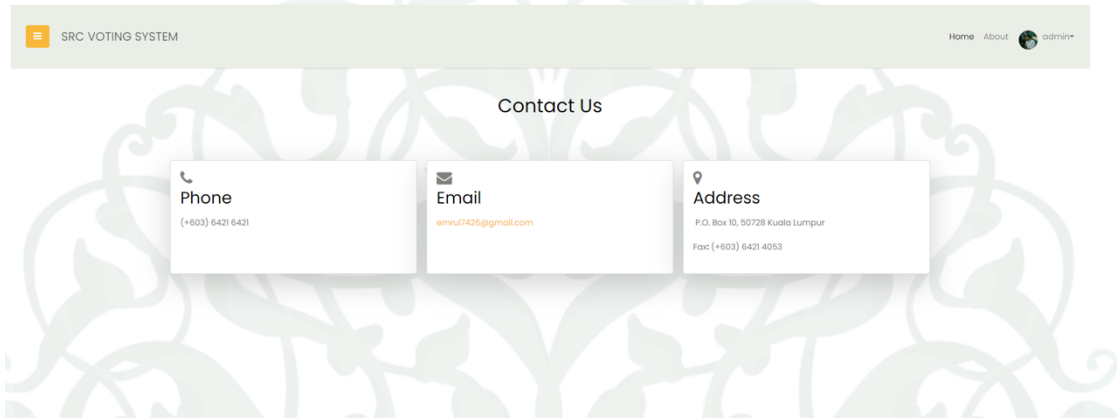


Figure 40: Contact page

Users can view contact details in contact us page and contact for any neccesities.

## **CHAPTER FIVE**

### **CONCLUSION**

The online voting system is an easy to use and reliable way of holding elections and casting ballots securely. Facial authentication provides added layer of security verification when casting votes. This system provides efficiency and convenience to the voters. They do not have to waste their time lining up in queue, do not have to go to any polling station which could be far away, and can avoid many other inconveniences. Time constraint is a major issue for many voters, who cannot go to the polling stations at the specified time. Online voting system is a direct solution to all of those problems. Voters can cast their ballots very easily, from wherever they are, just using a computing device connected to the internet.

Online voting system alleviates most of the problems faced by physical voting systems. With functionalities like surveys, alerts et cetera, voters can voice their agreement or disagreement to certain opinions and policies. They can find out important information that only they have relevance to. Suffice to say, this is a major step up and evolution from the currently used system which hasn't evolved much in the last few decades of technological advancements and leaps. System like this will benefit the voters, help voice their opinions and ensure a vibrant democracy.



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# APPENDICES

## A. Project Timeline

