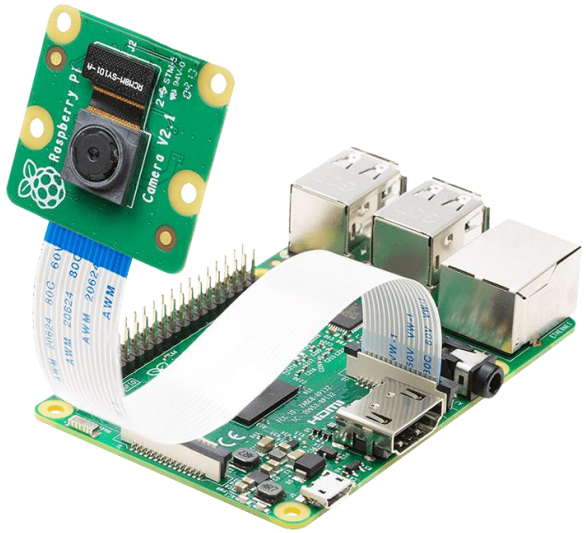
DEVELOPMENT OF IOT-BASED SOLUTION FOR CHECKING STUDENT ATTENDANCE



Student 1: Nguyen Truong Thanh (1652557)

Student 2: Nguyen Anh Quan (1552310)

Supervise: PhD. Pham Hoang Anh

January 25th, 2021

CONTENTS

Introduction

Methodology

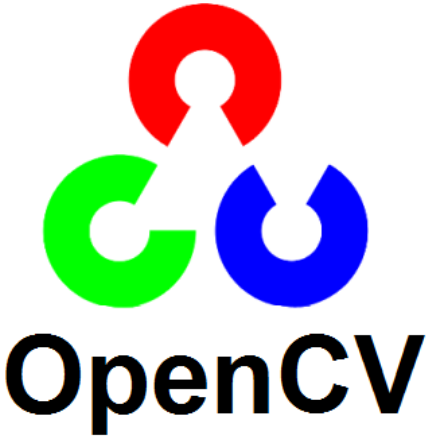
Evaluation and Testing

Conclusion

INTRODUCTION

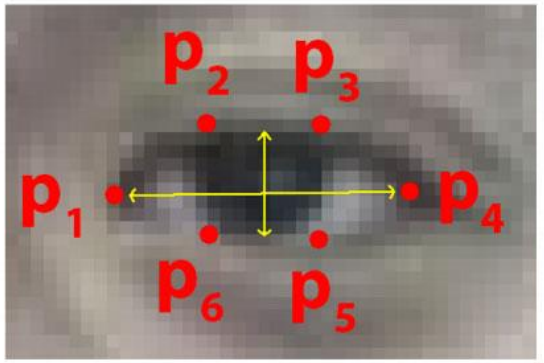
- Attendance marking
- Traditionally marking
- Fingerprint
- RFID Card
- Face Recognition

TECHNOLOGIES USED



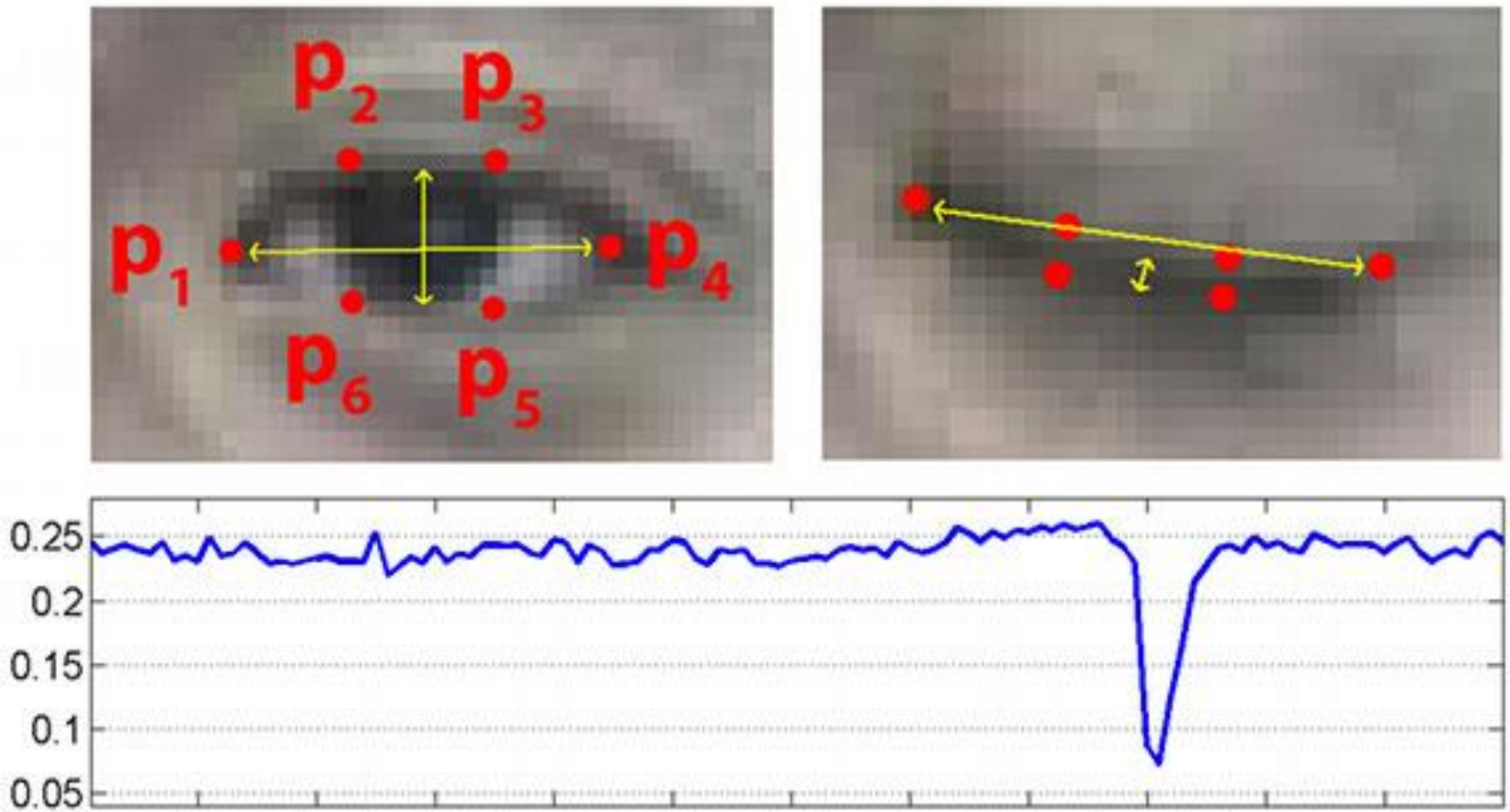
EYE ASPECT RATIO (EAR)

- Each eye is represented by 6 (x, y)-coordinates

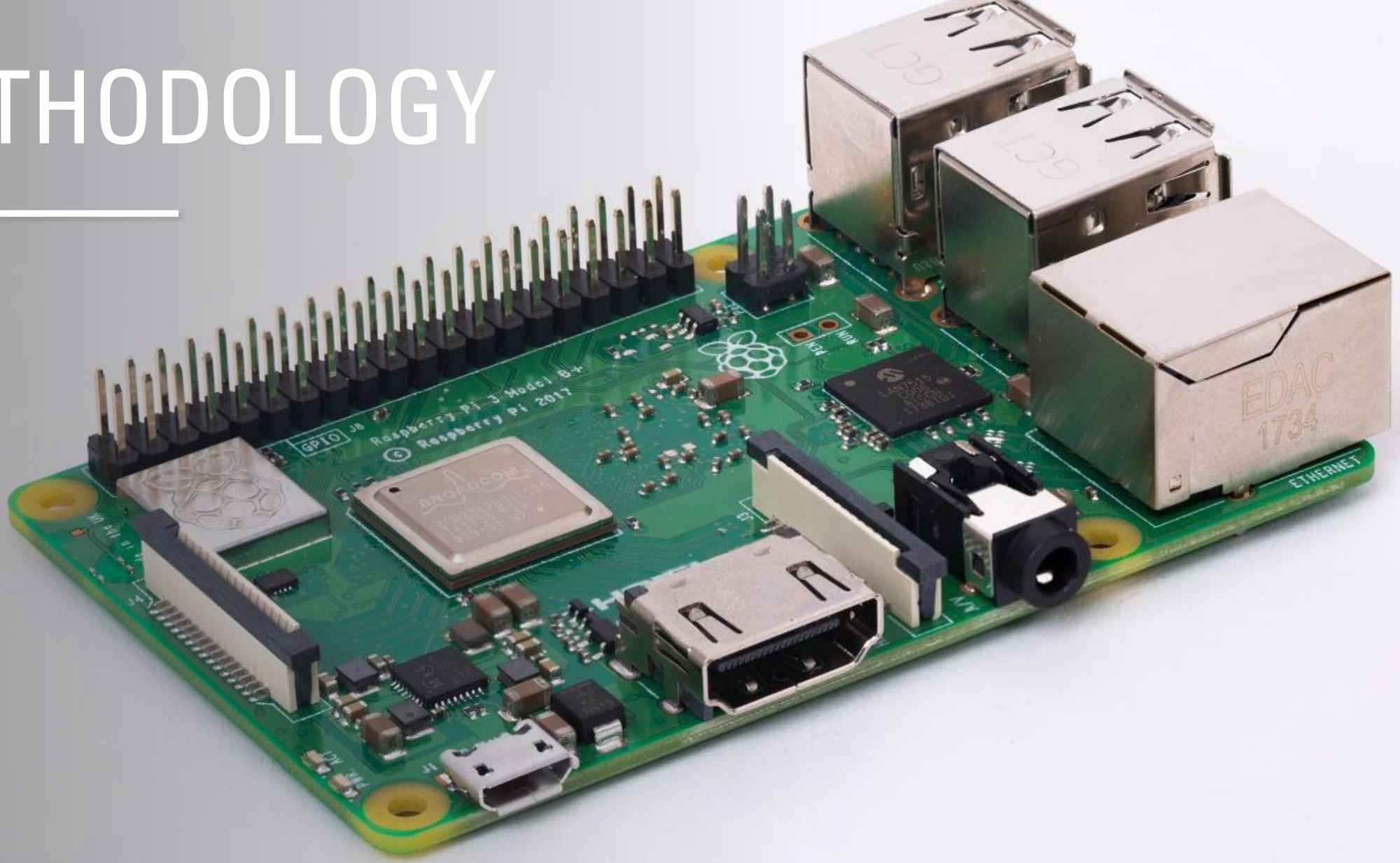


- There is a relation between the width and the height of these coordinates

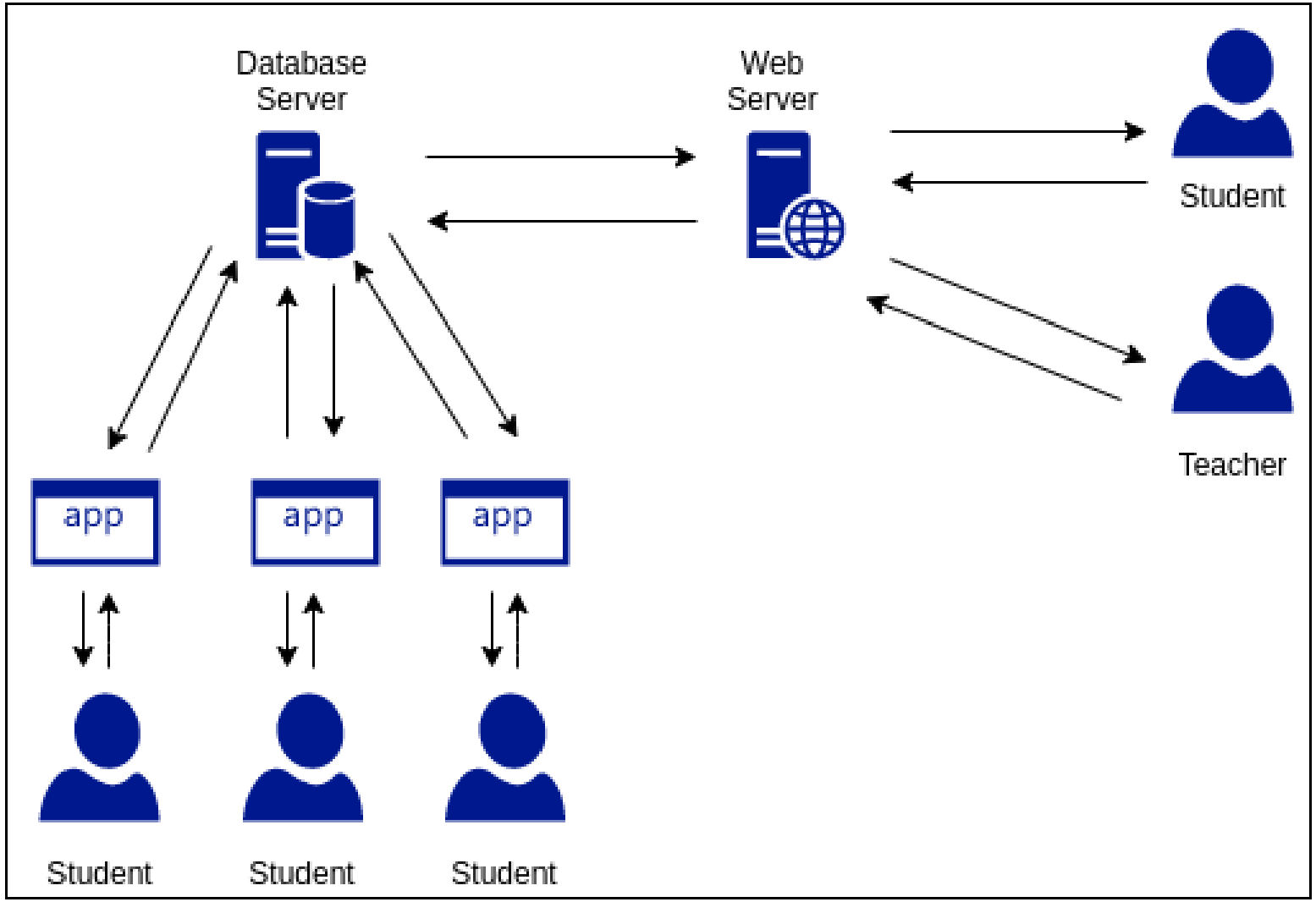
$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$


p2
p3
p1
p4
p6
p5
0.25
0.2
0.15
0.1
0.05

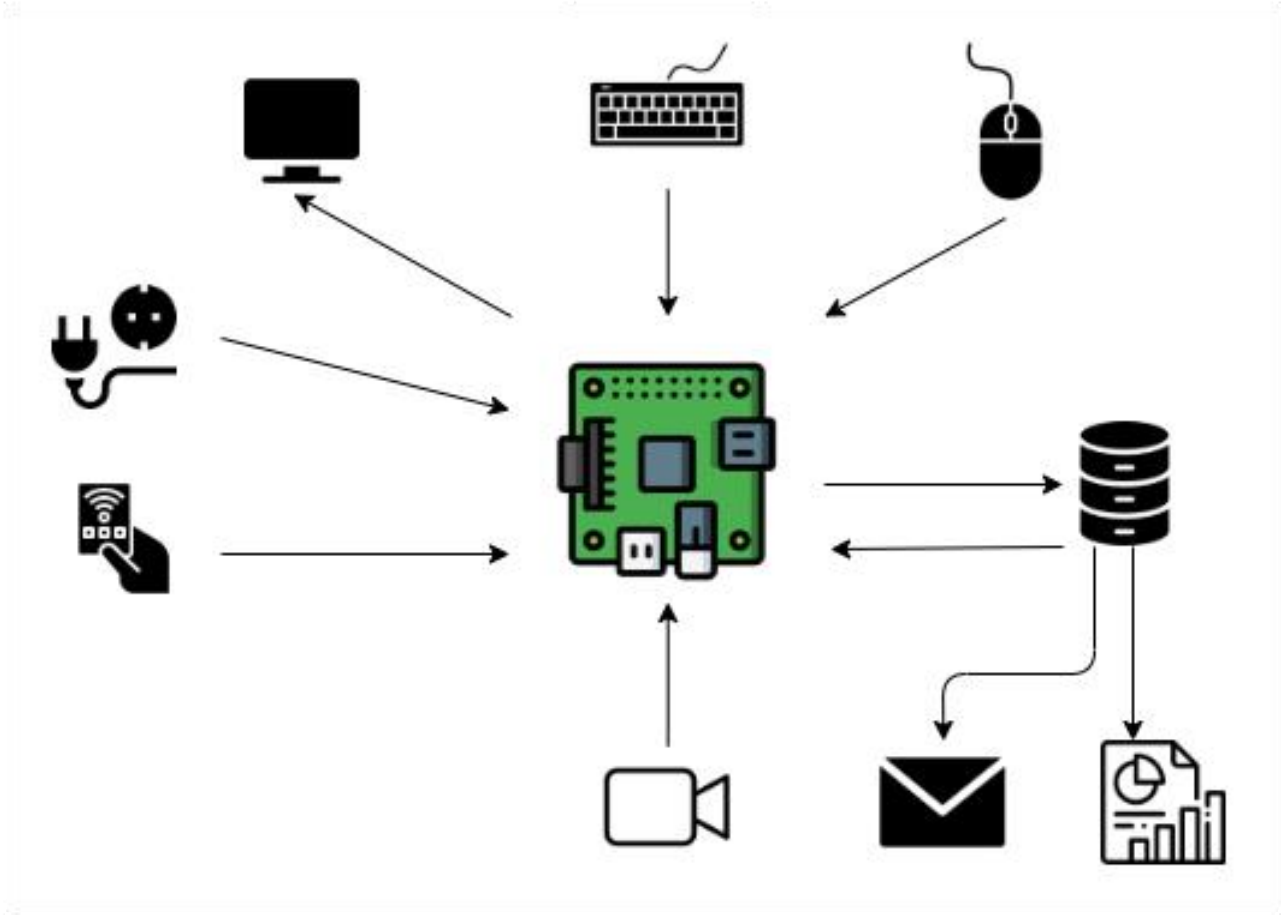
METHODOLOGY

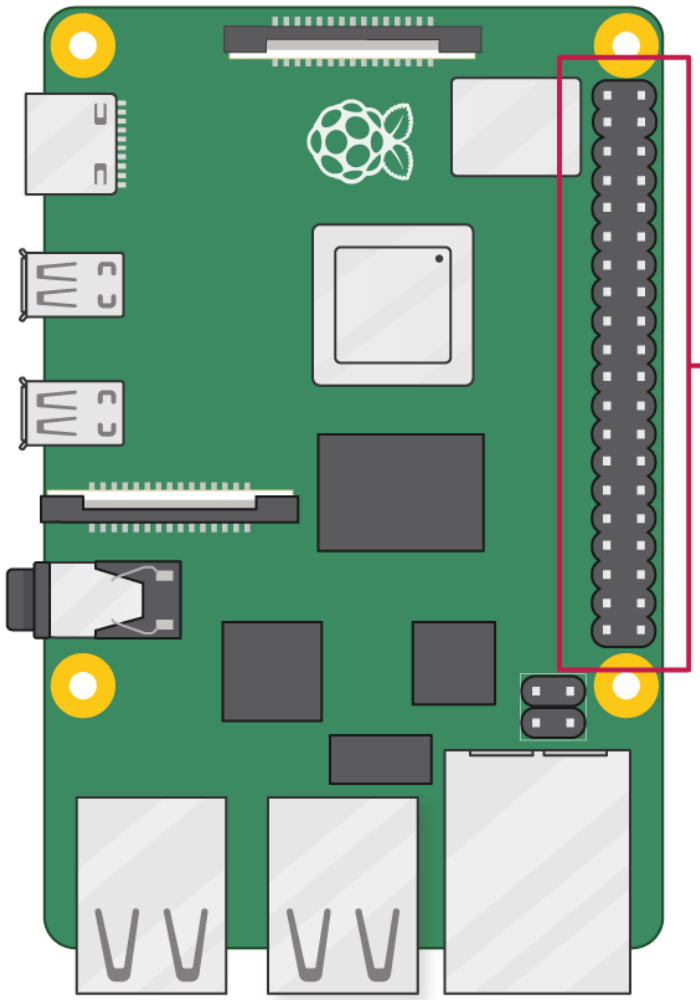


SYSTEM OVERVIEW

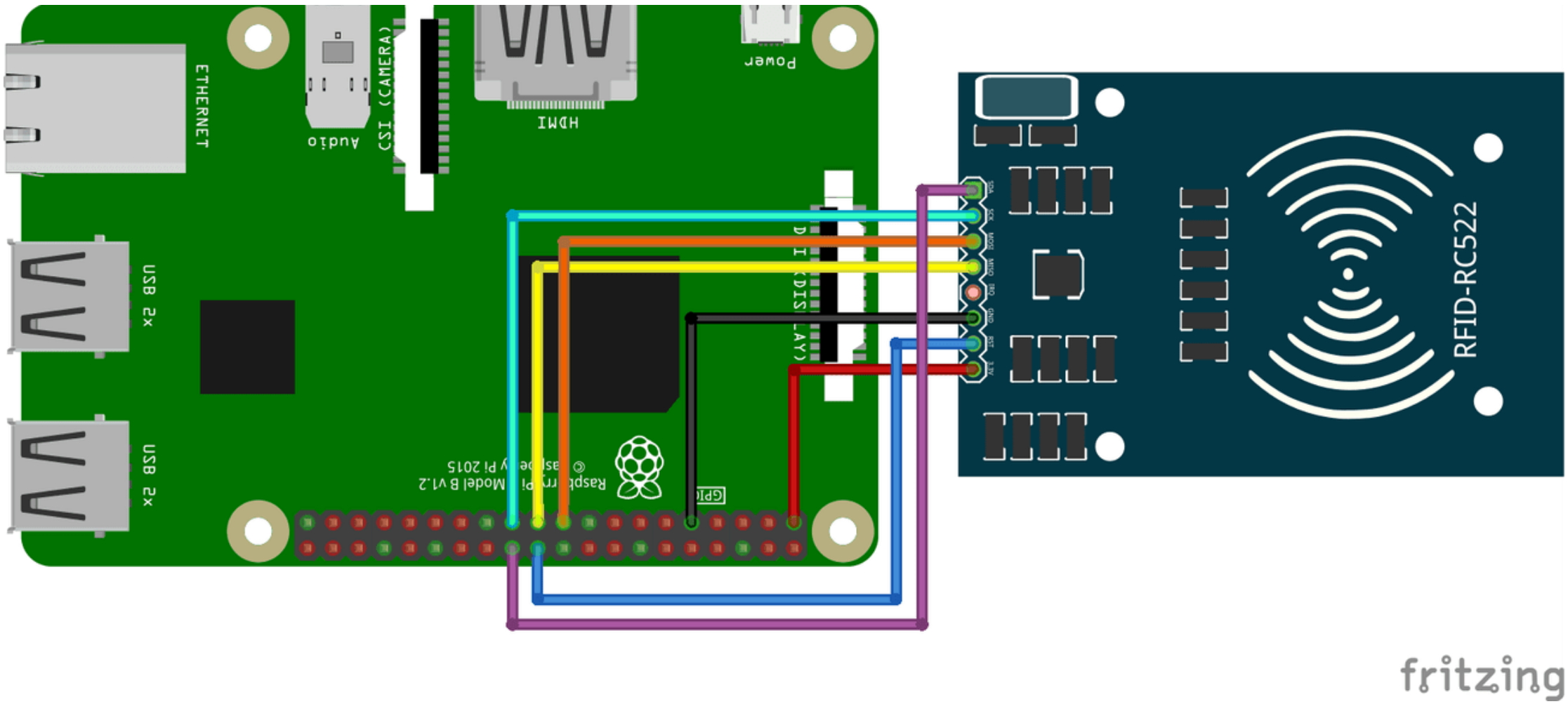


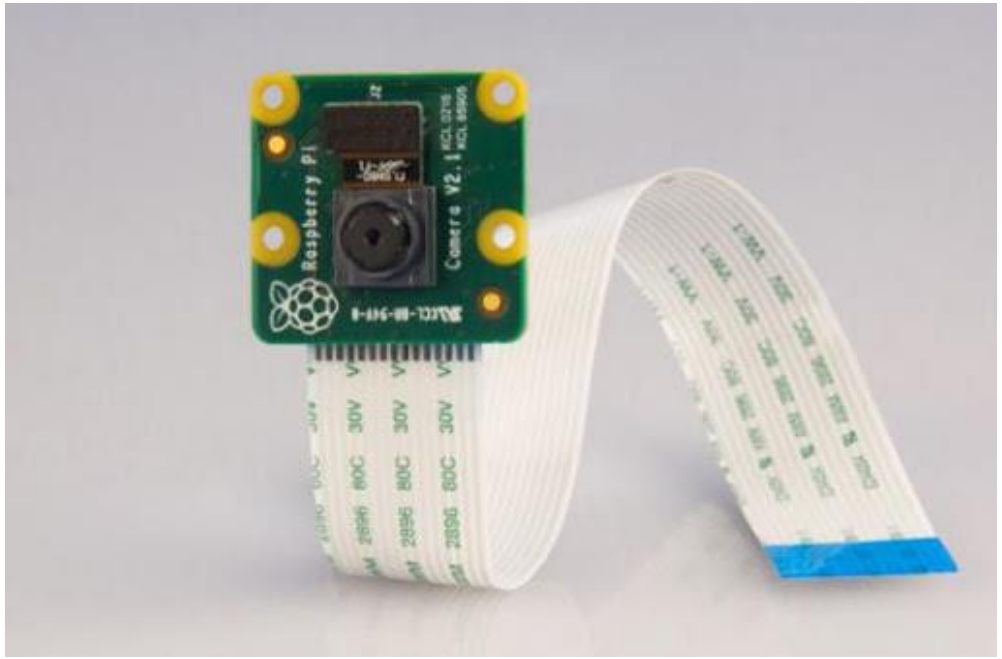
SYSTEM OVERVIEW





3V3 power	1	2	5V power
GPIO 2 (SDA)	3	4	5V power
GPIO 3 (SCL)	5	6	Ground
GPIO 4 (GPCLK0)	7	8	GPIO 14 (TXD)
Ground	9	10	GPIO 15 (RXD)
GPIO 17	11	12	GPIO 18 (PCM_CLK)
GPIO 27	13	14	Ground
GPIO 22	15	16	GPIO 23
3V3 power	17	18	GPIO 24
GPIO 10 (MOSI)	19	20	Ground
GPIO 9 (MISO)	21	22	GPIO 25
GPIO 11 (SCLK)	23	24	GPIO 8 (CE0)
Ground	25	26	GPIO 7 (CE1)
GPIO 0 (ID_SD)	27	28	GPIO 1 (ID_SC)
GPIO 5	29	30	Ground
GPIO 6	31	32	GPIO 12 (PWM0)
GPIO 13 (PWM1)	33	34	Ground
GPIO 19 (PCM_FS)	35	36	GPIO 16
GPIO 26	37	38	GPIO 20 (PCM_DIN)
Ground	39	40	GPIO 21 (PCM_DOUT)

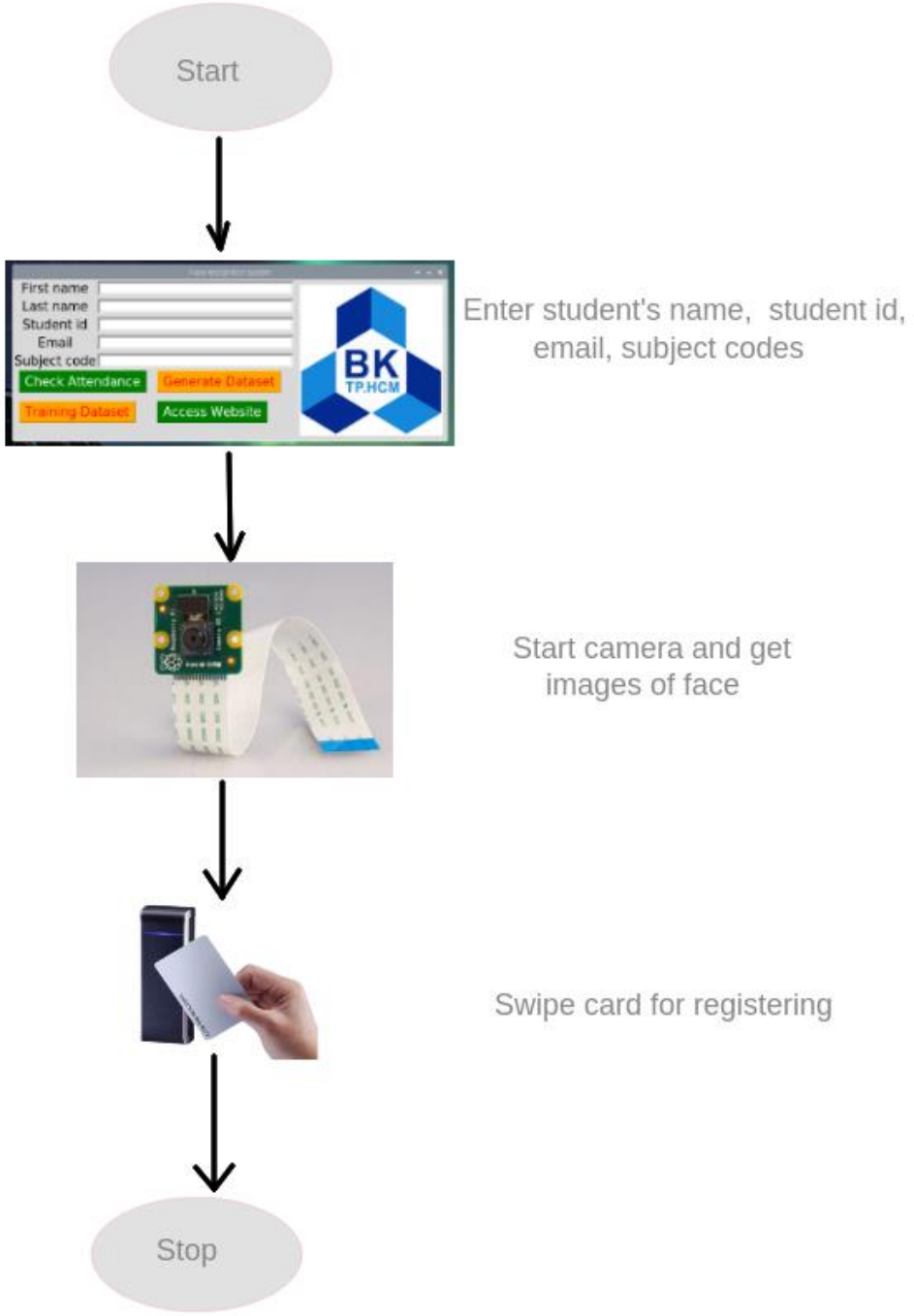

ETHERNET
USB 2x
USB 2x
Audio
CSI (CAMERA)
HDMI
Power
RFID-RC522
fritzing


Raspberry Pi
Camera V2.1

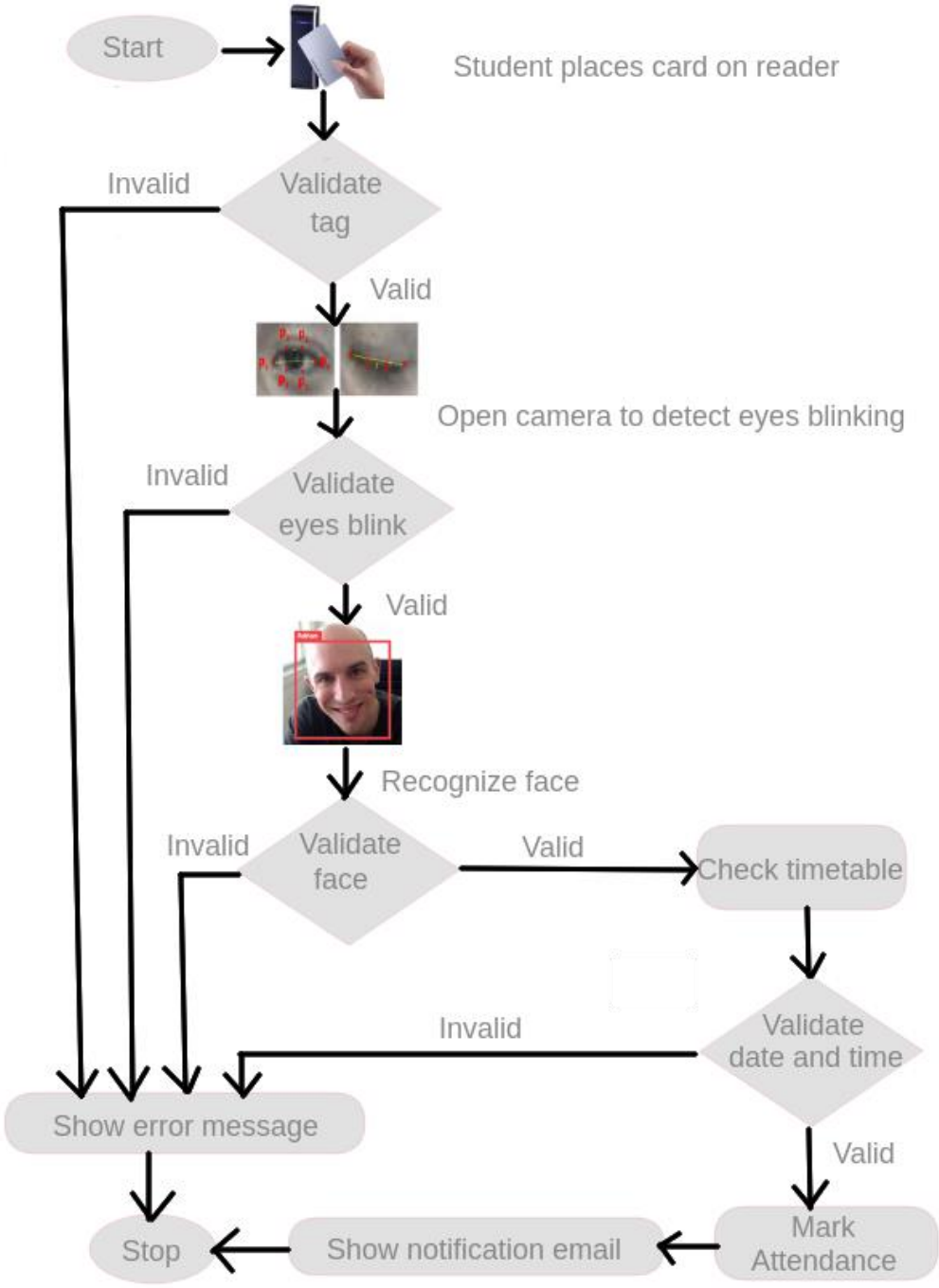
self.fingerprints
self.logdupes = True
self.debug = debug
self.logger =
if path:
self.file =
self.file.seek(0)
self.fingerprints.
@classmethod
def from_settings(cls, settings):
debug = settings.getbool(
return cls(job_dir(settings),
def request_seen(self, request):
fp = self.request_fingerprint(
if fp in self.fingerprints:
return True
self.fingerprints.add(fp)
if self.file:
self.file.write(fp +

PYTHON APP

REGISTER


Start
First name
Last name
Student id
Email
Subject code
Check Attendance
Generate Dataset
Training Dataset
Access Website
BK
TP.HCM
Enter student's name, student id, email, subject codes
Start camera and get images of face
Swipe card for registering
Stop

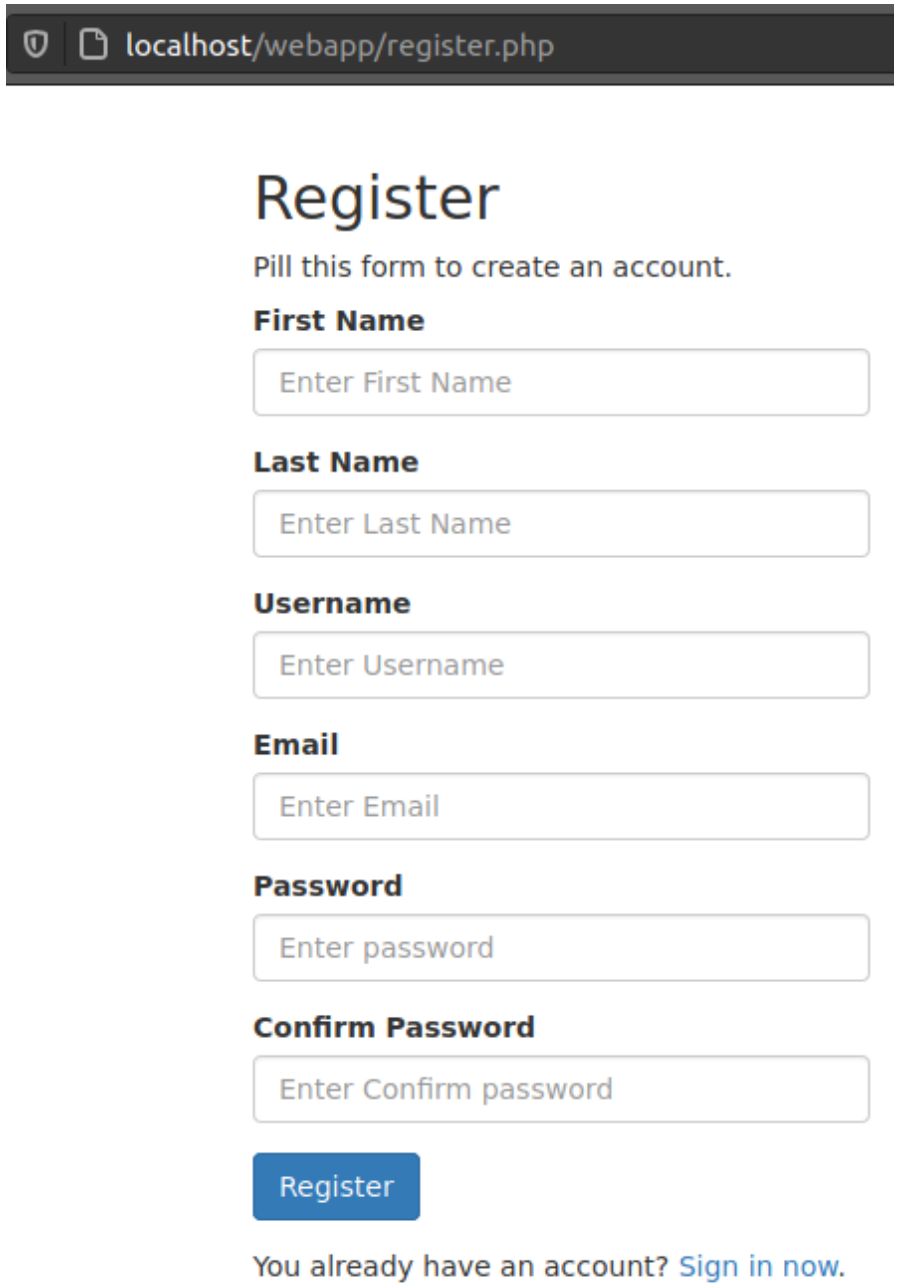
MARKING ATTENDANCE

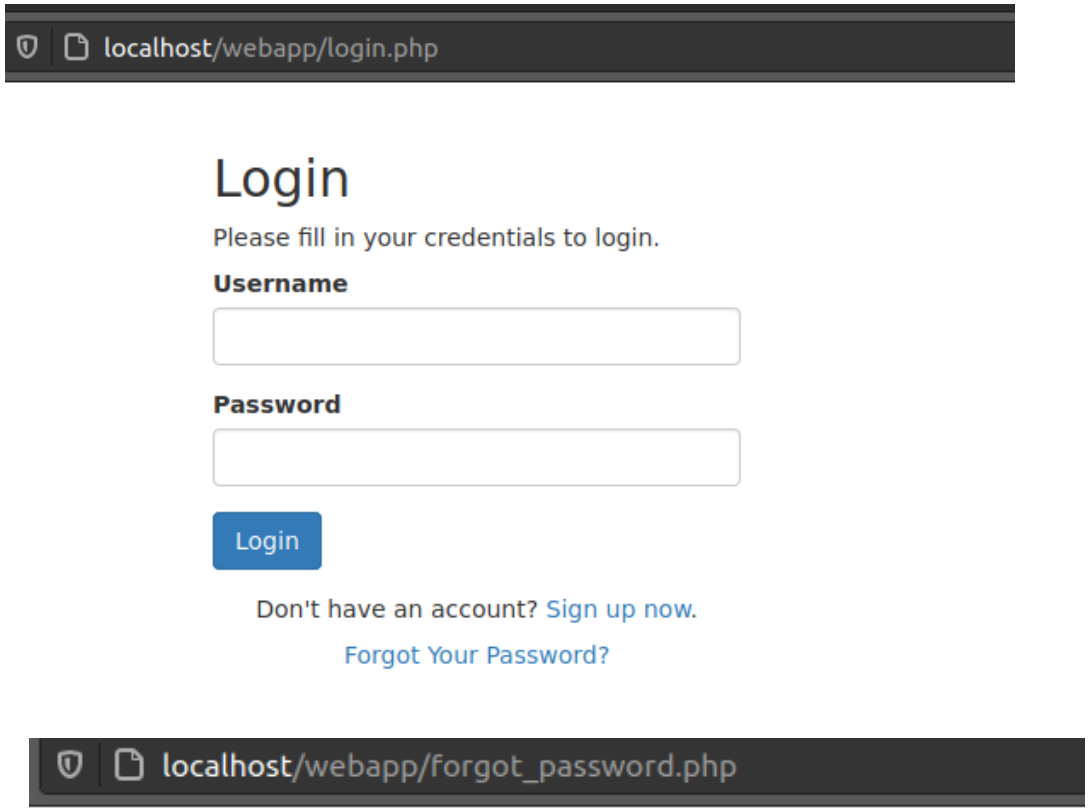


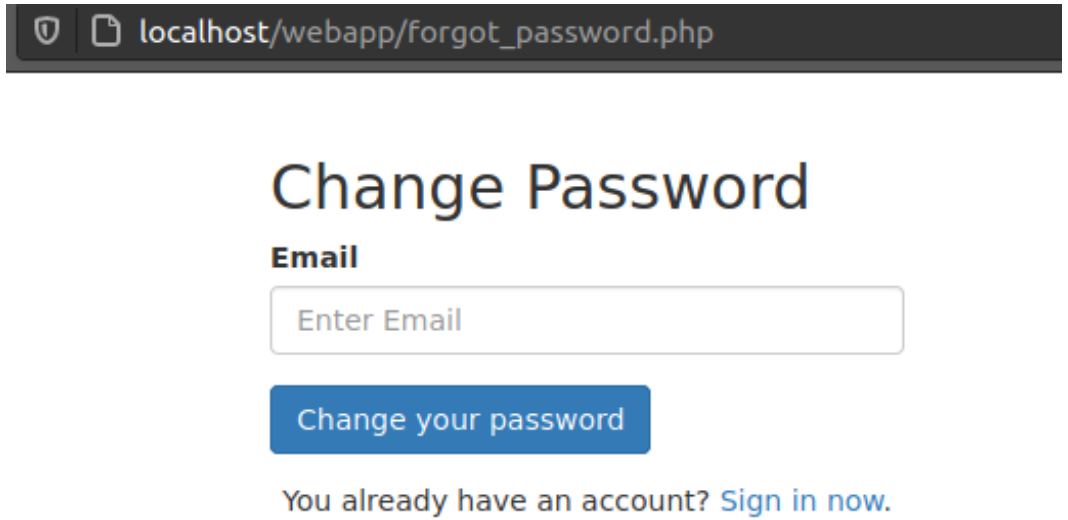
WEB APP

WEB APP

- Html, CSS, JavaScript, Ajax, Bootstrap, etc.
- 3 roles: admin, teacher, student
- Data charts, search bar
- Login, logout with session
- Registration
- Forgot password, confirm via email token


localhost/webapp/register.php
Register
Pill this form to create an account.
First Name
Enter First Name
Last Name
Enter Last Name
Username
Enter Username
Email
Enter Email
Password
Enter password
Confirm Password
Enter Confirm password
Register
You already have an account? Sign in now.


localhost/webapp/login.php
Login
Please fill in your credentials to login.
Username
Password
Login
Don't have an account? Sign up now.
Forgot Your Password?

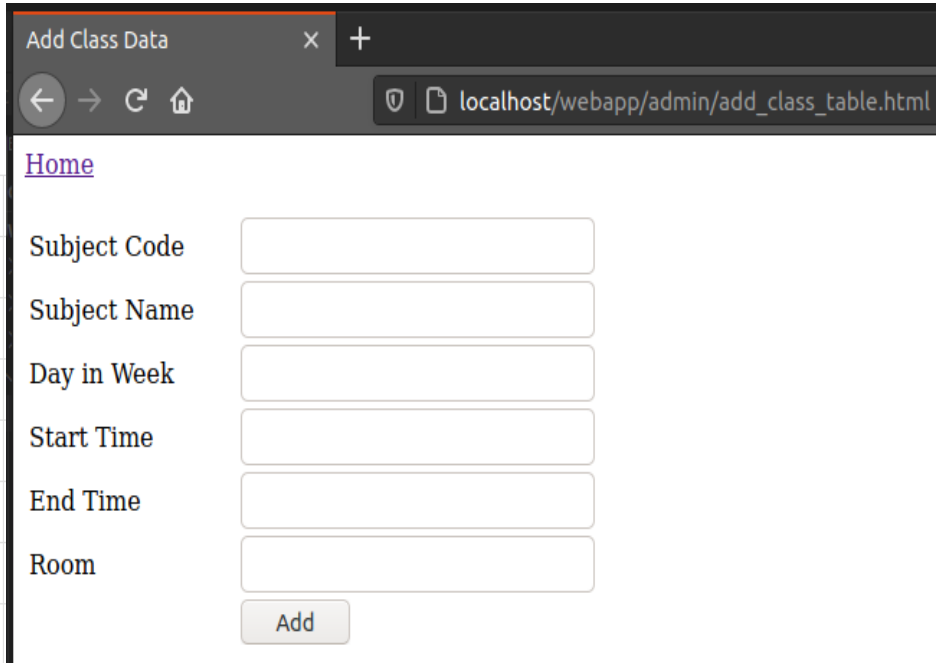

localhost/webapp/forgot_password.php
Change Password
Email
Enter Email
Change your password
You already have an account? Sign in now.

ADMIN

Class Table

Add New Class Data

ID	Subject Code	Subject Name	Day in Week	Start Time	End Time	Room
1	MT1003	Calculus 1	Monday	9:00	11:50	401B4
2	PH1003	Physics 1	Monday	12:00	14:50	203A4
3	MT1005	Calculus 2	Tuesday	7:00	9:50	502B4
4	CH1003	General Chemistry	Wednesday	12:00	14:50	405B4
5	CO2013	Operating System	Thursday	7:00	9:50	504B4
6	MT1007	Linear Algebra	Friday	12:00	14:50	402A4
7	CO3053	Embedded Systems	Saturday	7:00	9:50	504B4



TEACHER

Attendance Table

Add New Attendance Data

View Class Members

Graphical Results

Search Search information

Choose a class Select

filter

ID	First Name	Last Name	Student Number	Class Number	Clock In	Update
1	Thanh	Nguyen Truong	1652557	8	2020-11-02 09:46:00	Edit | Delete
2	Thanh	Nguyen Truong	1652557	8	2020-11-09 09:30:49	Edit | Delete
3	Thanh	Nguyen Truong	1652557	8	2020-11-16 09:43:58	Edit | Delete
4	Thanh	Nguyen Truong	1652557	8	2020-11-23 09:43:58	Edit | Delete
5	Thanh	Nguyen Truong	1652557	8	2020-11-30 09:43:58	Edit | Delete
6	Thanh	Nguyen Truong	1652557	8	2020-12-07 09:43:58	Edit | Delete
7	Thanh	Nguyen Truong	1652557	8	2020-12-14 09:43:58	Edit | Delete

TEACHER

Absent students

ID	First Name	Last Name	Student Number	Email
21	Chau	Nguyen Ngoc	1651017	1651017@hcmut.edu.vn
22	Hoang	Le Huy	1651025	1651025@hcmut.edu.vn
35	Khoa	Tran Nguyen Dang	1552448	1552448@hcmut.edu.vn
38	Duy	Ngo Tu	1752133	1752133@hcmut.edu.vn
39	An	Nguyen Thien	1810824	1810824@hcmut.edu.vn
41	Nguyen	Nguyen Thanh	1852618	1852618@hcmut.edu.vn
43	Toan	Nguyen Van	1552004	1552004@hcmut.edu.vn

TOTAL STUDENT OF CLASS

Choose a class

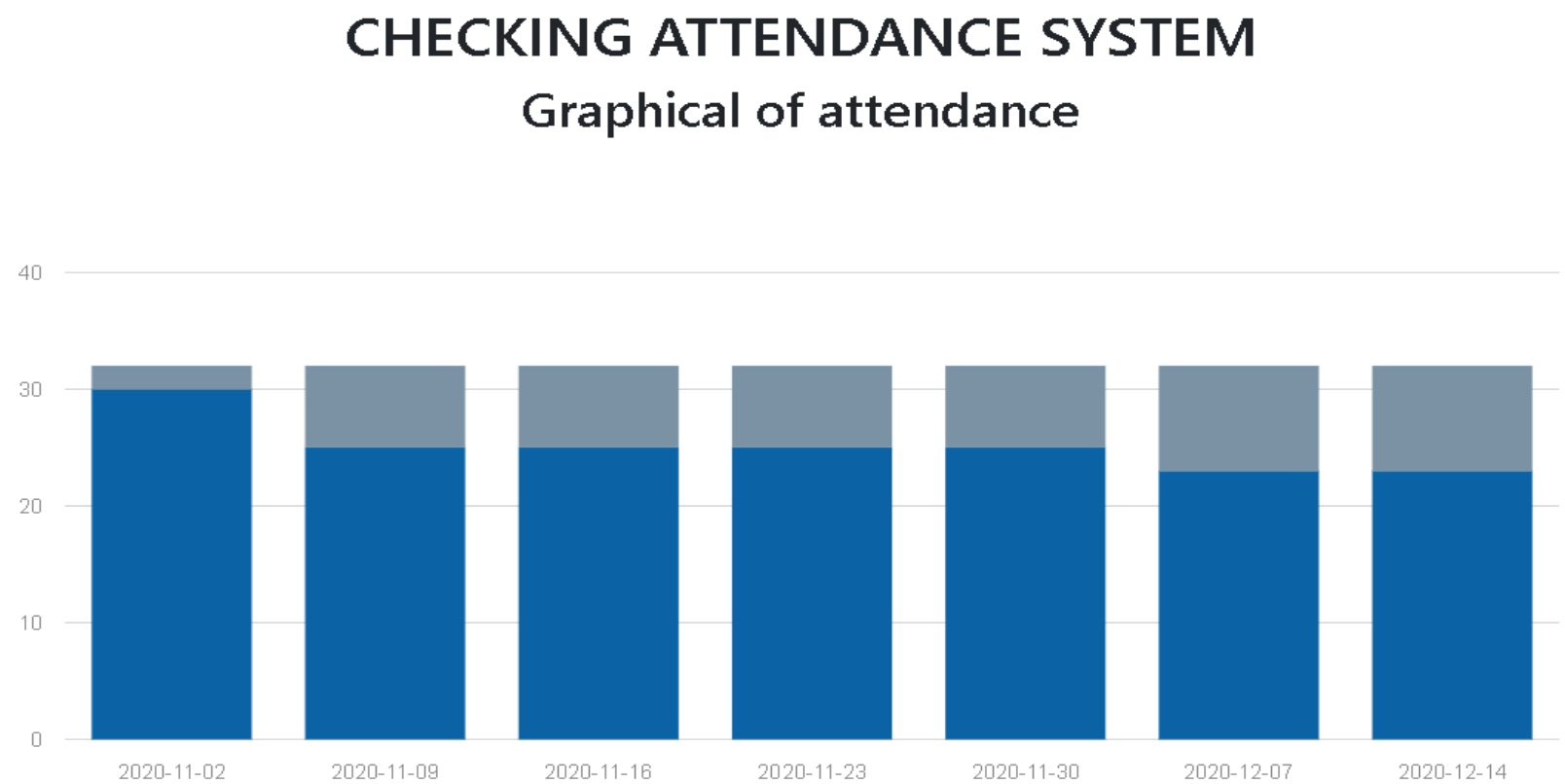
6

Submit

Total student: 13

ID	First Name	Last Name	Student Number	Email
3	Long	Nguyen Thanh	1655353	1655353@hcmut.edu.vn
6	An	Tran Thien	1651001	1651001@hcmut.edu.vn
7	Dang	Nguyen Hai	1651002	1651002@hcmut.edu.vn
15	Nhat	Nguyen An	1651010	1651010@hcmut.edu.vn
16	Nhat	Nguyen Tran Bao	1651011	1651011@hcmut.edu.vn
17	Thanh	Le An	1651012	1651012@hcmut.edu.vn
20	Minh	Nguyen Ngoc	1651016	1651016@hcmut.edu.vn

ATTENDANCE CHART



STUDENT

Attendance Table

ID	First Name	Last Name	Student Number	Class Number	Clock In
175	Quan	Nguyen Anh	1552310	8	2020-11-02 09:46:00
176	Quan	Nguyen Anh	1552310	8	2020-11-09 09:46:00
177	Quan	Nguyen Anh	1552310	8	2020-11-16 09:46:00
178	Quan	Nguyen Anh	1552310	8	2020-11-23 09:46:00
179	Quan	Nguyen Anh	1552310	8	2020-11-30 09:46:00
180	Quan	Nguyen Anh	1552310	8	2020-12-07 09:46:00
181	Quan	Nguyen Anh	1552310	8	2020-12-14 09:46:00

EVALUATION AND TESTING

Testing

Evaluation

TESTING

Test Case	Average time of 50 test cases (s)	Accuracy (%)
Register	91.1	\
Correct all	58	94
Wrong timetable	43.2	95
Other face in database	35.2	92
Unknown face	38.3	95
Unregistered card	27.9	100
Fake image	80.3	100

EVALUATION

EVALUATION

Advantages

- The system is easy to setup
- Have all a checking attendance system need
- Have data chart
- Low cost

Disadvantages

- Timing constraint
- Low capacity of RAM
- User interface is not good

CONCLUSION

Contributions

Future Works

CONTRIBUTIONS

- Give a solution to check student attendance using IoT devices.
- Combine RFID and Facial recognition
- Detect fake image of faces

FUTURE WORK

- Setup web server and database server to another hosting
- Move the project to the stronger system
- Use other methods to improve the efficiency of anti-spoofing to replace eye blink detection
- Create a better user interface
- Improved code logic of the system

THANK YOU
ANY QUESTION?