

# **Written Report**

## **Project Title: HCI Access (Group 9-02)**

### *Group Members:*

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### **Introduction**

#### ***Description of Ideas/Issues/Thesis Statement:***

Our project is a website which allows for a better, more secure visitor entry system, which complies with government regulations more strictly.

#### ***Rationale of Project:***

Currently, the school's entry system requires parents to provide their NRIC to enter the school (done when parents scan their cards), which is not recommended in the new Personal Data Protection Act (PDPA), an act aimed at protecting personal user data. Not only that, but according to talks with the school's estate, there is no proper form of authentication to allow visitors to enter the school, relying only on the questioning carried out by the security guards. Finally, NRIC cards can be easily lost and are not the most reliable when it comes to authentication. Thus, an unreliable visitor system, coupled with inadequate methods of authentication and the fact that it does not comply with government regulations, means change has to be made to improve the system.

#### ***Focus and Significance of Project:***

The target audience for this project would be parents of students in this school, but can be used by anyone. By digitalizing the process of obtaining a visitor's pass to enter, as well as the authentication part of things when the user arrives at the school, we can allow for a safer, more reliable visitor entry system, which also follows the PDPA.

### ***Scope of the Project:***

The project currently is confined to the school; however, with improving QR Code authentication, such a system may be implemented in other important facilities and places as well, not only limited to our school.

## **The Study and Methodology**

### ***Ideation, Description of Study:***

The idea of this project first came up when we had a talk with Mr Tay from estate, as well as other people involved in school security, on how unreliable the current visitor entry system was, and how the current system was not in line with the PDPA. Hearing this, we decided to use scanning technology, similar to the one used for students, to allow parents to enter the school. We decided to utilise QR Codes to achieve this; they were chosen over Barcodes as they

- a. Can contain more information than barcodes and a conventional barcode can take up to ten times the amount of printing space as a QR code carrying the same amount of information.
- b. Have higher reading speeds
- c. Are resistant to distorted or damaged symbols (meaning they can still be read accurately when distorted or damaged)
- d. Support greater confidentiality of the stored information as unless the conversion table between the character type and the stored data is deciphered, no one will be able to read the QR Code.

Our plan was to create a web portal whereby existing users (parents) could sign in to ask for visit requests, to which admins could either accept or decline. A auto-generated QR Code would be sent to parents, who could use it to scan QR Code scanners at the gate to enter.



**Fig 1.1** Planned system

***Investigation, Surveys (Needs Analysis and User Feedback), Experiments, Research:***

We did not conduct surveys but did this project as we heard about the vice principal of the school, according to our mentor, talking about confidentiality and authenticity when visitors enter the school, such as NRIC numbers and whether or not the people who entered the school who claimed to be parents really were parents.

Now is our developmental process:

1. After proposal evaluation, we set to work coding the program that generates the QR codes.
2. In the wake of the mid-term evaluation, we started working on the website and the portal and tested out and improved the code.
3. Finally the portal was done and the code could successfully generate QR codes and it is ready for final evaluation.

We researched on how QR Codes worked so that we could, with the help of existing tools and software libraries, create a program to automatically generate QR Codes. We used the following programming languages and tools:

1. Node.js
2. MongoDB
3. Heroku (for hosting)
4. Bootstrap (CSS)
5. Libraries like Nodemailer for creating automatically-generated emails

***Members' Role and Job Distributions:***

Oak Soe Khant → Lead Programmer (Backend Programmer)

Gavin Lu Heng Yi → Assistant Programmer (Front-end Programmer)

Tan Jun Hao Enzo → Written Report and Slides (Admin work)

Tan Yi Jun → Written Report and Slides (Admin work)

***Project Timeline:***

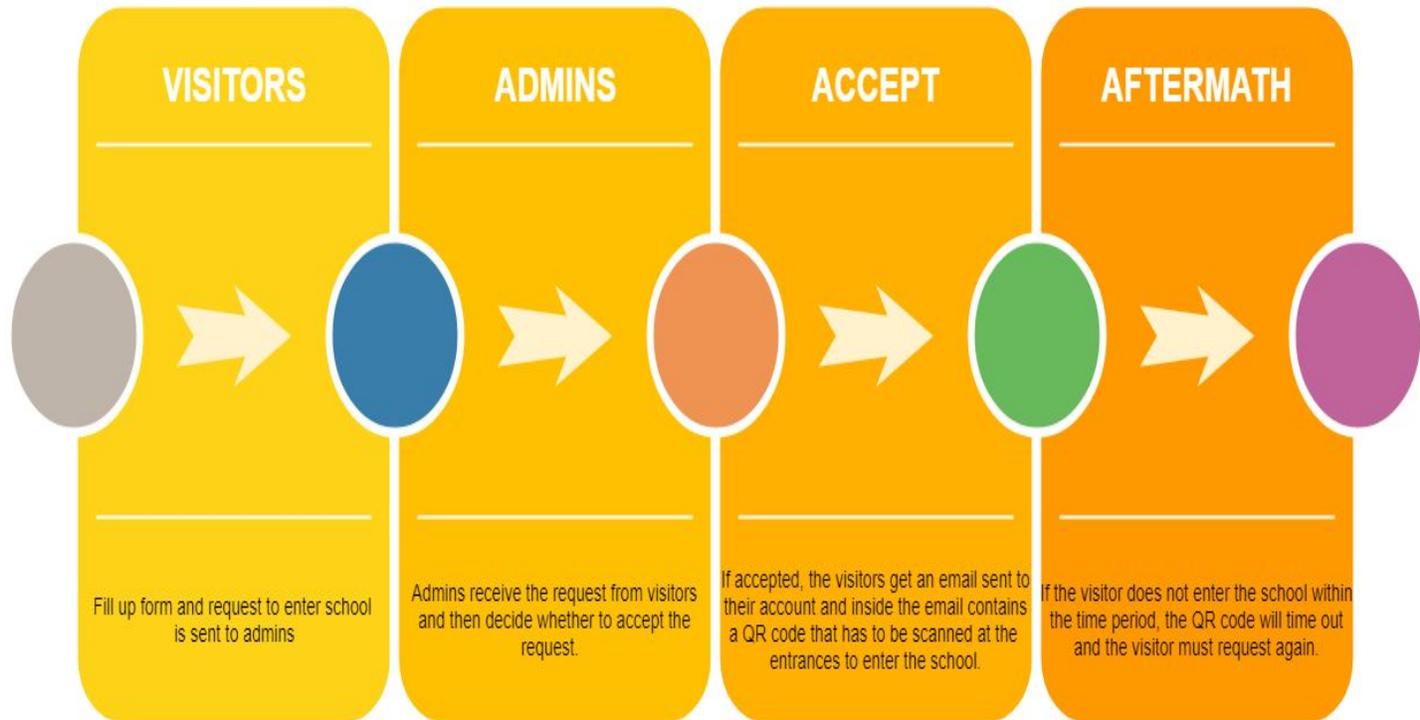


## Literary Review

We based this system off the system Google has in place for its own visitor entry system.

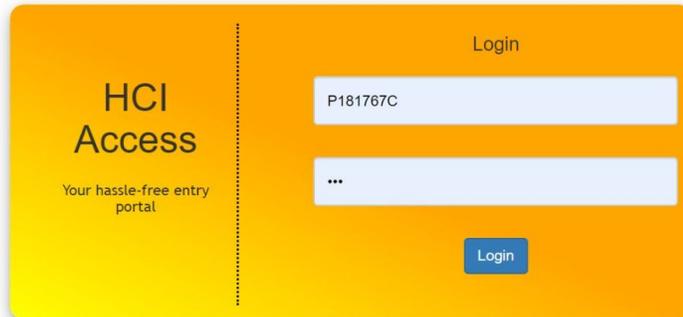
### Outcomes, Analysis and Discussions

#### *Flowchart of the Different Features of the System:*

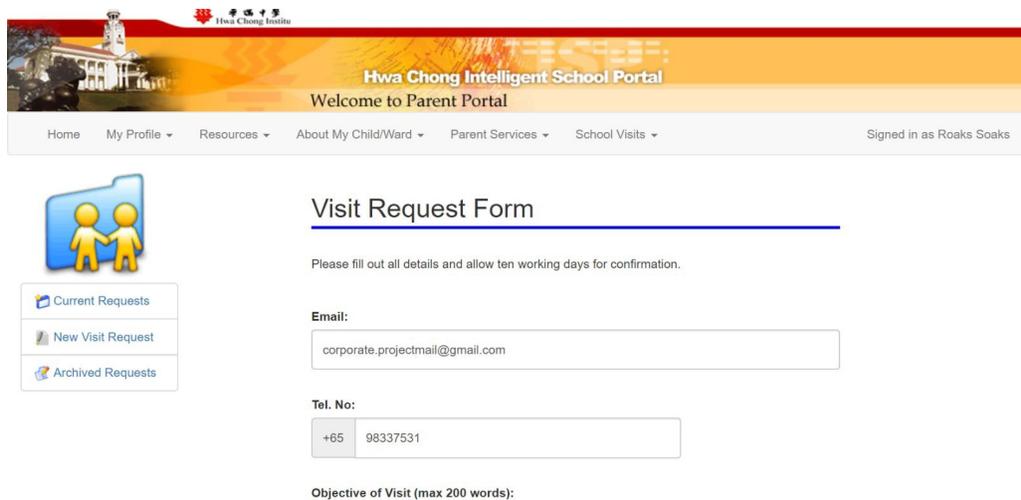


**Fig 2.1A** flowchart with a short summary about how our system functions.

**All Features of the System with Screenshots and Descriptions of its Purpose:**



**Fig 3.1** The login page. There is one for both admins and parents. In this case, we are simulating the ISP, hence the banner on top; however, the login feature is fully custom and functioning, and is integrated into the visit request portal.



**Fig 3.2** Shown here is the form the visitor fills out. The contents of the form are sent to the admin.



- Current Requests
- New Visit Request
- Archived Requests

**View All Your Requests**

Pending Requests				
Visit Reason	Date Sent	Requested Date	Requested Time	Status
I wish to visit the teacher for a parent teacher meeting so that we can discuss with the teacher on the child's grades. He has not been doing well in school as of recent, and we wish to get advice from the teachers. His teacher is Mr Vong, email is somethingsomething@something.com.	August 6th 19	August 6th 19	7:15 pm to 7:20 pm	Pending

Accepted Requests				
Visit Reason	Date Sent	Requested Date	Requested Time	Status

Declined Requests				
Visit Reason	Date Sent	Requested Date	Requested Time	Status

**Fig 3.3** The visitor can see his or her recent requests. Currently, the admin has not accepted the request yet.

## Your Visit Request Has Been Accepted.

Hi, Roaks Soaks

You have been invited to visit HCI! Here are your visit instructions.

**Visit Instructions**

Date: Aug 6th 19

Time: 8:10 pm to 8:15 pm

Check-in Gate: Gate 3 or Gate 4

Address: 661 Bukit Timah Road, 269734

Reference Code: 092998307

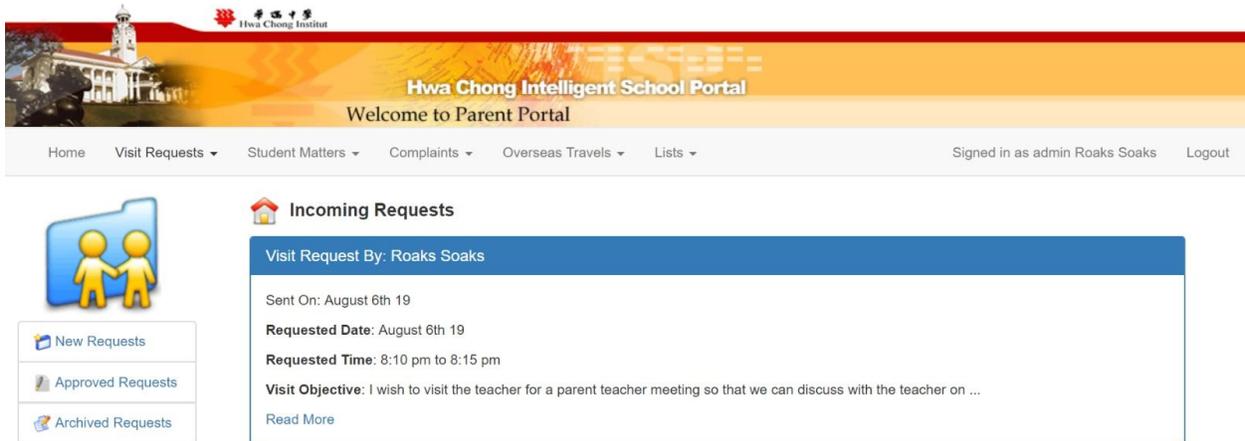
QR Code:

Do note that you may only access the school during the time period you have chosen. The QR Code is use-once; it may not be used more than one time.

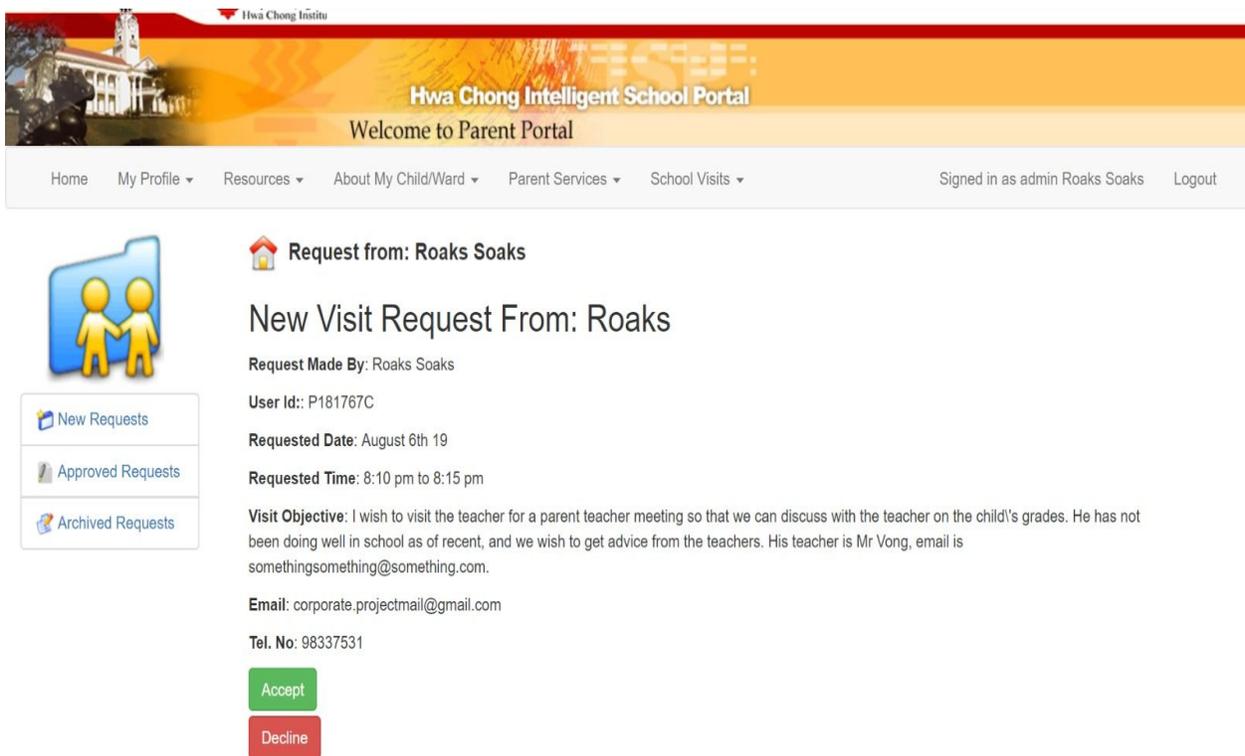
\*\*\*\*\* This was an automatically generated email, please do not reply. \*\*\*\*\*



**Fig 3.4** This is what the visitor will see when his or her request is accepted by the admin, with the qr code needed to enter, the location and the time to enter. The reference code is to be used if the QR Code, for whatever reason, does not work.



**Fig 3.5** This is what the admin sees when there is a new request.



**Fig 3.6** This is the page that the admins will see after clicking “Read more” on the new request.

**Hwa Chong Intelligent School Portal**  
Welcome to Parent Portal

Home Visit Requests Student Matters Complaints Overseas Travels Lists Signed in as admin Roaks Soaks Log



-  New Requests
-  Approved Requests
-  Archived Requests

### Archived Requests

Name of Requester	Id of Requester	Visit Reason	Date Sent	Requested Date	Requested Time	Accepted/Declined	Time Scanned (If Any)
Roaks Soaks	P181767C	I wish to visit the teacher for a parent teacher meeting so that we can discuss with the teacher on the child's grades. He has not been doing well in school as of recent, and we wish to get advice from the teachers. His teacher is Mr Vong, email is somethingsomething@something.com.	August 6th 19	August 6th 19	8:10 pm to 8:15 pm	Accepted	August 6th 2019, 8:10:20 pm

**Fig 3.7** This is an archive of the requests that have been previously made, seen by the admin.

### Implications and Recommendations

***Include Area for Improvements and Possible Further Extensions:***

1. Improve the page of our portal aesthetically.
2. Implement our system with the school's QR code scanning hardware. Due to our limited knowledge of low-level hardware regarding QR Code Scanners, we were unable to fully implement the project with the school's QR Code Scanners.

### Conclusion

***Reflection and Learning Points from the Project Development Process:***

Failure, contrary to popular belief, is not a bad thing. People fail all the time, and what's important is that we move on and learn from our wrongdoings rather than dwell on them. We encountered many setbacks while doing this project, as everyone does, I suppose, but learnt from them and continued marching on. We also ran on a tight schedule, and had to multitask in order to finish the project. We also learnt the importance of teamwork and how a single member of the team not contributing to the project could destroy us. However, we are very grateful to have such

a forgiving team who will give those people chances to amend their mistakes and continue to contribute to the project. At the same time, we had two members who went to Taiwan for a week to showcase their previous project, during the school term, and this effectively reduced the amount of work we did. However, we pulled through, the end result was finished and we are very proud of ourselves for achieving this.

### **Bibliography**

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