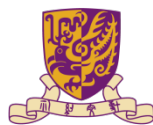


## **Technical Proposal**

### **LGUPass: An Integrated Face Recognition Access Control System at Harmonia College**

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## Background

In late 2019, Harmonia College of the Chinese University of Hong Kong, Shenzhen (CUHKSZ) installed four electronic security gates at blocks A to D after thefts occurred at the University Library. These security gates identify students by scanning one's CUHKSZ student ID card. Although the system provides additional security for the dormitory, complaints have been continuously raised by students about its inconvenience. Others are also worried that the current security system may not suffice to eliminate theft at the dormitories. As the student representatives at the Information Technology Services Office (ITSO), we propose to the university an upgrade in the current security system at Harmonia College.

## Problems

The first problem of the current security system at Harmonia College is the inconvenience brought by its means of identification. In a survey conducted among 54 Harmonia College students in March 2020, 39 (72%) participants reported that they had forgotten their student ID card at the dormitory for at least once; Meanwhile, 26 (48%) students complaint about the experience of card scanning, either because their hands are occupied sometimes by their belongings (18 of 26), or they sometimes struggle to find the ID card inside their bag (10 of 26). These unpleasant experience warrants a more human-centered approach for identification.

There are also safety concerns regarding the current system. In the same survey mentioned before, nearly 10% of the students said they had had the experience of losing their ID cards on campus. As our university campus is open to the public on weekends, strangers might use these unclaimed ID cards to enter the dormitory, which poses potential hazards to students' personal and property security.

## Solution

To cope with the problems mentioned above, we propose to replace the security gates at Harmonia College with a face recognition access control system named

LGUPass. LGUPass is an integrated system of hardware sensors and face recognition algorithms, powered by a database storing facial features of the students. To enter the dormitory, the user simply needs to look at the sensing camera of the system. Within 2 seconds, the algorithm behind LGUPass can extract the facial features of the comer, compare them against the database, and decide if the door should be unlocked. The entire process is completely contactless with no card scanning required. Regarding the accuracy, the system prototype is exceedingly robust with over 95% accuracy under normal lighting, and over 70% accuracy under poor lighting conditions.

### **Benefits**

Equipped with face recognition technology, LGUPass can make access control at Harmonia College more convenient and secure, which will greatly benefit all Harmonia students who pass the access control on a daily basis. Students no longer have to worry about forgetting their ID cards at the dormitory, and there will be no more frustrating bag searching. The identification process will be hands-free and contactless, so students can easily unlock the door even when their hands are occupied. Moreover, LGUPass can strengthen the security of the student dormitory. According to Andrejevic and Selwyn (2019), combinations of facial features are commonly distinct among individuals and - unlike ID cards - these information is difficult to be stolen by strangers. Replacing ID card scanning with LGUPass can benefit Harmonia students in terms of personal and property securities.

### **Implementation Plan**

The implementation of the LGUPass system at Harmonia College will be broken down into 6 major steps, starting on April 25, 2020. The entire process is estimated to span 60 days. Below is a detailed schedule for each step of the implementation.

Step	Date	Tasks
Recruitment	April 25, 2020 - April 30, 2020	Recruit a development team on campus
Software Development	May 1, 2020 - May 15, 2020	Incorporate face recognition algorithms into the system; database setup
Hardware Preparation	May 16, 2020 - May 26, 2020	Purchase sensing cameras; test connection with the software
Data Collection	May 27, 2020 - June 3, 2020	Collect facial data from students; load data into the database
First Testing	June 4, 2020 - June 6, 2020	In-lab testing of the system
Installation	June 7, 2020 - June 14, 2020	Install the system at Harmonia College
Second Testing (Open)	June 15, 2020 - June 22, 2020	On-site testing of the system
System Put into Use	June 23, 2020	

### Costs

The cost is listed for each step of the implementation in the following table.

Step	Cost	Purpose
Software Development	50000 RMB	Wages for the development team
Hardware Preparation	2500 RMB	Cameras for the final product and testing
First Testing	1000 RMB	Wages for the participants in testing
Installation	1000 RMB	Wages for Installation workers and equipment fee
TOTAL	54500 RMB	

### Conclusion

LGUPass is a solution to the current unsatisfactory access control system at Harmonia College. The current systems dependence on the student ID card will be eliminated, along with many existing problems caused by such dependence. With LGUPass, Harmonia students can enjoy a fast, card-free experience of passing the

access control. The security of the access control will also be strengthened to help prevent future thefts in the student dormitory.

## References

Andrejevic, M., & Selwyn, N. (2019, May). Facial recognition technology in schools: critical questions and concerns. *Learning, Media and Technology*, 114. doi: 10.1080/17439884.2020.1686014