

Automated smart box to alleviate unfair means in public examination in the context of Bangladesh

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Abstract—

Question Leakage has become one of the biggest problems in the last 5-6 years in Bangladesh. Instead of taking different pragmatic steps, it has become very difficult for the exam board controller to check the leakage of question papers. This is a quotidian scenario in Bangladesh. We mainly intend to solve this problem in our proposed system. In our proposed system, there will be a IOT based smart box in which all the board questions will be carried. If anyone tries to open the box illegal to leak the questions before the exam, our proposed system will show us the location details of the box and when the culprit will open the smart box, an image will be captured. In our proposed model, the attempt of tampering the smart box can also be identified.

Keywords—Question Leakage, Smart Box, IoT, Continuous monitoring, Security

I. INTRODUCTION

The Internet of things (IoT) [1] is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. In Bangladesh question leakage [2] has been one of the prominent problems of the recent time. In our proposed model we will implement an IOT based smart box system which will help us to prevent question leakage in public exam. Question leakage in public exams is destroying the backbone of education in our country. Sometimes our lawmakers are wanting to solve the problem by closing internet [3]. But we do believe these kinds of problems should be solved technically. In our proposed model the questions will be carried in the smart box. Each smart box will have a particular id. The smart box won't open until a particular time. At first, everyone will have to overcome a particular security, the security part will be ensured either using the fingerprint sensor or by password-based security system where we will use the concept of encryption or decryption. Then When someone wants to open a particular smart box illegally then a message will be given to the central authority against the particular smart box id. We will also have a web interface where we can store the smart box id, the location where it was unlocked and the time of opening it. So unlocking information and the particular smart box id and location will be sent to the administrator. We will use a sensor that will detect that the cover of the box is removed. The smart box will have remote control feature as this feature is indeed essential to make sure the box can be opened anytime if the system administrator

wants.

The rest of the paper is organized as follows. The background history and comparison related to this paper is given in Section II. Section III comprises of the conceptual design of the system, Section IV contains the implementation and work flow. After that we proposed the future expansion of the project with its limitation in Section V Lastly, Section VI contains the conclusion.

II. LITERATURE REVIEW

This research is focused to achieve a leakage-free examination for Bangladesh which will alleviate current question leakage problems, leading towards a better lifestyle. To find out the related literature, we have conducted searches in the major scholarly databases including ACM scholar, Google Scholar, IEEE explorer, Researchgate and ScienceDirect using suitable search strings.

The IOT based smart garbage system [4] for efficient food waste which was designed by Insung Hong and his team helped us a lot to understand the concept of IoT. The project was mainly implemented in the district of Seoul, the Republic of South Korea. It can reduce the food waste up to 33%. Another IOT based project was implemented by S.S. Navghane and his team. This is a smart garbage and waste collection bin [5]. They have mainly used GSM technology and wireless IR system. To make the city bad smell free, there is a system that will show you the current status of the garbage on the mobile web browser on the HTML page when your mobile is connected to the Wi-Fi. In another research, we have seen, Dr Y Raghavender Rao [6] designed an IoT based smart parking system where people can find nearest possible parking with the help of less consumption of fuel. This will help them to minimize their fuel cost. One of the latest researches of Geng Yang et al. [7] showed that they have built an IoT based Intelligent Medical Box. The box will provide health care support to the family.

Kunal Maurya and his team [8] had developed a real time vehicle tracking system using GPS and GSM technology. We have tried to implement their technique in our proposed system to stop the question leakage in the public examinations.

J.Chandramohan et al. [9] discussed the system which was a micro-controller based prototype which used fingerprint sensor and in order to track individual missing person's

location using GSM technology. They only dealt with bio-metric authentication using micro-controller which is a hardware concept. A study conducted by Jennifer C et al. [10] proposed an advance attendance system. It was an Arduino based system which fused with MATLAB. They evolved a fingerprint identification system using Adafruit Fingerprint algorithm with the help of Arduino. To find and recognize the face, they used Viola-Jones Face Detection Method and Principal Component Analysis (PCA) with the guidance of MATLAB.

III. DESIGN OF THE PROPOSED ARCHITECTURE

In this section, it is discussed how this system is designed. This can be subsumed under two factors such as finding the necessity and the conceptual design.

A. Finding the Necessity

Our proposed system can eliminate the question leakage problem from Bangladesh. We have found some major reasons which led us to develop the system. To understand the phenomena properly, we have visited some over populated areas of Dhaka city. We have talked with several general people including passengers, teenagers, school or college going boys and girls, passerby, job holders etc. We have asked them some questions regarding question leakage in Bangladesh. We have also asked them how to stop this question leakage in public examination. Based on their answers many inconveniences caused by the question leakage have been found which are stated below:

- 1) Those who are genuinely good students aren't evaluate properly.
- 2) It doesn't judge your talent.
- 3) Someone gets question paper night before the exam, gets good marks
- 4) An employee uses his own fingerprint to open the door for someone else to leave.
- 5) Education is the backbone of a nation. It makes our nation weak.

B. Developing the conceptual design

In this subsection, we will discuss the conceptual design which is the representation of our entire project. This will give an enhanced outlook on the project to understand it better. The block diagram is given in Figure 1

Features:

Continuous Monitoring : The central authority will have all the notification and current updates on the box by central database. If any problem happens central authority will be able to take necessary steps.

Security system : There will be a two layer security system for the authentication purpose. The security system poseses both the fingerprint authentication and password based security.

Send Sms : As soon as the box is opened the central authority will receive sms and every details of the box will

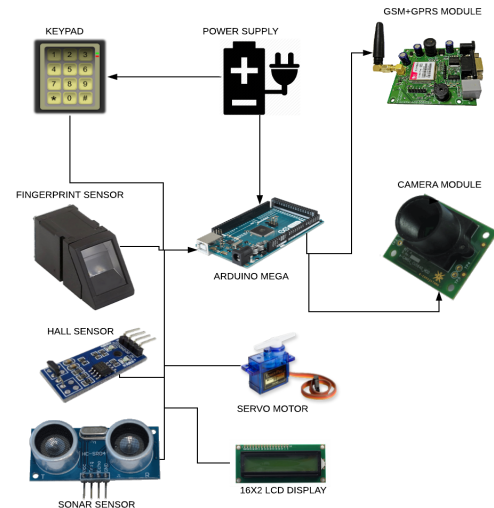


Fig. 1: Block Diagram of The Proposed System

also be given to central authority.

Camera capture : The image of the person who is opening the box will be captured by the camera. This feature helps culprit identifying process.

Location retrieval : Despite the various precautions taken, the user might still fall down from the wheelchair or need external help. For this, the voice command Help will send SMS to the users caregiver asking for assistance as well as the current location.

Central Control : If somehow authorized person gets sick or fails to open the box then the central authority will have the power to automatically open the box before 5 minutes of exam. It will be controlled by timer.

IV. IMPLEMENTATION AND WORKFLOW

In this section, we have discussed how we have developed our proposed system.

A. Components

We have used different components to implement our prototype. To control the entire system there was an Arduino Mega. GSM in the box was used to send informative SMS to the authorities. We used servo motors. We have used sonar sensors and hall sensors. To open the box in the initial stage, we need a fingerprint password or a 4 or 6 digit password given by the authority. To collect the fingerprint, we need a fingerprint sensor. To support the entire system we needed breadboards and jumper wires.

B. User Interface

The layouts of the UI designs are taken care of by Extensible Markup Language (XML). This format should be both machine & human readable. We have used Arduino Software IDE to develop this whole system.

C. Database

MySQL has been used as database because it is the most popular language and we have implemented in a short scale. In the database, we have primary key. For example, every examination center number is a primary key for a smart box.

D. Server

PHP is the server-side scripting language that database server was connected with the MySQL.

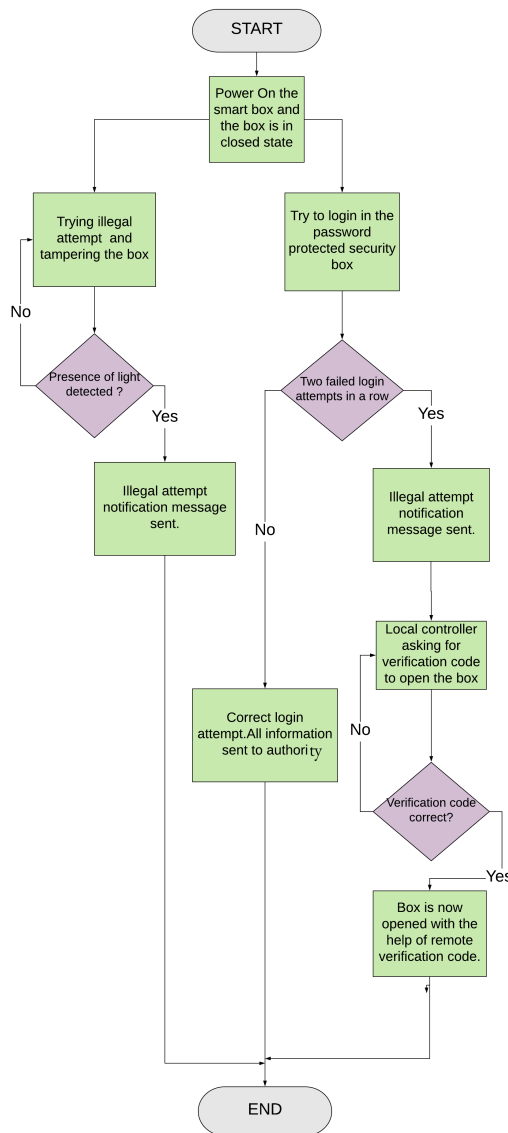


Fig. 2: Work flow diagram

Our project is powered with the help of two batteries. One low voltage battery is used to power up the Arduino which is programmed to control the smart box and another voltage battery is used to power up the GSM module. After our project is powered up there is a welcome message in lcd display. Our model's security will only work without light. Then the user is requested to enter the password. If the user enters the correct password the motor rotates and opens the box. We used GSM module to send SMS for both remote control and illegal

opening purpose. The location of the box opening and time opening of the box is also tracked in a remote database. The administrator will be able to know all the details of the box by that remote db and a front end web page. The image of the person opening the box is also captured by our camera module.

V. FUTURE EXTENSION

We have tried our level best to make the system accurate and error-free. But, still there are some accuracy that needs to be developed. In near future, if anyone tries to tamper the smart box, we want to collect their fingerprint [11], [12] and then send it to the server to verify.

We also want to develop a mobile application [13], [14], [15] for our police force. So, if any alert is found from any center about the question leakage, so that our nearest police officers can immediately go there and catch them red handed.

VI. CONCLUSION

We can say that the proposed system has been developed using existing technology. Our developed model of the smart box is capable of solving one of the prominent problems in our country. The security system is developed in such a way that it will be difficult to open the box illegally. If somehow anyone manages to open the box, then that culprit can easily be identified and punished. By implementing, the remote control feature we have mainly tried to show if somehow any malfunction happens then the box can be opened remotely right. So, all these features and implementation works have helped us in making a project which will solve question leaking in public examination problem digitally and technically. At the advent of technological advancement, the new generation of any country who have taken genuine preparation for the public examination deserves a question paper leakage free examination for fair judgment.

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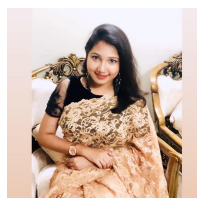
REFERENCES

- [1] R. K. Kodali, V. Jain, S. Bose, and L. Boppana, "Iot based smart security and home automation system," in *Computing, Communication and Automation (ICCCA), 2016 International Conference on*. IEEE, 2016, pp. 1286–1289.
- [2] S. Abdullah-Al-Nokee, "Question Leakage in public exam," <http://www.theindependentbd.com/printversion/details/137617/>, 2018, [Online; accessed 08-May-2018].
- [3] S. O. Report, "Education ministry wants Facebook closure during SSC exams," <https://www.thedailystar.net/city/education-ministry-wants-facebook-closure-during-ssc-exams-1523983>, 2018, [Online; accessed 21-May-2018].
- [4] I. Hong, S. Park, B. Lee, J. Lee, D. Jeong, and S. Park, "Iot-based smart garbage system for efficient food waste management," *The Scientific World Journal*, vol. 2014, 2014.
- [5] S. Navghane, M. Killedar, and D. V. Rohokale, "Iot based smart garbage and waste collection bin," *Int. J. Adv. Res. Electron. Commun. Eng*, vol. 5, no. 5, pp. 1576–1578, 2016.
- [6] Y. R. Rao, "Automatic smart parking system using internet of things (iot)," *Int J Eng Technol Sci Res*, vol. 4, no. 5, 2017.

- [7] G. Yang, L. Xie, M. Mäntysalo, X. Zhou, Z. Pang, L. Da Xu, S. Kao-Walter, Q. Chen, and L.-R. Zheng, "A health-iot platform based on the integration of intelligent packaging, unobtrusive bio-sensor, and intelligent medicine box," *IEEE transactions on industrial informatics*, vol. 10, no. 4, pp. 2180–2191, 2014.
- [8] K. Maurya, M. Singh, and N. Jain, "Real time vehicle tracking system using gsm and gps technology-an anti-theft tracking system," *International Journal of Electronics and Computer Science Engineering*, ISSN, pp. 2277–1956, 2012.
- [9] M. A. K. T. G. R. J. Chandramohan, R. Nagarajan, "Attendance monitoring system of students based on biometric and gps tracking system," *International Journal of Advanced Engineering, Management and Science (IJAEMS)*, vol. 3, no. 3, 2017.
- [10] J. C. D. Cruz, A. C. Paglinawan, M. I. R. Bonifacio, A. J. D. Flores, and E. V. B. Hurna, "Biometrics based attendance checking using principal component analysis," in *Humanitarian Technology Conference (R10-HTC), 2015 IEEE Region 10*. IEEE, 2015, pp. 1–5.
- [11] En.wikipedia.org, *Biometric Technology: Fingerprint*, 2017. [Online]. Available: <https://en.wikipedia.org/wiki/Fingerprint>
- [12] T. Agarwal, *Biometric Sensors Types and Its Working*, 2014. [Online]. Available: <https://www.elprocus.com/different-types-biometric-sensors>
- [13] P. Wadhwa, "Attendance system using android integrated biometric fingerprint recognition," *International Research Journal of Engineering and Technology (IRJET)*, vol. 4, no. 6, 2017.
- [14] A. A. Kumbhar, K. S. Wanjara, D. H. Trivedi, A. U. Khairatkar, and D. Sharma, "Automated attendance monitoring system using android platform," *International Journal of Current Engineering and Technology*, vol. 4, no. 2, pp. 1096–1099, 2014.
- [15] V. J. A. Sharma, "Location based attendance tracking using mobile devices," *International Journal of Computer Sciences and Engineering*, vol. 5, no. 4, 2017.



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