



Development of Slot Box Using GSM and IR Sensor

Nor' Ashikin binti Mohd Nasir^{1a}, Wan Mohamad Syazaril Asyraf Bin Wan Yusof^{2b} & Muhammad Nafis Bin Adam^{3c}

¹JKE, Politeknik Ibrahim Sultan, Johor, Malaysia

^an_shikin@pis.edu.my, ^bwanasyrif554@gmail.com, ^cnafisadam576@gmail.com

Abstract.

Pigeon holes are described as a small, medium-sized box-shaped box for fill out a letter or mail. Pigeon holes are also known as message boxes or manual mail systems and commonly used to communicate in organizations, workplaces and even institutes education. As usual, documents and messages are placed in a person's pigeon hole for collected. Users who typically use pigeon holes are like staff at organization to receive any important letter or memo related to official duties and also commonly used by lecturers or staff at a university. To ensure that important documents are not lost or stolen, the warning system must apply for notification to its owner. Slot Box with a warning system to the owner is the best product to solve the problem the. While there are many pigeon holes at an affordable price in the market still, no guaranteed to meet most customer needs. With the help of that technology will be inserted into the slot box, this will enhance and expand many functions and also reduce the problems that most users will face. For the implementation of this project, the scope of its use is reduced to lecturers in institutions and universities only. This Slot Box is a project to help the lecturers inside update the delivery of assignments in a more orderly and systematic manner. Task calculation process sent by students can be reduced due to the LCD display that has been displayed display of the number of tasks that have been submitted. Through this project as well, the security system is also given priority which is the addition of words the key to the task-taking process in the Slot Box. This can improve the aspect safety at the pigeon hole in the event of loss / theft of student assignments or more very important letter / memo.

@2020 Published by JOJAPS Limited

Keywords: Pigeon Hole; Mailbox; GSM; Arduino; Assignments.

1. Introduction

Slot Box is a hardware system that operates by using Arduino Mega mainboard, Arduino Uno and with Infrared Sensor that integrated with GSM SIM900A Modules that also will inform the user about the mail that arrived in the pigeonhole. When the letters cross the Infrared sensor's alignment, it will send a trigger to the Arduino Uno and integrate to the GSM Modules to send the notifications. It does operate by sending Short Messaging System (SMS) to inform the user about the arriving mail with additional counting system. This system is more efficient. All the notification's process was programmed in the Arduino IDE platform, and it will be uploaded to the Arduino Uno that integrated with GSM Modules that act as signal system to operate the entire sensor. This might be an interesting device and helpful product. Not to forget, this project also implements with the systematic design and system of automated timer for earlier and late holes to submit the document or assignment.

2. Methodology

This project focusing on the system features of capability on communication as well as the security aspect of the design. All the features play an important role for this project to connect with the all the objectives. There are various main components that involved into Slot Box which are included Arduino Mega, Arduino Uno, GSM SIM900A and Magnetic Door Lock.

Basically, the first method that the user will do when using the Slot Box is turn on the power either from the battery or Adapter power connector. As long as there are given enough power to function, the Slot Box will function as the objectives stated. Next, the user can do two things which are unlock the door by key in the password or key in the dateline for estimating the time given for specific roles of submitting the assignments of students if the user is a lecturer. This Slot Box will be focusing on the lecturer as the scope of this project priority on the learning organizations like staff, teachers and lecturers from school, college and university.

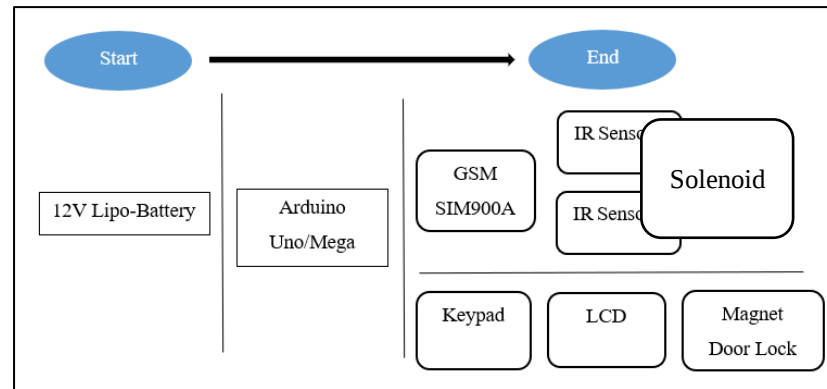
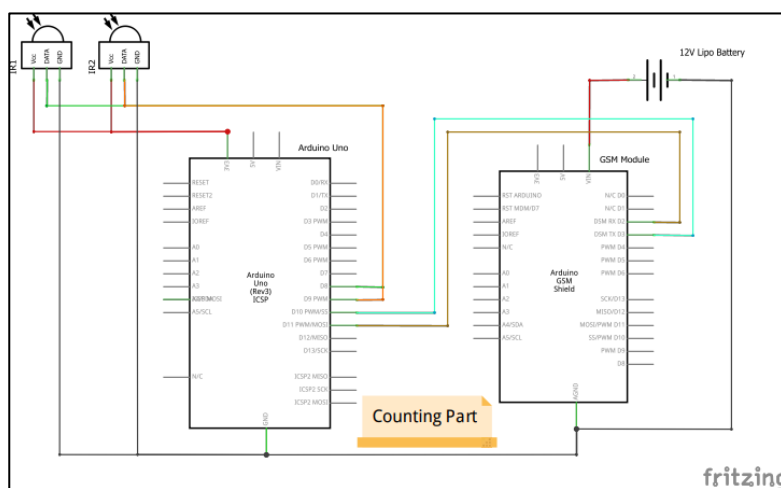


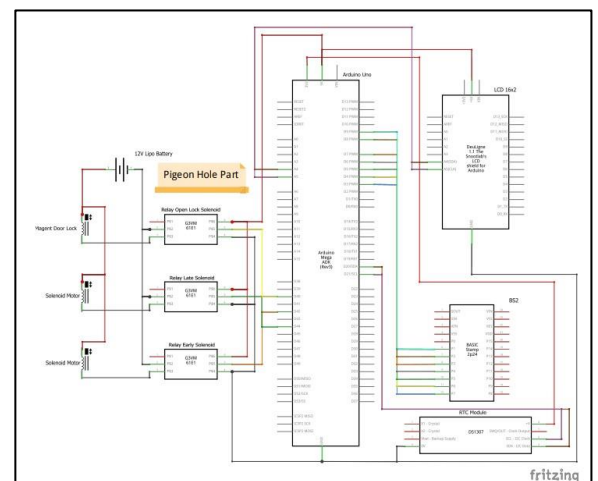
Figure1: Block Diagram of the Project

3. System Development

The design of the project has been made with the types of plywood with the base size of width and height with the same as the size of A4 paper which is 21.0 x 29.7cm. All the main components are connected to the 12V Li-po battery which is the same as 240V AC power supply that will automatically converted to 12V DC. The GSM SIM900A will sending out the notifications of SMS to the user when there are documents or assignments submitted through the two different holes of earlier and late holes. Both holes also connected to the relay module that acts as the switch to control the motor of solenoid. The solenoid will function as open or close both holes follows by the time given that have been set on the keypad earlier after turn on the Slot Box. As for the output, the LCD will show the timer or the date and time to the user of the Slot Box.



a2



b2

Figure 2: (a2) Schematic circuit of GSM SIM900A and (b2)Schematic circuit of Magnet or Lock

4.0 Result and Discussion

Experiment was conducted to find out which source of power is applicable for the GSM SIM900A to function successfully. There are three appliances used which is Arduino Uno as a main board for applying the based-on coding system, GSM board for the signal purposes and the IR sensors for detecting any documents or assignments near each of earlier and late holes. Result shows the theory section, and the result will be used for the functionality of the GSM SIM900A modules.

Result 1

The first result shows the final hardware design of the prototype development. This result clearly shows how all the components required for our system are connected. The actual picture of the products refers to Figure 3.

Result 2

The second result shows how to configure much voltage needed for the GSM to send out the notification (SMS).

Results: Table 1: Table of the differences of types of power apply to the GSM SIM900A

Method	Theory	Result
1. Battery 12V Li-po	2A @ 12V – Enough power to successfully function the GSM SIM900A	Battery easily to run out of source power after 2 hour of uses
2. Adapter Power Connector	2.5A @ 12V – Enough power to successfully function the GSM SIM900A	Still in a good condition to supply the power

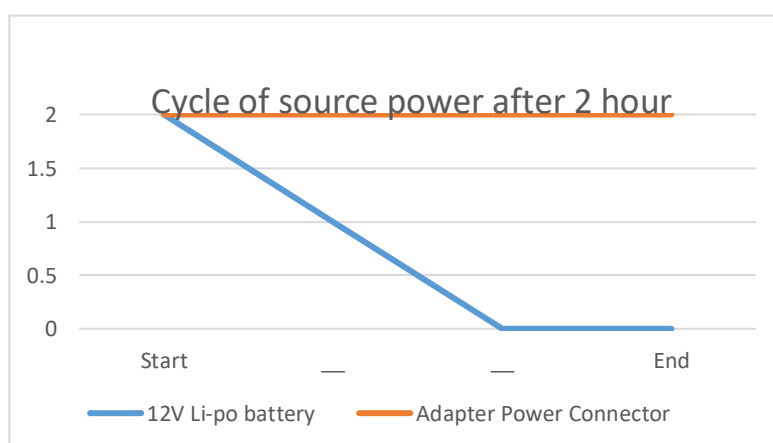


Figure 3: Graph of source power after 1 hour between two different types of source power

Result 3

The third result show how the magnetic door is working. It is operate by using the keypad and insert the password to open and close the door.

Result Table 2: The Result Of Magnetic Door

No	Type of test	Process	Output
1	Sending 3 documents ontime submission date line	Setting Dateline :	IR Sensor detected GSM send SMS to notify - The amount of submission' - Display time and date Magnetic Door - Door "ONTIME" will be open - Door "LATE" will be close
2	Sending 3 documents after submission time		IR Sensor detected GSM send SMS to notify - The amount of submission - Display time and date Magnetic Door - Door "ONTIME" will be close

- Door “LATE” will be open



Figure 5: The actual product (a5) The keypad for setting dateline (b5) and the photo of circuit (c5)

5.0 Conclusion

In a conclusion, the “Pigeon Hole 2020” has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus, this project has been designed and tested successfully. The system has been tested to function automatically. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully. The users of the pigeon hole (lecturers/workers) do not need to carry out manual checking anymore. The users also will not forget to retrieve their mails as they have been notifying via sms about mail availability. The users also notified whenever their pigeon holes were submitted into the pigeon hole.

References

- SUN Zhixin, LUO Bingqing, LUO Shengmei, ZHU Hongbo. Security Model of Internet of Things Based on Hierarchy Computer engineering, 2011:1-7(20).
- Curran, K., Craig, R. (2001) “A Short Message Service Online Application for Delivering Urgent Information to Students”, In: 1st Joint IEI/IEE Symposium on Telecommunications Systems Research (2001)
- Agrawal, P., Famolari, D.: Mobile Computing in Next Generation Wireless Network. In: Proceeding of the 3rd International Workshop on Discrete Algorithms and Methods for Mobile Computing and Communications, pp. 32–39 (1999).
- Nazariah bt Abdullah. Smart Pigeonhole System by Sending Notification through Short Messaging System, Universiti Malaysia Pahang: Tesis (2015)
- Fadzilah bt Kusin. SMS Based Child Monitoring System, Kolej Universiti Teknologi Tun Hussein Onn: Thesis (2005)
- Mohamad Eliyass bin Jamaruppin. Pigeonhole Notification System by Utilizing Telegram Messenger, Universiti Malaysia Pahang: Thesis (2014)
- Nurliyana bt Azizan. Intelligent Receiving Box Integrated with GSM Network, Universiti Teknikal Malaysia Melaka: Thesis (2015)
- Simmons, B. (2015, January 9). Advantage of plywood. Retrieved from <https://fennerschoolassociated.anu.edu.au/fpt/plywood/advply.html>.