

A
PROJECT REPORT
ON
SMART DOOR LOCK SYSTEM
B.Tech (IT) Sem-VII

Prepared By
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DEPARTMENT OF INFORMATION TECHNOLOGY
FACULTY OF TECHNOLOGY,
DHARMSINH DESAI UNIVERSITY
COLLEGE ROAD, NADIAD – 387001
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A
Project Report
On
SMART DOOR LOCK SYSTEM
BTech Sem VII

In fulfilment of requirements for
Bachelor of Technology
In
Information Technology

Submitted By:

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Under the Guidance of
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CANDIDATE'S DECLARATION

We declare that pre-final semester report entitled “SMART DOOR LOCK SYSTEM” is our own work conducted under the supervision of the guide Prof.(Dr.) Harshad B Prajapati.

We further declare that to the best of our knowledge the report for B.Tech VII does not contain part of the work which has been submitted either in this or any other university without proper citation.

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CERTIFICATE

This is to certify that the project carried out in the subject of software design project entitled “SMART DOOR LOCK SYSTEM” and recorded in this report is a bonafide report of work of

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Of Department of Information Technology Semester VII. They were involved in project work during academic year 2016.

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1. Pishangkumar Ujeniya
2. Mohib Sorathia

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1. INTRODUCTION

1.1 Project Details

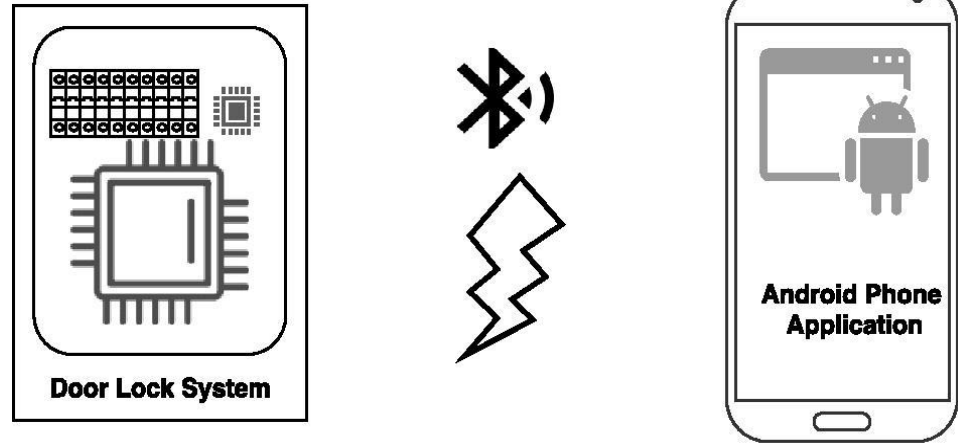


Figure : Block Diagram

Smart Door Lock System would be working with combination communication between hardware Lock Mechanism and Software Android application on the basis of correctness of password to open & close the door lock.

1.2 Purpose

The purpose of this document is to specify the detailed description of the Smart Door Lock System that will be designed and implemented. This document will explain the purpose and features of the system, the functionality of the system and its constraints.

1.3 Scope

The Goal of this system is to develop a Smart Door Lock System Hardware and Android Application. Door Lock System would be working on communicating via Android app.

Application would be giving commands to System and it would work accordingly.

2. PROJECT MANAGEMENT

2.1 Feasibility Study

2.1.1 Technical Feasibility

For running of our code and algorithm for checking the correct password and performing related Door Locking and Unlocking tasks we here be using Arduino UNO board as microcontroller.

The main reason behind using Arduino is it is open source programmable microcontroller and has many different attachable i/o ports and pins.

For our task we need some around 16Mhz of CPU which is available in Uno board.

We also have different alternatives boards like Arduino Micro which has high number of i/o pins which we do not need a lot in numbers, also it has 32 Kb which is same as Arduino UNO but bootloader uses 4Kb while in case of Arduino UNO it also has 32Kb but its bootloader uses only 0.5Kb so we get more space for other purposes.

Also when we go to compare with Arduino Mega with Arduino UNO we can conclude that Arduino Mega has so many i/o pins and 256Kb of Space which is totally useless for our task.

In comparison to price also Arduino UNO is cheaper than Arduino Micro and Arduino Mega.

For smartphone app development we choose Android platform as Android is opensource and is great in todays' market.

2.1.2 Implementation Feasibility

We choose Bluetooth connectivity rather than wifi chip because of its cost efficiency and its less use of range.

On considering the success rate of our Algorithm to fulfill our task we have made a logical algorithm for checking the correct stored password with the input from Android Phone via Bluetooth sensor would be implemented using Motor Driver Lock Mechanism.

Lock Mechanism we would be keeping mainly based on Motor driving. As moving the locking part to and fro would be easy using motor as displacing mechanism with gears and racks.

2.1.3 Cost of implementation

No.	Description	Cost in Rs
1.	Arduino UNO	400
2.	L293D	150
3.	Bluetooth Module HC05	350
4.	Motor	80
5.	Gear	20
6.	Rack	55
7.	Power Supply	250
8.	Jumpers	25
9.	Wires	30
10.	Stopper Holder	150
11.	Fast Araldite	35

3. GENERAL DESCRIPTIONS

3.1 Software Used

Arduino IDE: Arduino IDE is open source IDE software used for making Arduino board programs and sending them to Arduino board via USB port.

Android Studio: Android Studio is open source IDE software used for making Android Smartphone applications and helps in debugging them too.

Notepad++: Notepad++ is a free source code editor which supports several programming languages running under the MS Windows environment.

OpenOffice: OpenOffice an open source document editor office suite. Writer a component of openoffice helps to make document file.

3.2 Hardware Used

ArduinoUNO: Arduino UNO is a microcontroller board based on ATmega328P. It has 14 digital I/O pins with 6 analogue inputs, 16 Mhz Quartz Crystal, a USB connection.

It contains everything needed to support the microcontroller.

Bluetooth Module (HC - 05): HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.

Motor Driver IC L293D: A motor driver IC is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver ICs act as an interface between microprocessors in robots and the motors in the robot.

Here we would be using most commonly used IC L239D for DC motor to rotate in either direction.

Low RPM Motor: Low RPM Motor for getting out displacement of rack a little slower as lock mechanism would be needing only very few milliseconds of motor rotations.

Power Supply: 5V DC Power Supply needed for L293D circuit board and Arduino UNO would be given power supply via USB cable or Power pin.

3.3 Milestones & Deliverables

No.	Milestone	Deliverables
1.	Feasibility Study	Feasible
2.	Requirement gathering	Specific Functional Requirements
3.	System Design	UML Diagrams
4.	Arduino Coding	Arduino Module
5.	Basic Android Coding	Basic App
6.	GUI Coding	Final App
7.	Test Cases	Working as expected

3.4 Roles

No.	Role	Name
1.	Programmer	Pishang Ujeniya
2.	Designer	Mohib Sorathia
3.	Requirement Analyst	Pishang Ujeniya
4.	Tester	Mohib Sorathia

4. SPECIFIC FUNCTIONAL REQUIREMENTS

1.0 Arduino Kit

Input: Power Supply 5V

Process: Arduino Board Starts.

Output: Arduino LED blinks.

2.0 Connectivity

2.0.1 Bluetooth Module to Arduino

Input: Input to Arduino RX TX pin 0, 1 from HC-05 Bluetooth & Power supply.

Process: Bluetooth Module connects to Arduino.

Output: Emitting of Bluetooth Signals starts.

2.0.2 IC Driver

State: IC L239D Connected to Arduino and Power Supply.

Input: Logic State to Pins 2, 9 depending upon Arduino Code.

Process: IC switches according to input.

Output: IC gives output to motor depending upon logic.

2.0.3 Motor

Input: Positive & Negative input from IC pins 3, 8.

Output: Depending upon the input Motor Rotates.

3.0 Android App

3.0.1 Request Bluetooth ON

Input: Request Android Device for Bluetooth turning ON.

Process: Connects to System.

Output: Gets Lock Status.

3.0.2 Lock/Unlock

State: Present State of System.

Input: Enter Password and Toggle Lock/Unlock Button.

Process: Sends command and Password to System.

Output: System Locks/Unlocks if Correct Password.

3.0.3 History

Input: Click on History Button

Output: Android App shows History for Lock Unlock Time.

3.0.4 Clear History

Input: Click on Clear History Button

Process: Clears Table Records from Database.

5.DESIGN

5.1 Use Case Diagram

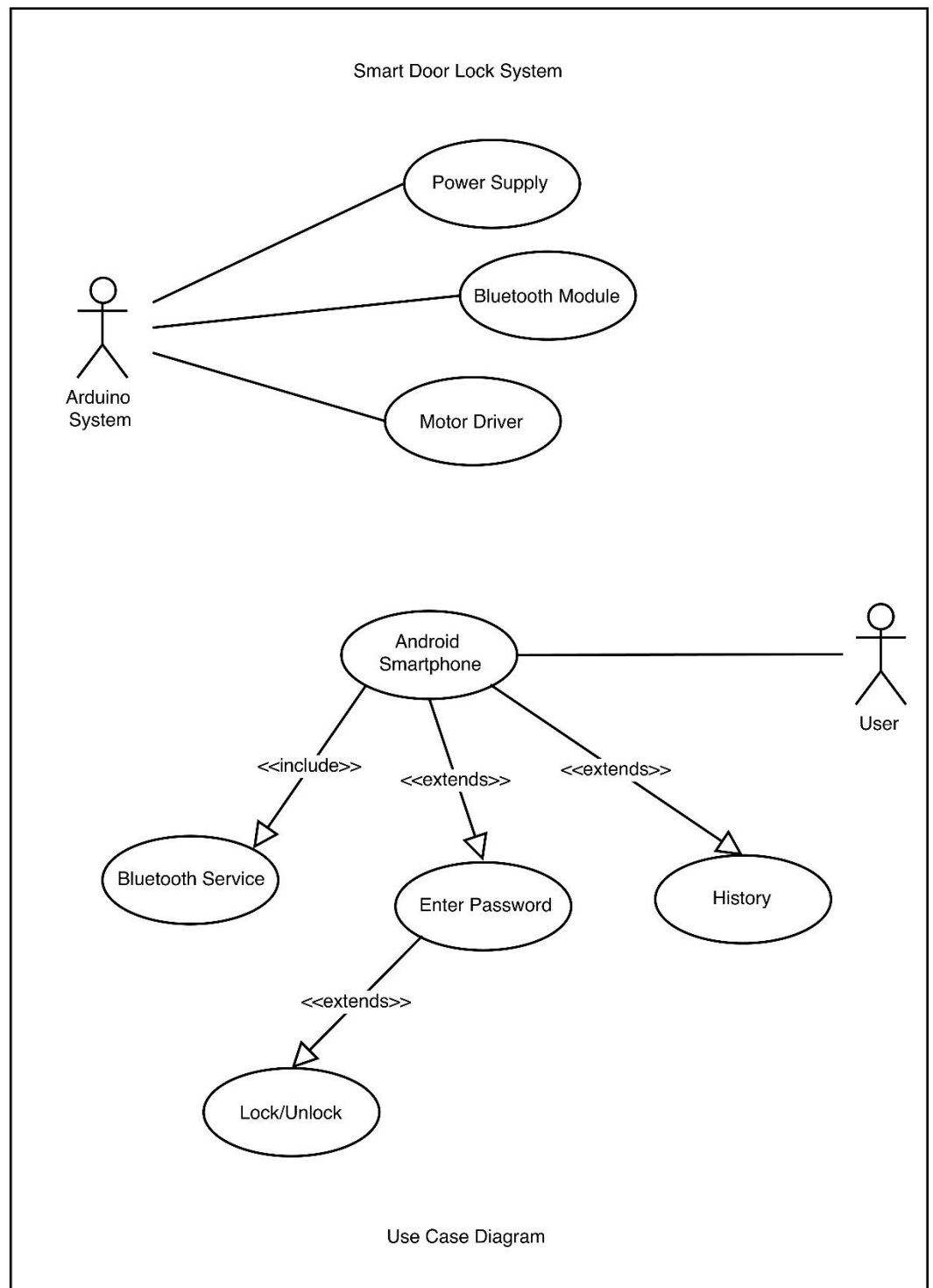


Figure 1 Use Case Diagram

5.2 Activtiy Diagram

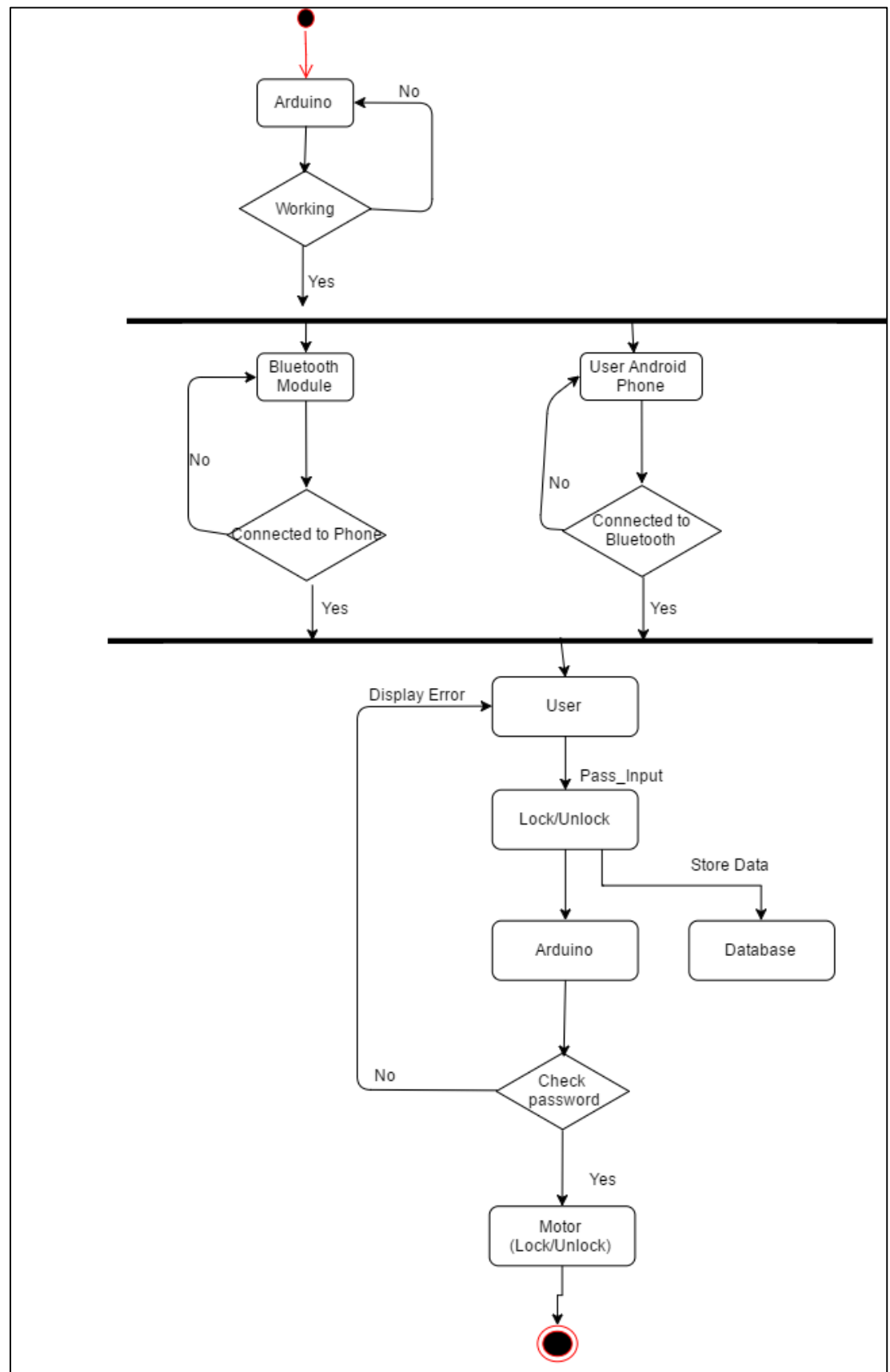


Figure 2 Activity Diagram

5.3 Sequence Diagram

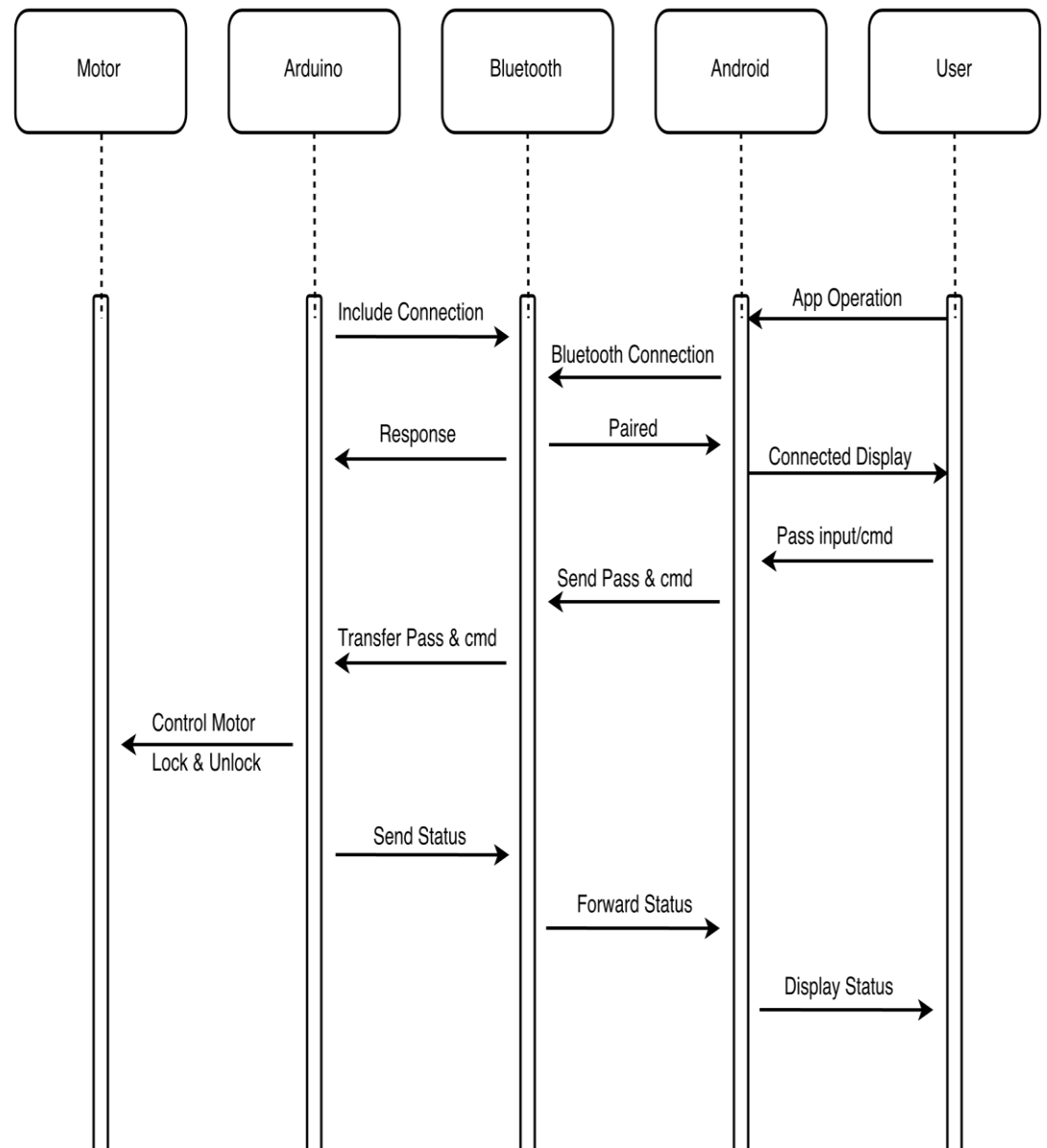
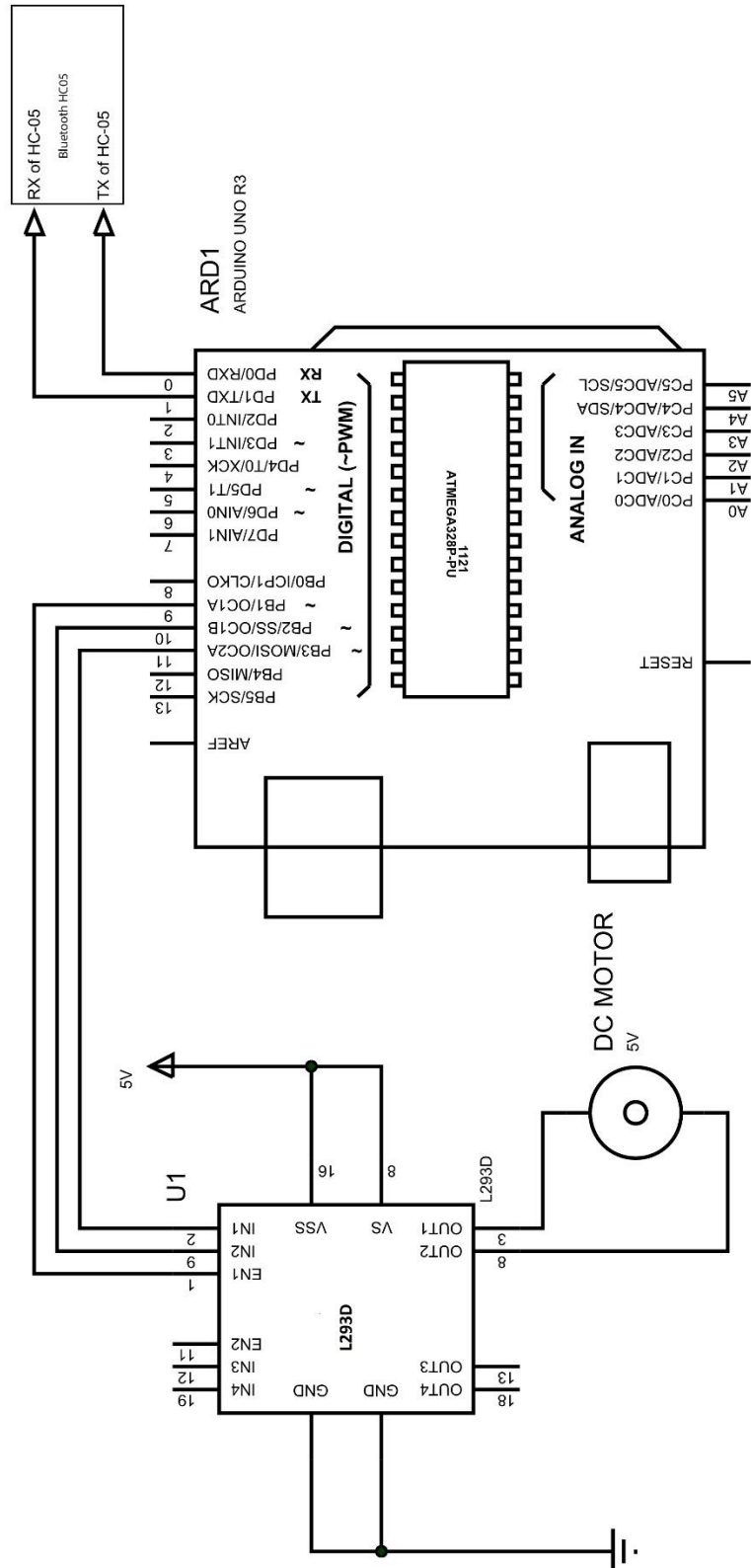


Figure 3 Sequence Diagram

6. IMPLEMENTATION

6.1 Circuit Diagram



6.2 Component Pin Diagram

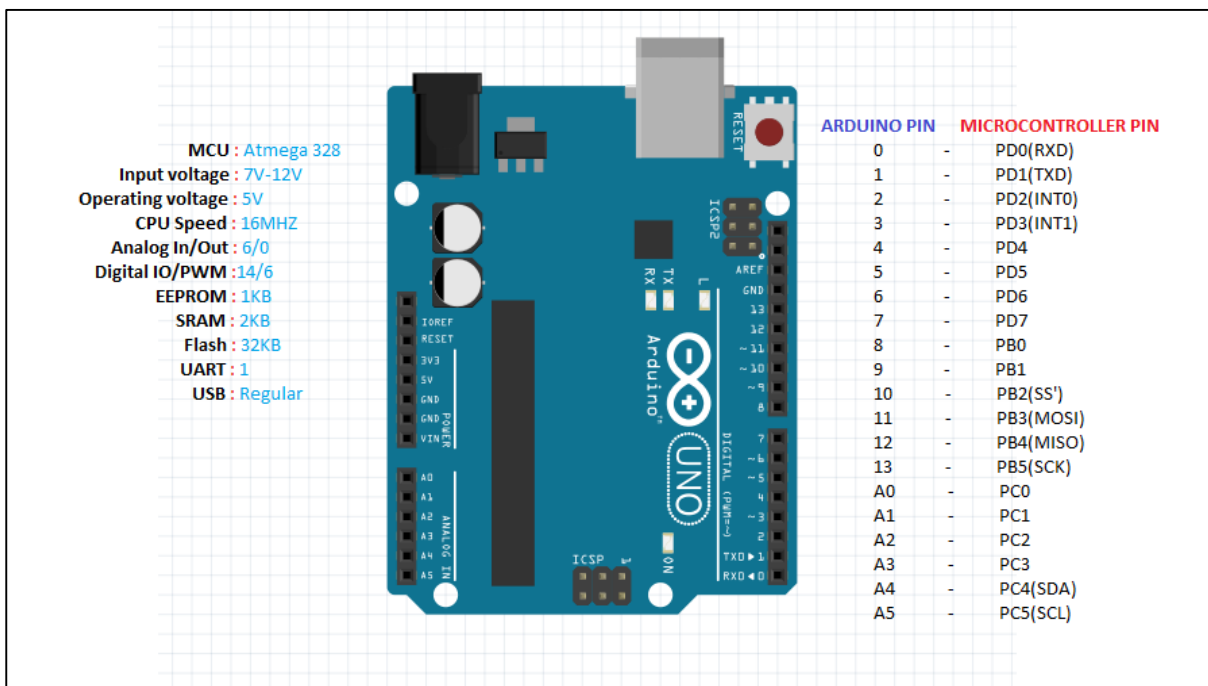


Figure 4 Arduino UNO Pin Diagram

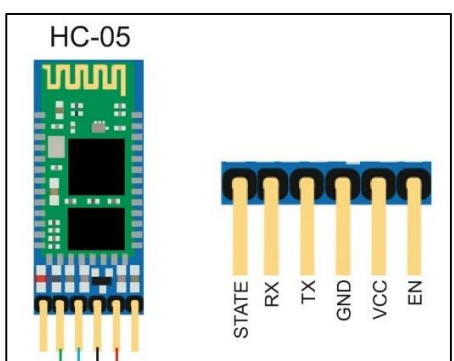


Figure 5 Bluetooth Module HC05

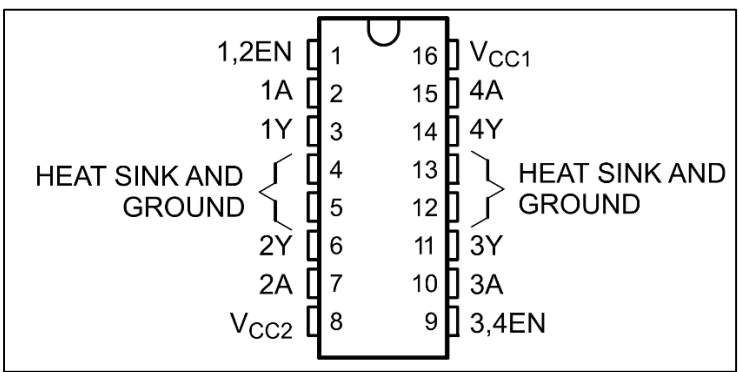


Figure 6 Motor Driver IC L239D

6.3 Hardware Implementation

Arduino Uno would communicate with Bluetooth module using TXD and RXD pin ports.

VCC and GND would be applied for circuit to get power and enabling the functionality.

The motor operations of either two or one motor/s can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. 1 & 9 pin for enabling.

The motor ic input logic and enabling input are controlled from Arduino via program depending upon the pins of Arduino which are connected to L293D IC.

Pin 2 is connected to Lock Mechanism via soldering and the other pin 13 is connected to rack of Lock Mechanism which would be making displacement horizontally.

When in Locked state the pins 2 and 13 would be connected each other and circuit would be completed which works feedback for getting the current status of Door Lock system whether it is locked or not from Arduino Code checking the values at 2 and 13.

6.4 Software Implementation

Our main software implementation includes android application development.

Android app development and coding we would be doing in Android Studio IDE available on Internet free for developers.

In the project we have created 7 activities, namely MainActivity which would be displaying animation of 3 dots as loading flash screen and then would initiate second activity.

Connect in this activity a button which on click would ask for Bluetooth turn on permission and would enable bluetooth.

BlueList in this activity a text area which would be displaying

to “Select HC – 05” and would display list view with available paired Bluetooth device.

GetStatus in this activity a button would be displayed to fetch the data from Lock System whether the system is locked or unlocked.

ToLock in this activity there would be displayed a textbox to enter Password and click Lock button which would send password and command of Locking in single string concatenated to Lock System and the Lock system would be fetching password whether it is correct or not and depending upon it would decide the function.

ToUnlock this activity is same as ToLock, but in this the command is Unlocking is sent.

History this activity would be rendering a dynamic table with dynamic colourful rows displaying date and time and task performed for Locking or Unlocking. Along with it would be displaying Clear History button which on click would clear all database table records.

7 TESTING

7.1 Testing Strategy

The development process repeats this testing sub process a number of times for the following phases.

- Unit Testing
- Integration Testing

Unit Testing tests a unit of code after coding of that unit is completed. Integration Testing tests whether the previous programs that make up a system, interface with each other as desired. System testing ensures that the system meets its stated design specifications. Acceptance testing is testing by users to ascertain whether the system developed is a correct implementation of the software requirements specification.

Testing is carried out in such a hierarchical manner so that each component is correct and the assembly/combination of components is correct. Merely testing a whole system at the end would most likely throw up errors in components that would be very costly to trace and fix.

We have performed both Unit Testing and System Testing to detect and fix errors.

7.2 Testing Method

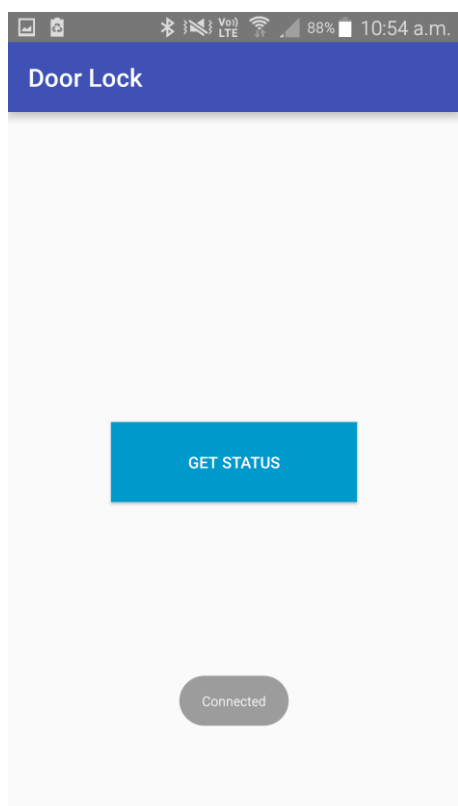
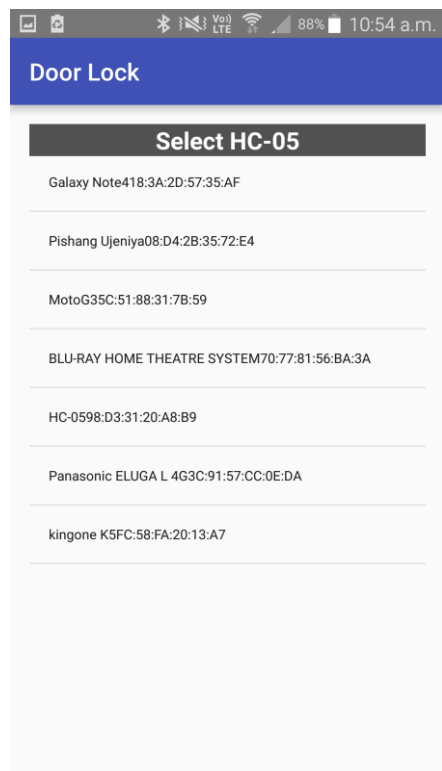
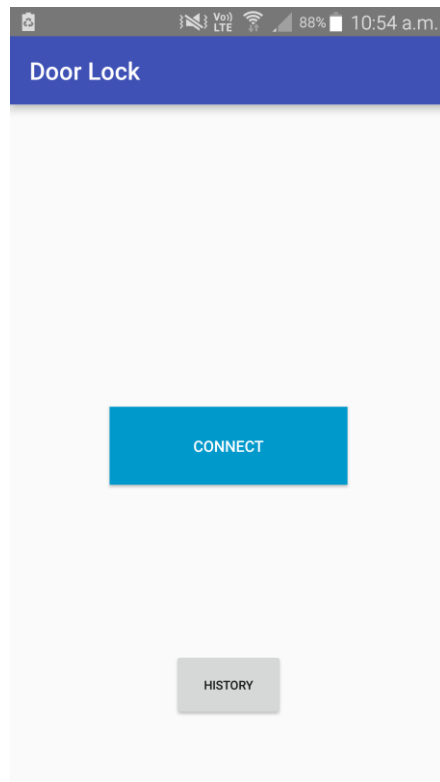
Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings. This method of test can be applied to virtually every level of software testing: unit, integration, system and acceptance. It typically comprises most if not all higher level testing, but can also dominate unit testing as well.

7.3 Test Cases

The Test Cases are described below:

Test Case ID	Test Scenario	Test Process	Expected Results	Actual Results
TC01	Bluetooth	-Open App -Deny Permission	Ask Again	As Expected
TC02	Bluetooth	-Turn BT on -Open App	Automatically Off Bluetooth	As Expected
TC03	Device Select	-Open App -Permit BT -Press Connect -Don't Select HC-05	Show Respective Error and exit the app	As Expected
TC04	Get Status	-Open App -Permit BT -Press Connect -Select HC-05 -Click GetStatus	Get the Lock Current Status	As Expected
TC05	Lock/Unlock	-Open App -Permit BT -Press Connect -Select HC-05 -Click GetStaus -Enter correct Password -Press L/Unlock	Lock System must perform respective task.	As Expected
TC06	Lock/Unlock	-Open App -Permit BT -Press Connect -Select HC-05 -Click GetStaus -Enter wrong Password -Press L/Unlock	System should stay idle, No Process as password is wrong	As Expected
TC07	Lock/Unlock	-Open App -Permit BT -Press Connect -Select HC-05 -Click GetStaus -Enter correct Password -Press L/Unlock -Press L/Unlock -Press L/Unlock	System should Lock once if its locked then even though password is correct system then should stay idle No Process	As Expected
TC08	Show History	-Open App -Click History	Show History Table	As Expected
TC09	Clear History	-Open App -Click History -Clear History -Open App -Click History	No Data Found message	As Expected

8 SCREENSHOTS



⌂ ⓘ 🔒 VoLTE 77% 11:36 a.m.

To LOCK

Enter Password to Lock

CLOSE

EXIT APP

HISTORY

⌂ ⓘ 🔒 VoLTE 76% 11:36 a.m.



To Unlock





Enter Password To Unlock

OPEN

EXIT APP

HISTORY



Vo)
LTE80%11:25 a.m.

History

18-11-2016 10:56:33	LOCKED
18-11-2016 10:56:33	LOCKED
18-11-2016 10:56:59	OPENED
18-11-2016 10:57:24	LOCKED
18-11-2016 10:58:16	LOCKED
18-11-2016 10:58:44	OPENED
18-11-2016 10:59:39	LOCKED
18-11-2016 11:00:33	OPENED
18-11-2016 11:01:20	LOCKED
18-11-2016 11:01:28	LOCKED
18-11-2016 11:01:28	LOCKED
18-11-2016 11:01:28	LOCKED
18-11-2016 11:01:29	LOCKED
18-11-2016 11:02:09	OPENED
18-11-2016 11:02:58	LOCKED
18-11-2016 11:05:14	OPENED
18-11-2016 11:05:38	LOCKED
18-11-2016 11:05:48	LOCKED
18-11-2016 11:06:24	OPENED
18-11-2016 11:06:56	OPENED
18-11-2016 11:07:25	LOCKED
18-11-2016 11:07:28	LOCKED
18-11-2016 11:07:57	LOCKED
18-11-2016 11:08:25	OPENED
18-11-2016 11:08:29	OPENED
18-11-2016 11:09:00	LOCKED
18-11-2016 11:09:03	LOCKED
18-11-2016 11:09:23	LOCKED
18-11-2016 11:09:24	LOCKED
18-11-2016 11:09:24	LOCKED
18-11-2016 11:09:24	LOCKED
18-11-2016 11:09:31	LOCKED
18-11-2016 11:09:31	LOCKED
18-11-2016 11:09:31	KED
18-11-2016 11:09:31	KED
18-11-2016 11:09:32	KED
18-11-2016 11:09:32	LOCKED
18-11-2016 11:09:32	LOCKED
18-11-2016 11:09:32	LOCKED
18-11-2016 11:09:32	LOCKED

CLEAR HISTORY

9 CONCLUSION

After applying out best efforts in this project we conclude that by understanding all module of this project, and mechanisms we can implement a Smart Door Lock System which would be better in terms of future security and much more user friendly with the latest advancing generation. We checked the feasibility and requirement for this System. Then we defined overall look and flow of control among modules in paper. After this we started actual design of our modules.

All modules of system are developed separately. Then we integrated all modules by means of control flow among all modules.

After Coding and integrating of all modules done, whole system was then tested once again (i.e. Integration Testing). Thus we were able to Lock, Unlock the locking mechanism using Bluetooth connectivity from Android application wirelessly.

10 LIMITATION & FUTURE ENHANCEMENTS

Limitations: User can't change password.

System works in limited Bluetooth range.

If no inverter set upped in the house, then due to electricity power loss, system won't work.

Future Enhancements: Password can be made changeable.

Whole system would be synchronised through internet from main servers.

Users would be having their accounts online and can manage their locking & unlocking remotely.

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