

SMART LOCK: A LOCKING SYSTEM USING BLUETOOTH TECHNOLOGY & CAMERA VERIFICATION

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Abstract: *The new generation is now full of smart people using smart technology. Smart devices makes life of a person easy and updated. There are hundreds of goods available today that allow us have power over the devices without human intervention, either by remote control; or even by voice command. So in "Smart Lock" an ARM7 controller and Bluetooth module from the mobile device is used for smart lock system. The proposed system describes improvement of a security system that is integrated with an Android mobile phone device using Bluetooth as a wireless connection protocol. Android OS is currently the go ahead on mobile market share while Symbian OS was already discontinued. This proposed system allows a user to lock or unlock a door a short range from the door. The application was designed to allow the user to also check the status of the door. The mobile device requires a password to increase the security of the system. The hardware on the door uses a microcontroller to control a linear actuator that acts as the locking mechanism. The Bluetooth protocol was chosen as a communication method because it is already integrated into many Android devices and is secured through the protocol itself. It also fits well into the design requirements of the project for a short range, wireless connection method. The system is designed such that the motion of the user will be captured from the camera and the user will be detected and then only he will be given a key to lock or unlock. The system will be designed for security purposes. It will work as when bell rings at the door, it will act as a trigger to the camera and the camera will capture the video of the person standing in front of the door, that will be shown to the registered user who is away from home and then he will identify the person and can share the key with that person for a particular time period. This increases great security for homes and that too without human intervention.*

Keywords: Automation, ARM7 controller, bluetooth model, dc motors, camera.

I. INTRODUCTION

We introduce a smart digital door lock system. The system is proposed such that the motion of the user will be captured

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from the camera and the user will be detected and then only he will be given a key to lock or unlock. A digital door lock system is an equipment that uses the digital information as smart card, and finger prints as the process for authentication as a substitute of the legacy key system. In our proposed system, a Bluetooth module is set in digital door lock and the door lock acts as a central main controller of the overall system. Technically, our proposed system is the group of sensor nodes and actuators with digital door lock as base station. A door lock system proposed at this point consists of Bluetooth module and smart phone for user verification, motor module for opening and closing of the door, sensor modules, communication module, and control module for controlling other modules.

A. Domain Description

The project idea is to design an automated device for locking and unlocking of the door as nowadays an automated device can replace good amount of human working force, moreover humans are more prone to errors and in intensive conditions the probability of error increases whereas, an automated device can work with diligence, versatility and with almost zero error. The system is designed such that the motion of the user will be captured from the camera and the user will be detected and then only he will be given a key to lock or unlock.

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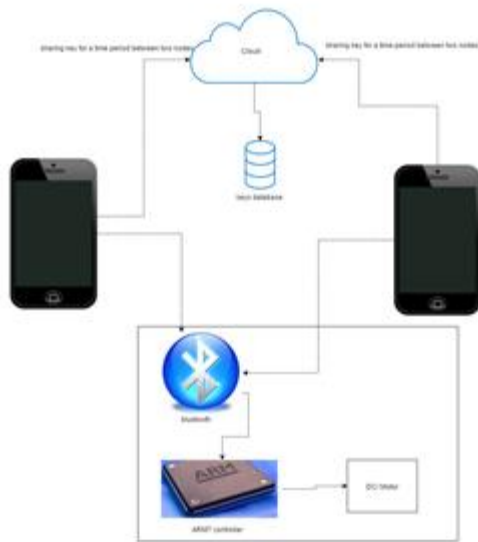
B. Technological Overview

The system will be designed for security purposes. It will work as when bell rings at the door, it will act as a trigger to the camera and the camera will capture the video of the person standing in front of the door, that will be shown to the registered user who is away from home and then he will identify the person and can share the key with that person for a particular time period. This increases great security for homes and that too without human intervention.

The system is designed such that the motion of the user will be captured from the camera and the user will be detected and then only he will be given a key to lock or unlock. Our smart lock system will operate over wireless network like Bluetooth. There are five parts:

- 1) The control module which is the brain of the system.
- 2) The motor module controls the locking operation.
- 3) The communication module that is used for communication between the devices and the control module.
- 4) The I/O module which uses the Bluetooth Module and Smart phone for authentication.
- 5) The sensor module i.e Phone/ Bluetooth.

II. PROJECT OVERVIEW



A. Product Scope

The main aim of the project is to design a door lock system which will perform authentication of the

user as well as opening and closing of the door. Entering and exiting without using those traditional keys is the main aspire of the project. The system is designed such that the motion of the user will be captured from the camera and the user will be detected and then only he will be given a key to lock or unlock.

B. Product Perspective

The mobile device requires a password to increase the security of the system. The hardware on the door uses a microcontroller to control a linear actuator that acts as the locking mechanism. The Bluetooth protocol was chosen as a communications method because it is already integrated into many Android devices and is secured through the protocol itself. It also fit well into the design requirements of the project for a short range, wireless connection method. Our smart lock system will operate over wireless network like Bluetooth. There are five parts:

- The control module which is the brain of the system.
- The motor module controls the locking operation.
- The communication module that is used for communication between the devices and the control module.
- The I/O module which uses the RFID reader for authentication.
- The sensor module i.e Phone/ Bluetooth.

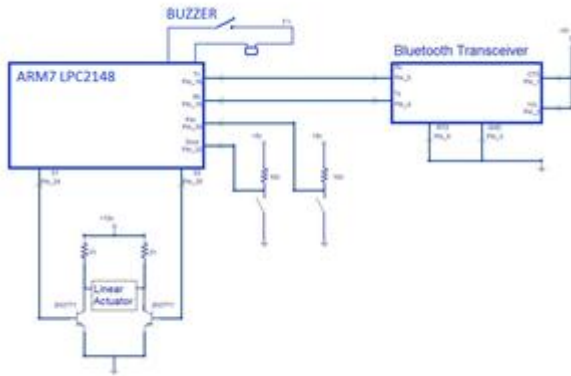
Product Functionality and Users Functionality of Smart lock includes:

- Complete security.
- Confidential key sharing
- Capturing motion of the user using camera.
- List of Alerts: Someone at the door, key being used, etc
- Help to keep a check on people using the key.

The basic user of the Smart lock will be owner of the house. Once the door bell rings, the camera will be triggered and motion of the user will be captured. The owner will be

informed about the person standing at the door, and then the owner will identify the person and can share the key for a particular time period. In this way the system provides great security.

C. Circuit Diagram



III. OVERALL DESCRIPTION

A. Design & Implementation Constraints

The mobile application is constrained by the system interface to the Bluetooth within the mobile phone. Since there is a single system and single user, the interface will most likely be the same. But, there may be a difference between what navigation features each of them provide. The Bluetooth range and capturing of the motion by the camera is also a constraint for the application. Since the application authenticates the user and the key Bluetooth range and camera capturing function of the application to fulfil the working of the project.

- Operating System: Android
- Technology: Android 4.0
- Web Server: Tomcat
- Database: My SQL

B. Assumptions & Dependencies

One assumption about the product is that it will always be used on mobile phones that have enough performance. If the phone does not have enough hardware resources available for the application, for example the users might have allocated them with other applications; there may be scenarios where the application does not work as intended or even at all.

Another assumption is that the Bluetooth components in the phone work in the same way. If the phones have different interfaces, the application need to be specifically adjusted to each interface and that would mean the integration with the system would have different requirements than what is stated in this specification.

C. Specific Requirements

- External Interface Requirements:

The external interfaces may include the key sharing interface between the system, owner and the key user.

- Hardware Interfaces:

- 1) Phone with Bluetooth facility
- 2) ARM7 controller
- 3) Motor

The hardware used is a motor in the lock system for unlocking and locking. An ARM7 controller is also used for the purpose.

- Software Interfaces:

The mobile application communicates with the Bluetooth application in order to share a key between the users to lock and unlock the door.

- Communication Interfaces:

The communication between the different parts of the system is important since they depend on each other. However, in what way the communication is achieved is not important for the system and is therefore handled by the underlying operating systems.

IV. MATHEMATICAL MODEL

Input:

The input will be a password or a key.

1. Output:

Depending upon the key, door will unlock or lock.

2. Method:

The locking and unlocking system will follow below steps:

3. Register device.
4. Set range and user.
5. Set key
6. Bring the device in range
7. Detect the user by camera
8. Authorized user gets the key
Use key to lock and unlock

V. CONCLUSION

Conclusion This is an ongoing project. This paper gives basic idea of how to control security using digital keys. We use door lock system as a model for indoor and outdoor key lock system. The system is designed such that the motion of the user will be captured from the camera and the user will be detected and then only he will be given a key to lock or unlock. It also offer security and ease for Android phone/tab users. This project is based on Android platform which is Free Open Source Software. So the achievement rate is easy on the pocket

and it is reasonable by a common person. Accomplishment of wireless Bluetooth connection in microcontroller permits the system installation in more easy way. The system has been successfully designed to control the door condition using an Android Bluetooth-enabled phone and Bluetooth modules via Bluetooth HC-05. The mobile device needs a password to increase the security of the system. The hardware on the door uses a microcontroller to control a linear actuator that acts as the locking mechanism. The Bluetooth protocol was selected as a communications method because it is already incorporated into many Android devices and is secured through the set of rules itself. It also fit well into the design necessities of the project for a short range, wireless connection method

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