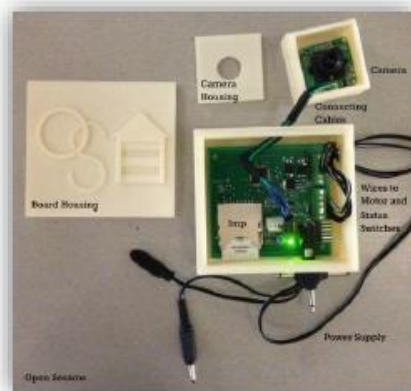# Open Sesame User Manual

NOTRE DAME EE SENIOR DESIGN

Team Open Sesame

Denise Garcia, Ka Hin Lee, Veronica Martinez, Jane McGuinness, and Angie Savela

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Purpose

The Open Sesame garage system is designed to provide peace of mind to its users by improving access to information. Using

wireless detection and commands sent from a smart phone application, a basic garage door's functions can be expanded into a high-tech system, while retaining all original safety features.

What is included?

In your welcome box you should find:

- ☐ Complete printed circuit board
- ☐ Circuit Board and Camera Housing
- ☐ Electric Imp
- ☐ Power Supply
- ☐ Camera
- ☐ Connection Cables
- ☐ Magnetic Switches for Door Status
- ☐ Screwdriver

After checking to make sure everything has been included, please download the electric imp app for blink up, and our Android application from the google play store.

Setup

Internet Connection

The entire electric imp system relies on a trustworthy internet connection. Make sure to keep your log in information for your wireless internet handy during setup. This first section can be completed before installing the system in your garage. In fact, we suggest working near your wireless router to ensure proper connection, and to only the work with the board.

This is necessary to complete the "blink up" process and connect your electric imp to the cloud. We will include instruction here, but if you are having any difficulties please check the electric imp website for a more detailed list of troubleshooting tips and tools.

1. Download the electric imp application and create an account with electric imp
2. Plug in the wall wort power, making sure that the voltage is set to output 4.7V as seen in the image below.
3. Connect your circuit board to power using the included power cable.
4. Plug in the electric imp to the SD card slot on the board. The light on the end of the imp should turn on.
5. Each electric imp is preloaded with a unique agent code. It is important that this remains secret. After a successful blinkup, log into the electric imp website where the code will need to be loaded onto the imp.

Android Application

This step is vital to the functionality of your Open Sesame System. After logging into the electric imp website, you will need to find the agent URL. When you first open the Android application you will be greeted with a welcome screen. There will be two important fields to fill out: Wi-Fi network name, and agent address. The Wi-Fi network you select now will be used for the proximity detection feature. The agent URL can be found after logging into the electric imp website.

Note that the example used for the demo does not require these steps. We have hard-coded the Wi-Fi network and agent URL for the purpose of demonstrating the features, this description is include for a possible evolution of the system.
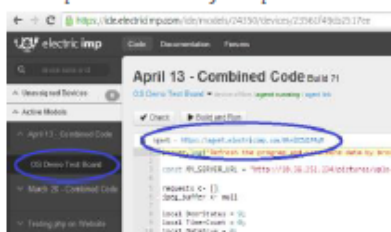
Connecting the Camera

Inside the welcome package you will find a small camera and cable. At this time, the connections should be made. First, remove power to the board. Next, thread the cable through the housing as seen in the images below and plug the connectors in at each end, placing the respective components in their housing. Apply power and test the camera feature using the Android app, instructions can be found on page 5. It may be necessary to reset the board using the reset button next to the SD card slot.

Installation in Garage

This will be the most challenging part of setup, mostly because it requires some finely-tuned connections.

Connecting the Door Status Sensors

In the welcome box there should be two sets of magnetic switches. These will serve the purpose of the door status sensors. When the connection is made, the circuit is closed, and the microcontroller can read where the garage door is positioned. The wires and ports are color coded. Connect the wires to the board with the help of the screwdriver.

Mounting the Circuit Board Housing

The housing should be attached in a way that allows for access to the imp and reset button in an emergency. Velcro should be used to allow for repositioning as needed.

## Connecting the Board to your Garage Door Opener

After connecting the wires to the circuit board, the wires can be threaded through the openings in the side of the housing and connected to the garage door opener. Using the manual for your own opener, check to see which wires should connect where to retain original functionality.

# Using the Open Sesame Android Application

The Android application is very user friendly. We have provided maximum functionality, with minimal work on the user's part. After the initial setup described on page 3, the app will be fully functional.

Check the Status, Open, Close, and Photograph
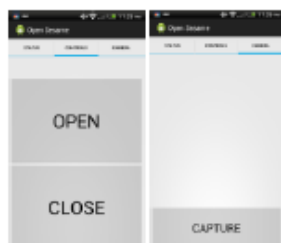
Along the top of the app interface you have three options, check the status, change the status, or photograph the door. To check the status, the button must be pressed twice in order to both refresh and obtain the status. Whenever the button to open or close you garage door is pressed, the command is sent to the imp, where a decision is made based on the current status to run the opener.

Wi-Fi Detection
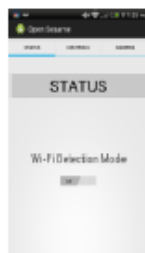
This mode of operation has been designed for driving. Using the Wi-Fi signal as a threshold, commands are sent from the phone. This mode is designed with a commuter in mind. Instead of fumbling around trying to find a remote, as soon as you leave your driveway and are out of range, a signal is sent to close your garage door. Similarly, when entering the Wi-Fi range, the door will be told to open.

Who Are We?

Pictured from left to right: Angie, Jane, Veronica, Denise, and Ka Hin

We are seniors about to graduate from the University of Notre Dame with degrees in Electrical Engineering, and together we form Open Sesame. This senior design project was inspired by an increasing dependence on garage doors for security and the need to bring outdated, but still functioning products, into the world of instant information.

More Information

While we are leaving our Notre Dame emails behind, please check out our website for a detailed list of our process including the documentation we have compiled along the way.

http://seniordesign.ee.nd.edu/2014/Design%20Teams/osesame
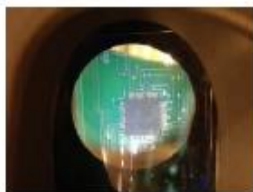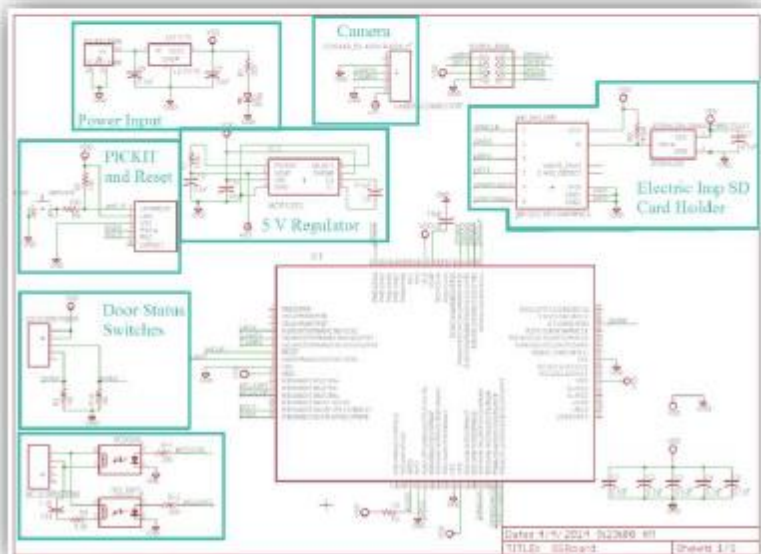
Notre Dame EE Senior Design
Spring 2014

How does it work?

The Open Sesame system is designed to interface with an existing garage door, with no exclusions to brand. All it requires is a garage door opener, tools to mount a set of switches, a stable Wi-Fi connection, and a smart phone, although the commands can also be run from an internet interface, however some of the system capabilities are limited. The flow chart below shows how information is passed between the different components in the system. The design retains all of the original capabilities of the garage door opener system and acts as an additional remote that is not limited by range. All of the commands begin at the user's cell phone, and are sent by accessing URLs set to match the specific electric imp. The imp then communicates with the microcontroller mounted on a circuit board designed for this project. The microcontroller has been programmed to send commands to the garage door opener in the same fashion as someone using the wall remote, allowing for flexibility and retention of all original safety features.
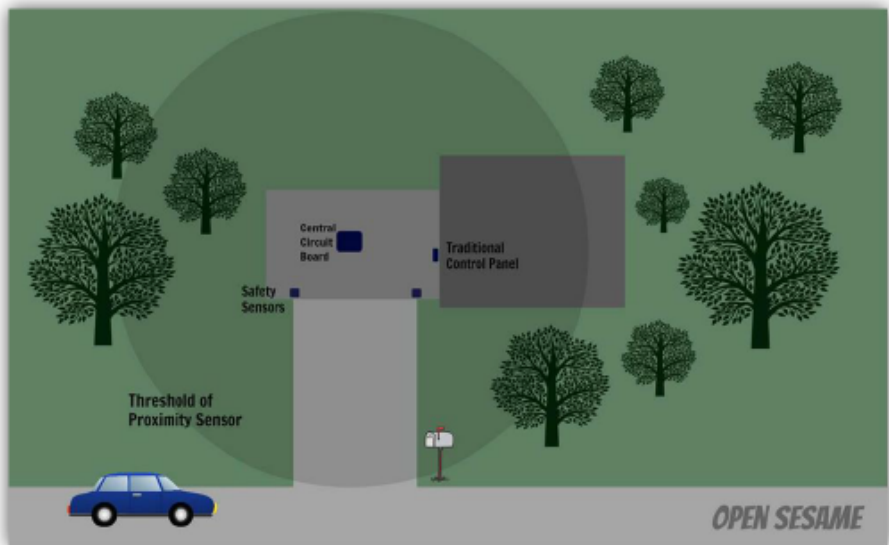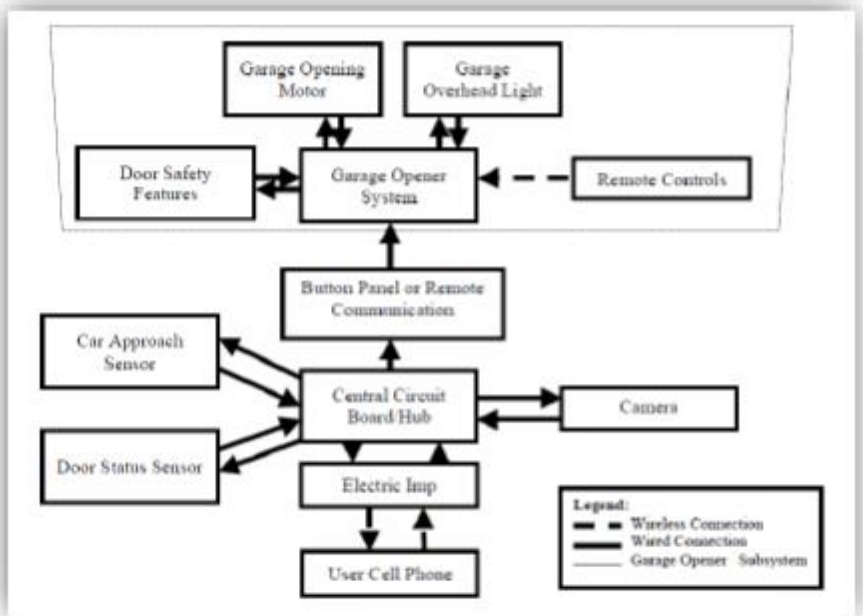
System Block Diagram

Circuit Board Components