

Light Control by LytCtrl

Arduino based remote for lights/outlets controlled by Android App

9/15/2016 Version 2.00

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# Signatures

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# Change Log

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| --- | --- | --- | --- |
| **Date** | **Version** | **Author** | **Comments** |
| 5/14/2016 | 1.00 | Lydia Doza | First draft of proposal |
| 6/7/2016 | 1.10 | Lydia Doza | Proposal Revision  Numbered sections  Dotted line in Table of contents  Section 7.1.1  Included Calvin Caldwell’s name  Section 7.1.5  Clarified location of archive  Section 8.1  Extended section  Section 9.1  Added details to  1.1, 1.2, 1.3, 1.4.1  Added requirement to describe control system  Section 9.5  Added more details for WiFi info and Outlet info |
| 9/15/2016 | 2.00 | Lydia Doza | Formatting changes to conform to Wilsonville campus senior project proposal template standards. |

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# Introduction

Home automation systems are still new to the market, which means the cost of buying one is high. *LytCtrl* (pronounced light control) aims to provide an economical light automation system with android app controlled outlets.

*Light Control* will provide an inexpensive option to users who wish to replicate the setup. This project will facilitate a **DIY** approach to adding android app controlled lights in the home.

The system will have four major subsystems:

1. a WiFi router,
2. a server (in this project a Raspberry Pi 3 is used but any server will work),
3. the outlet assembly,
4. and an android app.

*LytCtrl* focuses on the user’s perspective by making installation intuitive. The software package for the home computer will lead the user through a step-by-step wizard for installation and security setup. Each outlet cover has a Bluetooth chip, allowing communication to the home computer. When a new Bluetooth device is discovered, the home computer notifies the administrative Android user. The Android user can setup a new outlet and assign it at product type (light, alarm clock, tv, etc) and a nickname. Later, they can check to see which outlets are on or off. With a quick tap, they can turn off their bedside lamp they forgot to turn off.

The secondary focus of *LytCtrl* is to help develop home use of Internet of Things (IoT), the idea that everyday objects have some sort of network connectivity. In this case, it is the network of the computer, outlets, and android devices. *LytCtrl* will be on the leading edge of this new, IoT industry.

## Project Goal Statement

LytCtrl will deliver an android app, server software package, and an outlet cover to turn an outlet on and off by June 2017.

## Major Features

1. **Android App**
   1. Ability to sign up for account
   2. Ability to sign into account
      1. Allow to automatically sign into Android (via Gmail)
   3. Pair Android app with Ubuntu server over locally connected WiFi
      1. Save IP address of server
   4. Shows user outlets
      1. Name of outlet
      2. Organized by room
      3. Current on/off status
      4. Allows user to turn outlet on/off
   5. Allows user to set a timed action
      1. Outlet will be turned on or off at time chosen by user
2. **Admin Access stored to “global” server**
   1. Add new outlets
   2. Remove outlets
   3. Edit outlet name
   4. Add rooms
   5. Edit rooms
   6. Edit outlet room
   7. Has access to every outlet in house
   8. Add/remove any outlet’s list of users
   9. Grant admin privileges to other users
3. **Raspberry Pi 3**
   1. Hosts the home Ubuntu server
      1. Pair server with Android connected on local WiFi
         1. Send IP address of server
         2. Update MySQL Database with user credentials
            1. First user paired is Admin
      2. Android Client communication
         1. Receive instruction
            1. Send Bluetooth packet to specified OutletID
         2. Receive status request
            1. Send status request packets to specified OutletIDs
            2. Receive Bluetooth packets

Interpret and update database of outlet status

1. **Outlets**
   1. Relay default position set to off
   2. Bluetooth
      1. Set Bluetooth Name (20 character limit)
      2. Pair Bluetooth with server
      3. Change Bluetooth pair password
      4. Test Bluetooth communication
      5. Send state of relay (on/off position) over Bluetooth
      6. Receive instruction from Bluetooth server
   3. Microcontroller
      1. Save paired Bluetooth info to server
         1. BluetoothName
         2. BluetoothPairingPassword
      2. Interpret incoming Bluetooth packet
         1. Instruction
            1. Set pin to output

Turn relay on

Turn relay off

* + - 1. Status Request
      2. Send Packet
         1. BluetoothName
         2. Relay Status (on/off)

# Customers

The focus for customers for this project are the type of users who like **DIY** projects. All of the design work created for this project will be published online with the source code. There will be step by step instructions to re-create this project for those who wish to teach themselves about writing code, basic electronics, and networking.

# Project Success

The indicator for success for this project will be the ability to turn an outlet on/off with the Android App.

# 4 Risk Management

**Risks**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Risk ID** | **Description** | **Impact (1-10)** | **Likelihood (1-10)** | **Priority (Impact \* Likelihood)** |
| 1 | Communication between home server and outlet | 10 | 5 | 50 |
| 2 | Setting up home server | 10 | 3 | 30 |
| 3 | Sync Android App users with home server | 10 | 1 | 10 |

# 5 Technical Environment

* Android Phone (Samsung Galaxy S6 for this project)
* Raspberry Pi 3
  + Ubuntu Server
* Wireless Router
* Outlets
* ATTiny85 microcontroller development board
* 220VAC @ 20A Relay
* JBtek HC-06 Bluetooth to UART converter

|  |  |
| --- | --- |
| **Technical Area** | **Technical Tool Used** |
| Programming Language(s) | Java |
| Database | MySql for Linux platform and SQLite for Android |
| Middle Tier | Ubuntu server |
| Client Tier / User Interface | Android app |
| Networking | Bluetooth within the home for outlets to connect to server/gateway.  WiFi to connect Android device to setup server/remote access. |
|  |  |

I will be using online resources to learn about the tools as I build this project. I have limited to no exposure to any of the tools listed prior to building this project.

# 6 Summer Work Plan

The plan for this summer is to order all of the parts for my senior project and complete this project proposal. I will make the first outlet assembly and begin programming it. I’ll install all of the necessary tools and ensure that I have can build a mock Android app, set up my router, set up the server, and put on a simple database.

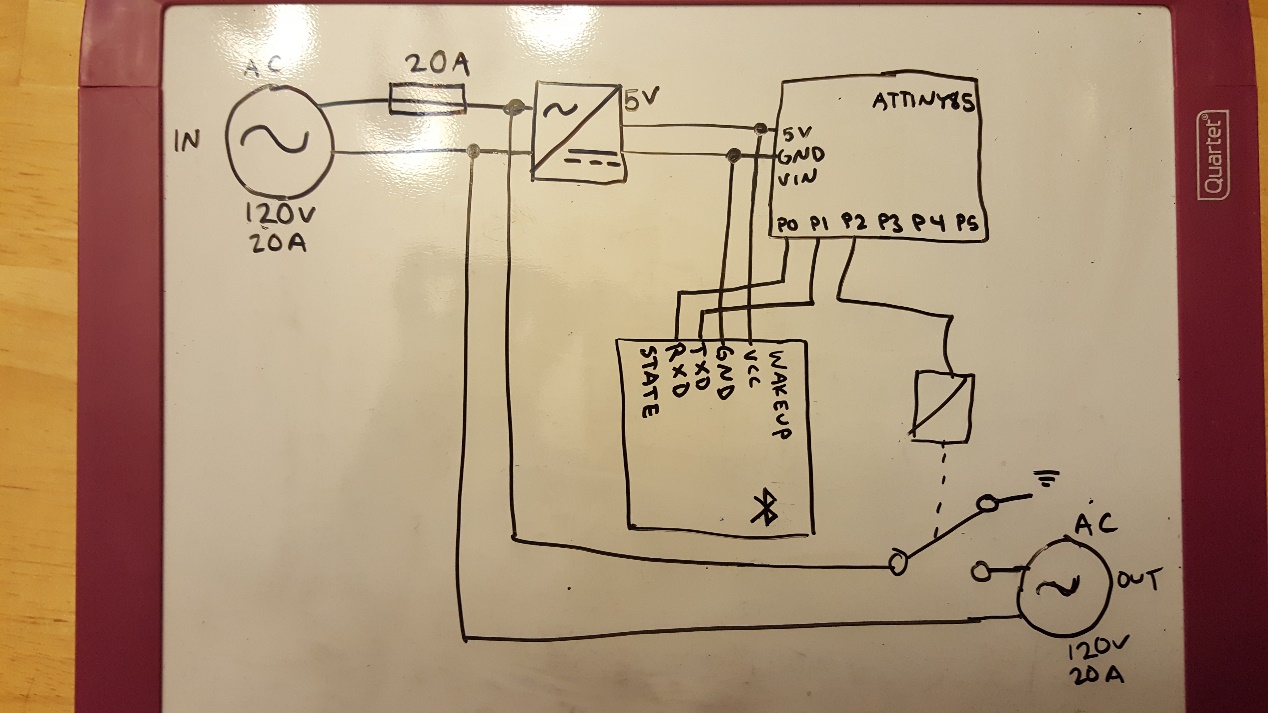
Once I get things set up I’ll constantly be assessing whether I have the right tools for the job and make adjustments after researching the database, server, and programming on the ATTiny85.

If I find that along the way I cannot make the outlets communicate with the server, I will try to allow a connection directly to the android phone, although this would prevent remote access to the outlet status.

# Appendix A Glossary

**DIY** Do It Yourself

# Appendix B Outlet Assembly Wiring Diagram



# Appendix C Microcontroller Data Sheet

