

Light Control by LytCtrl

Arduino based remote for lights/outlets controlled by Android App

9/15/2016 Version 2.00

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# Revision History

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| 5/14/2016 | 1.00 | Lydia Doza | LytCtrl | First draft of proposal |
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# Signatures

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# Introduction

## Purpose

This document serves as a proposal for the senior project Android App, *LytCtrl*. There are many others like it, but this one describes one mere Home Automation app.

This proposal lays out the features and functionality to be implemented in the project, pending approval.

## Scope

This proposal provides a coarse overview of the product requirements

It describes:

* For whom the document is intended
* Project management
* A general description of the project
* Product requirements
* User profiles
* Glossary
* Additional documentation for the project

## Intended Audience

This proposal was written primarily for my Senior Project Advisor, Sherry Yang, and for those who happen to read my GitHub. I’m looking at you, recruiters and future employers.

# Project Management

## Change Management Procedure

The CAT team will handle change requests as the need arises.

### CAT Team

The CAT team is made up by the Senior Project Advisor, Sherry Yang, and the senior year student, Lydia Doza.

### Medium

Change requests will be managed through email within the CAT Team and managed in the scrum wiki

### Protocol Response Time

Response to change requests will be analyzed and responded to within 3 business days.

### Impact Analysis

Both members will evaluate the affects a change will have on the project regarding functional requirements, dependencies, and the impact on the timeline.

### Archive

Change requests will be archived in the scrum wiki for reference.

## Software Delivery, Installation, and Acceptance Criteria

The Android App and the Raspberry Pi software will have installation instructions and the source code available on GitHub.com at <https://github.com/LydiaDoza/LightControl>. The acceptance criteria will depend on the functional requirements being met and usability.

## Documentation and Online Help

Project management documentation and tracking is available at <https://tree.taiga.io/project/lydiasaurus-lytctrl-senior-project/>.

Online help is available in the GitHub repository at <https://github.com/LydiaDoza/LightControl>.

## Project Risks

Some of the risks this project may face include the communication between the server on the Raspberry Pi and the NanoLeaf Rhythm module, successfully setting up the server on the Raspberry Pi, and syncing information between the Android App users and the server.

## Customer Responsibilities

The customer will be responsible for setting up the server on the Raspberry Pi (including securing it) and providing their own NanoLeaf Light Panels with Rhythm Module.

## Status Reporting

Project status will be reported once a week to the senior project advisor and will include:

* Work completed this week
* Work to be completed next week
* Issues, their severity, and possible solutions

# System General Description

LytCtrl will deliver an android app and a server software package to control NanoLeaf Light Panels.

## Project Summary

Smart lighting is becoming more popular, but control of the lights has limited functionality. Typically, smart lights allow their color and brightness to be changed manually with limited automated color changing or turning on/off.

*LytCtrl* will give more control to owners of the NanoLeaf Light Panels with Rhythm modules by adding time scheduling and user profiles so that multiple users can control the same lights.

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 should work),
3. the NanoLeaf Light Panels with Rhythm Module,
4. and an android app.

*LytCtrl* focuses on the user’s perspective by making installation intuitive. The software package for the Raspberry Pi server will lead the user through a step-by-step wizard for installation and security setup (assuming the Raspberry Pi is used in UI mode). Upon launching the Android app for the first time, the user will be prompted to log in. The Android app will then search for lights nearby. The user will then be able to see what orientation their lights are in and start programming their color and brightness. In a separate menu on the Android app, the user will be able to schedule when they want their lights to be turned on and which “light profile” (color/brightness/transition) to use.

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, smart lights, and android devices. *LytCtrl* will be on the leading edge of this new, IoT industry.

## Perspective

### History/Prior Releases

No prior releases of this app have been made.

## Major Subsystems

* Android Phone (Samsung Galaxy S6 for this project)
* Raspberry Pi 3
* Wireless Router
* NanoLeaf Light Panels
* NanoLeaf Rhythm Module

|  |  |
| --- | --- |
| **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.

## Relation of System to Existing System(s)

The *LytCtrl* Android app will depend on the Android SDK. The Raspberry Pi server will use MySql and the NanoLeaf API in order to store user data and communicate with the NanoLeaf Light Panels.

## Hardware Platform Description

* Android phone (development and testing on Samsung S6)
* Raspberry Pi 3
* NanoLeaf Panels and Rhythm Module

## Software Platform Description

* Android version 7.0 (Nougat)
* MySQL Community Server version 8.0.12
* SQLite for Android
* NanoLeaf Open API

## Third Party Libraries

* NanoLeaf Open API

# Product Requirements

## Functional

* + 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. Shows logged-in user
       4. Pair Android app with Ubuntu server over locally connected WiFi
          1. Save IP address of server
       5. Shows user NanoLeaf Light Panels
          1. Number of Panels
          2. Orientation of the panels
          3. ~~Current on/off status~~
          4. Current panel brightness
          5. ~~Current Panel Color~~
          6. Selected Transition to/from on/off
          7. Allows user to turn panel(s) on/off
       6. Allows user to set a timed action
          1. Shows list of scheduled actions (turn on/off)
          2. Allow user to set an action once at a specific time
          3. Allow user to set an action daily at a specific time
          4. Allow user to set an action weekly at a specific time
          5. NanoLeaf Light Panels will transition with a user selected transition
       7. Allow user to set WiFi detection to signal the server when the user arrives home to set an action
    2. **Admin Access stored to “global” server**
       1. Grant admin privileges to other users
       2. Each subsequent admin is prioritized for scheduling collisions
    3. **Raspberry Pi 3**
       1. Hosts the home Ubuntu server
          1. Pair server with Android connected on local WiFi
       2. Send IP address of server
       3. Update MySQL Database with user credentials
          1. First user paired is Admin
          2. Android Client communication
       4. Receive instruction from Android App
          1. Send NanoLeaf API call to NanoLeaf Rhythm Module
       5. Receive status request from Android App
          1. Send status request packets to NanoLeaf Rhythm Module
          2. Receive NanoLeaf API message

Interpret and update database of outlet status

## Performance

The communication with the Android App and the NanoLeaf Light Panels in the same location will have very high performance, with less than a second of delay between sending a command to the NanoLeaf Light Panels reacting. However, there will be a little more delay when the Android App is communicating the Raspberry Pi server first, and then to the light panels, with up to 3 seconds of delay.

## Reliability

*LytCtrl* will be solidly reliable.

There are a few factors that will affect reliability of this system:

* Local Internet connection reliability
* Power reliability
* Changes to the third-party library

## Data Description

Data will be stored on each user’s Android in a MySQL database. A list of prioritized users will be stored on the Raspberry Pi to resolve scheduling conflicts.

## Security/Safety

User’s commands to the Raspberry Pi and/or the NanoLeaf Light Panels will be delivered via encrypted TCP/IP and the data stored in the databases will be encrypted.

## Constraints

Use of any of the source code, Android App, or NanoLeaf API should follow all federal laws. *LytCtrl* is not affiliated, employed by, or contracted by NanoLeaf.

# User Profiles

The target users may fall into the following profiles described as users who are:

* Interested in light [**DIY**](#_DIY) solutions for building a home automation system
* Interior Designers for planning events
* Interested in waking up to a “light alarm”

# Glossary

## DIY

“Do it yourself”

# Appendices

## Appendix A – NanoLeaf API Documentation

Development documentation for the NanoLeaf API is accessible online at <https://forum.nanoleaf.me/docs>. There are no downloadable versions of this documentation.