

IoT Project Analysis Year 2 Semester 2

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Project Title: Home Automated Smart Lamp

Purpose: The purpose of this Project is to build a home automated lamp controlled remotely from a mobile phone and/or controlled by Motion Sensor as a second option providing the customer more options.

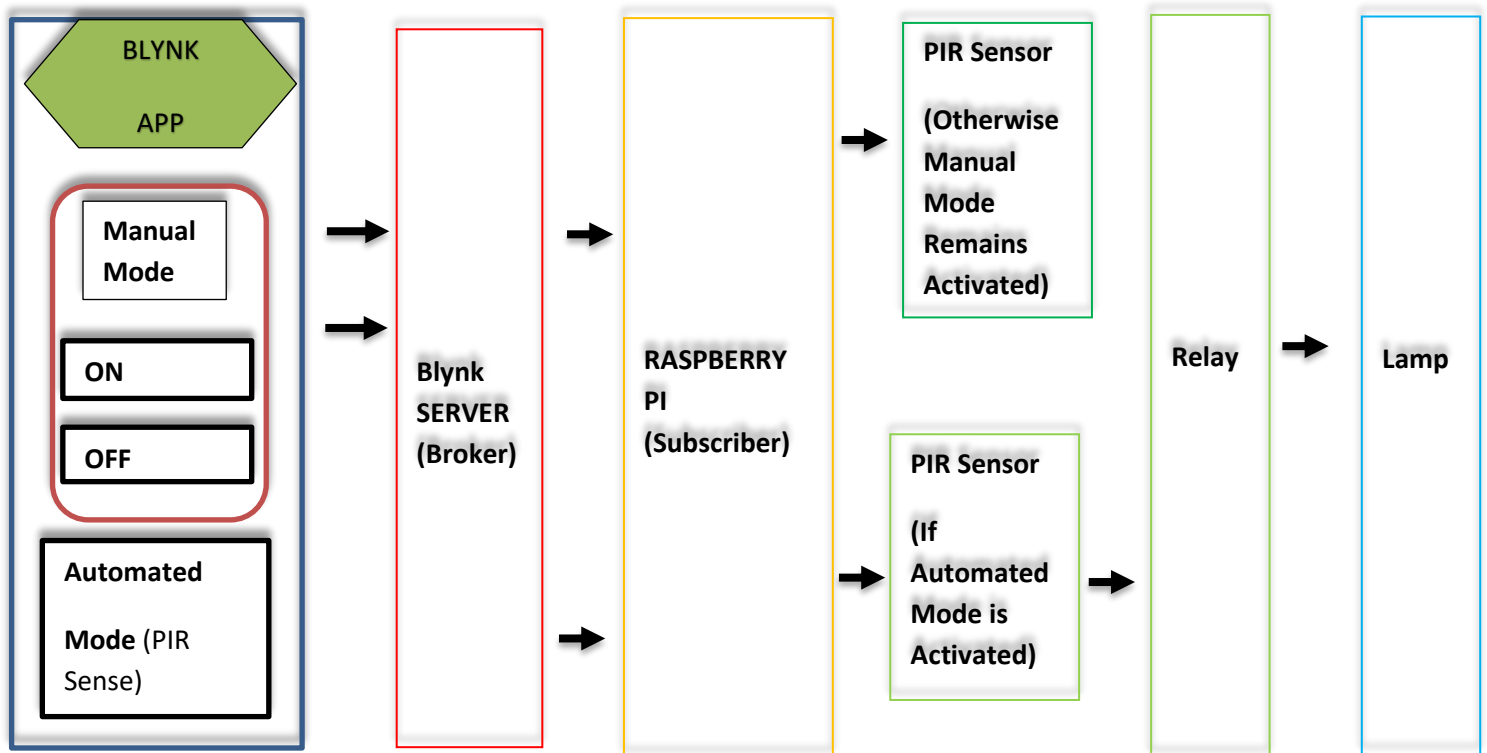
Customer Feature List:

The Customer will be able to turn on/off a Lamp or any end appliance connected to the Relay with the click of a button on a Smartphone application at will. This will provide a quick and more efficient way to turn off/on any appliance so long as it is connected to what we call a relay. Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open, there is an open contact when the relay is not energized. The Customer will also be able to set the sequence of the Lamp turning on/off to be automated when someone is walking by with the touch of a button also, which will activate a Sensor that is dedicated to motion called a PIR Sensor (Passive Infrared Sensor). A PIR Sensor is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in **PIR-based motion** detectors.

Major features in this Project include:

1. **Switching ON/OFF the Lamp**
2. **Smartphone interface**
3. **Blynk Server**
4. **Wi-Fi**
5. **Blynk App**
6. **PIR Sensor**

ContextDiagram:



Name	Binary Code	Type	Description
ON	1	On	This will trigger the relay switch to turn
OFF	0	Off	This will send a digital signal to turn trigger the relay to turn off
Automated	1 or 0	On	This will send a digital on signal to activate the PIR Sensor which will then determine whether to turn on or off depending on whether there's movement
Manual	0	Off	This will send a digital off signal to deactivate the PIR Sensor, allowing you to use the ON/OFF Button again

Systematic Fncctionality:

When an ON signal is published, the data (1 Binary Signal) is sent to the Blynk Server, which receives it and send it to the virtual pin event in the code on the raspberry pi which will trigger the relay which is connected via GPIO Pin which will then turn on the Lamp. When an OFF signal is published, the data (0 Binary Signal) is sent to the Blynk Server, which receives it and sends to the virtual pin event in the code on the raspberry pi and turn the relay which is connected via GPIO Pin back off. This turns the Lamp off as a result because there's any voltage passing through that specified pin. My Application contains a Token key of my Blynk Account, this is how it knows exactly what to connect to. The events are written in Javascript in which my virtual pins that listen for once it's connected to the Server once the program is run. The **PIR Sensor** works differently, I've written it in Python and that is called by the Javascript program using by using a module called a 'child process'. Since **Node.js** runs in a single thread, the child process module allows to me to create a child processes in Node.js. Those processes can easily communicate with each other using a built-in messaging system. There are four different ways to create a child process in Node: `spawn()`, `fork()`, `exec()`, and `execFile()`, but you can read more on it in which you will find a link provided on my **Readme.md** File.

What will my Project depend on?

My Project will depend on its performance and latency in terms of getting a reply from the Blynk Server and publishing the data values the subscriber (**raspberry pi**). It will also depend on the connectivity such as the input signals that is passed from the Smartphone.

Non-Functional Requirements:

- 1) The communication will be Wireless which means the data being sent to the receiver (The Raspberry Pi and then to the Relay which will trigger the switch) will depend on the input.

Concepts Used:

I will be using other skills aquired in other modules such as Discrete Mathematics (Logic), Computer Systems, Physics, Programming, Electronics & Device Systems.

Language used:

JavaScript, Python

Technology/Tools:

- Raspberry Pi 3B board
- SD Card
- Raspbian Operating System
- 1 x 5V Relays
- 1 x Lamp
- 2 x Resistors 150 to 220 ohms (Optional)

- **2 x Different Color LEDs (Optional)**
- **Alarm Speaker (Optional)**
- **Wi-Fi**
- **PIR Motion Sensor**
- **Smartphone Device**
- **Jumper Wires**
- **Raspberry Pi 3 Model B**
- **Blynk Application**