PES UNIVERSITY

Mini-Project 2019

Project Title	Voice-based Automation Using Alexa
Project Guide	Prof. H. B. Prasad

PES UNIVERSITY

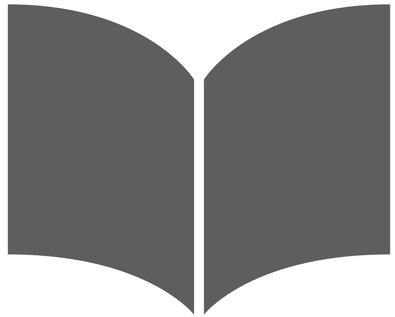
Problem Statement

- An attempt towards automating University centres using speech
- To bridge the gap between automation and voice control in a modern day setup
- To create an experience zone at ISFCR, PES University

User Characteristics

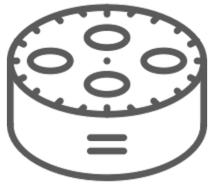
- Who? ISFCR members, faculty members, special guests
- End user must be authorised to use the centre and its facilities
- User must know the appropriate Alexa commands and what to expect as a result

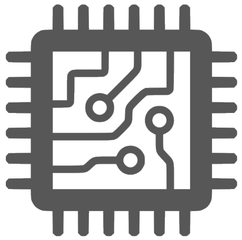
Literature Survey



- Kamdar, H., Karkera, R., Khanna, A., Kulkarni, P., Agrawal, S.: A review on home automation using voice recognition. Int. Res. J. Eng. Technol. 4(10), India (2017)
- Srinath, M. S., Kishore, M. N., Praveena, M. D. A.: INTERACTIVE HOME AUTOMATION SYSTEM WITH GOOGLE ASSISTANT. IJPAM, India (2018)
- Kaundinya, A. S., Atreyas, N., Srinivas, S., Kehav, V., Kumar, N.: Voice Enabled Home Automation Using Amazon Echo. IRJET, India (2017)
- Purwar, K., Verma, A.: Smart Home Automation System based on IoT through Speech. International Journal of Computer Applications (0975 – 8887) Volume 172 – No.6, August 2017
- Web resources and YouTube tutorials
- Alexa Voice Services documentation
- Blynk App documentation

Proposed Solution





- Use an already available speech recognition platform such (Amazon Alexa) to receive commands
- Associate commands with actions using web-hooks provided by the IFTTT platform
- Use programmable boards like Raspberry Pi and NodeMCU to perform the required actions
- Focus on ease-of-use and practical implementation

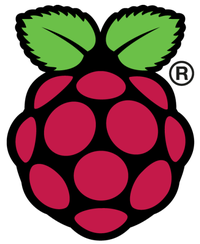
Uniqueness

- Elegant confluence of technologies from the fragmented IoT landscape
- Cost-effective solution to automate rooms using existing infrastructure
- Scalable architecture
- Easy-to-use, robust and intuitive
- Fail-safe

Relevance

- Several companies are pushing towards automation
- With the advent of 5G and sophisticated sensors, IoT is the future
- Home automation already set in motion by companies like Philips Syska and Wemo
- Big companies actively working in this domain

Technologies Used

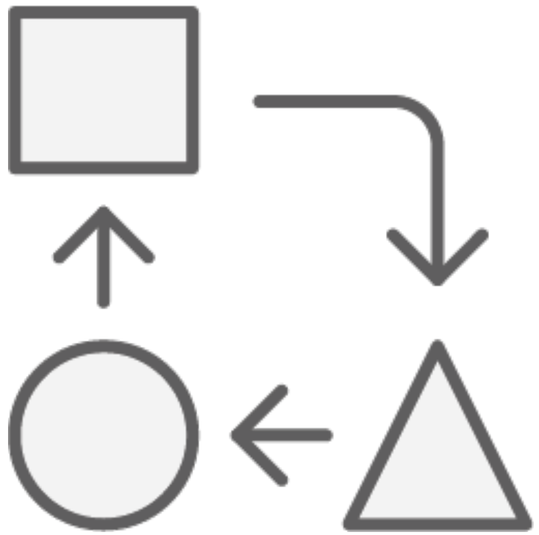


- Blynk App, IFTTT
- NodeMCU, Raspberry Pi, Arduino Uno
- DHT 22, LDR, MQ9 Sensors
- Python for central processing
- Xampp Server for hosting webpage

Dependencies and Constraints

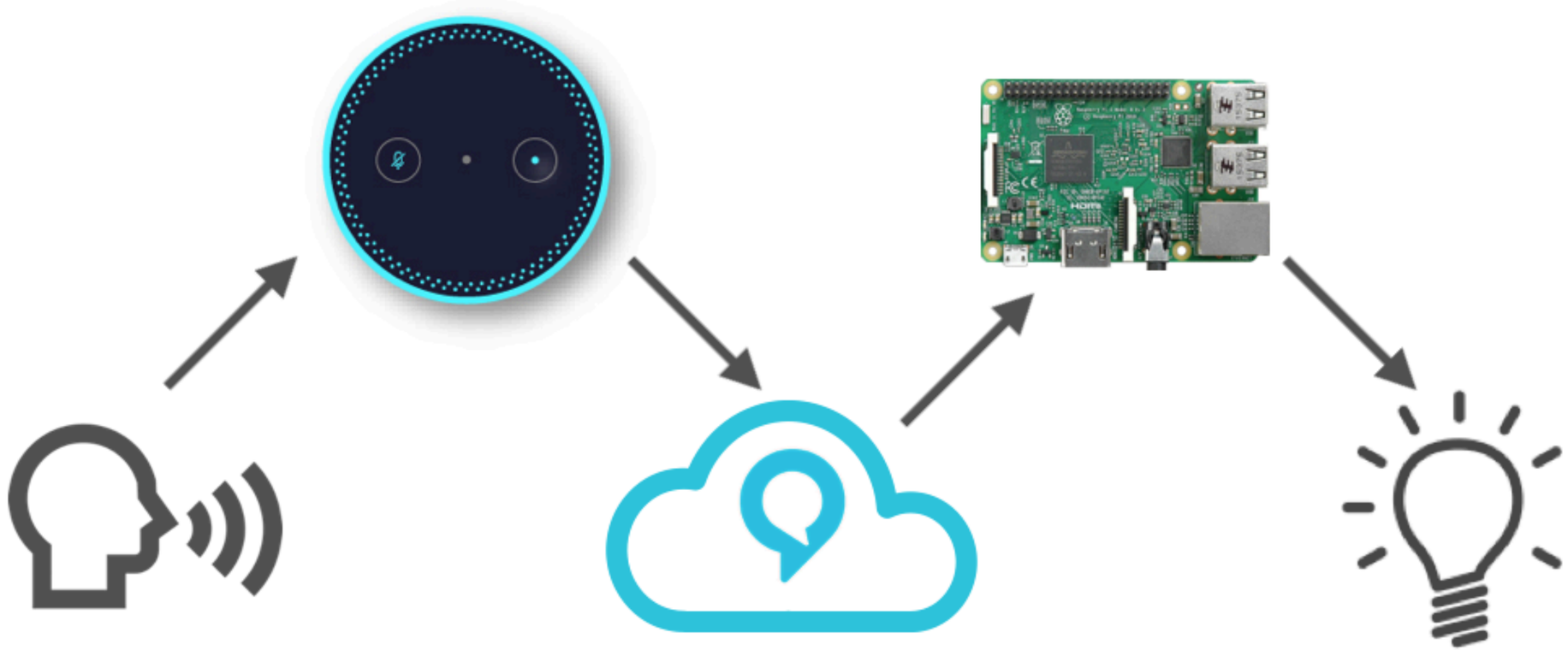
- An active internet connection is required for IoT features to operate
- Speed of the internet connection determines response time
- Limited capabilities due to usage of free services
- Active power supply needed for end components

Design Approach

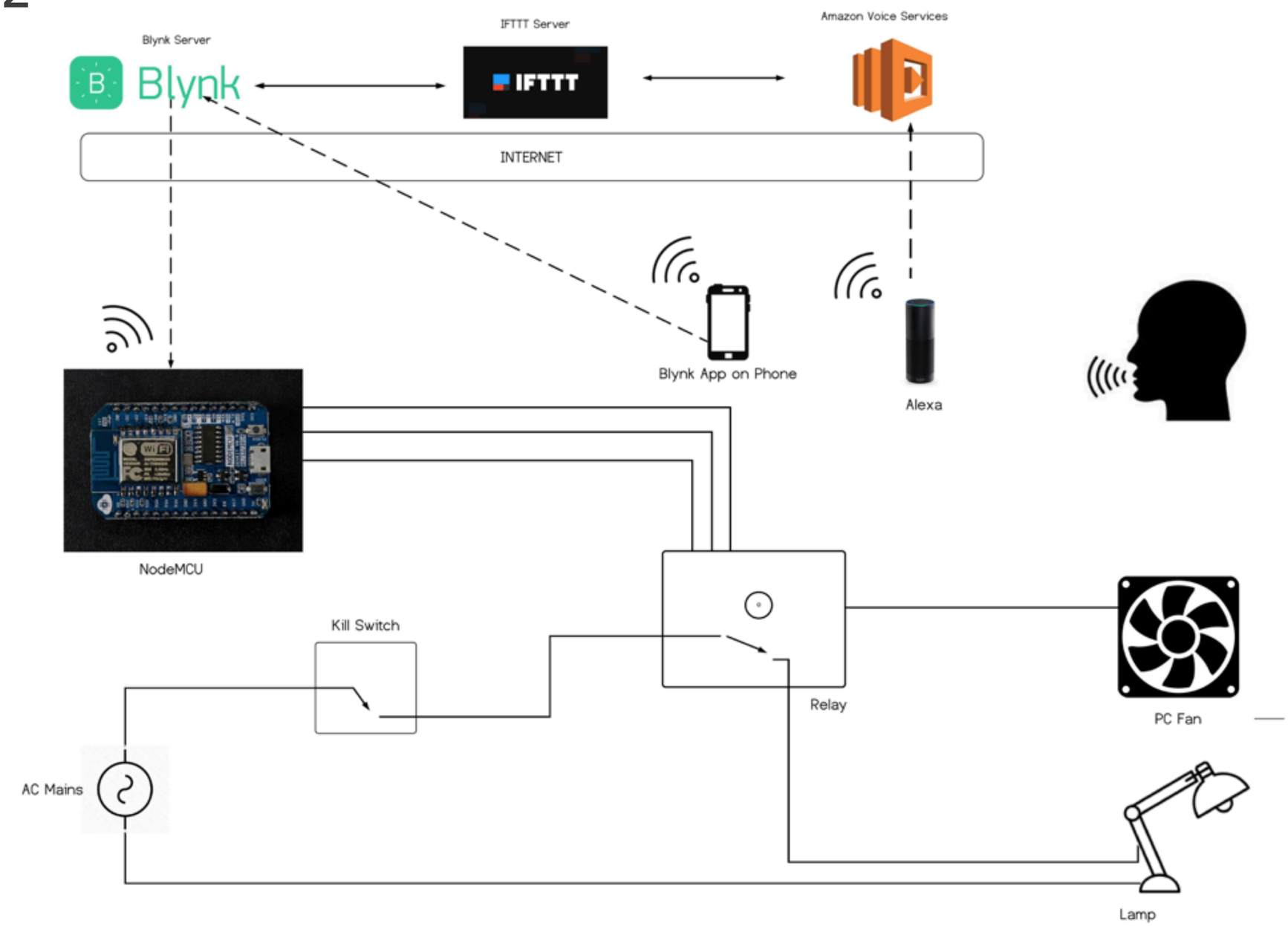


- Iterative Design Approach was followed
- Central goal was to develop an elegant and robust solution
- The designing was carried out in steps, with incremental changes

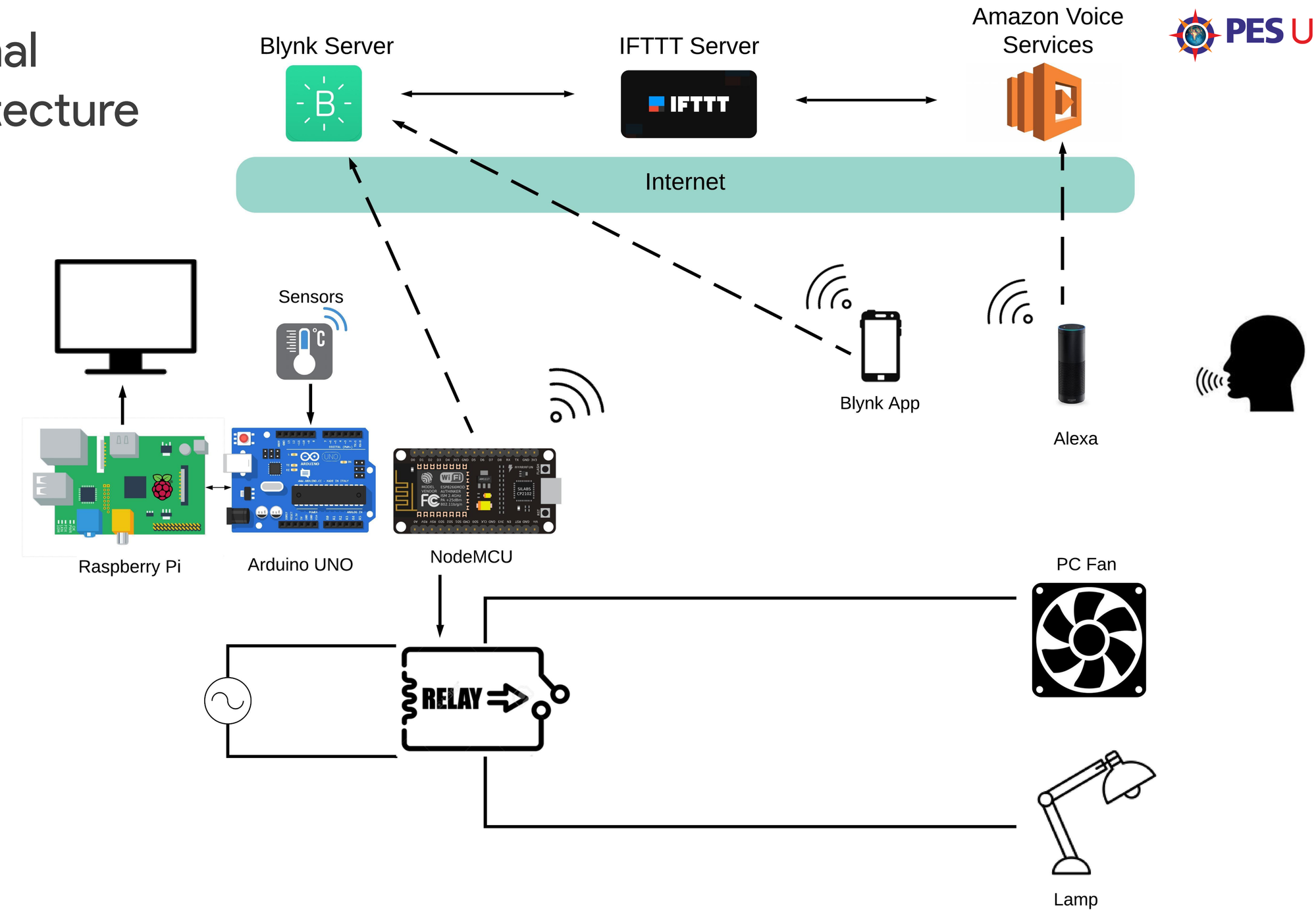
Iteration 1



Iteration 2

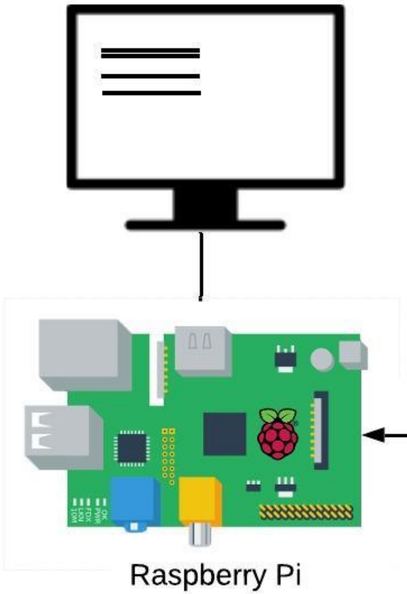

Blynk Server
Blynk
IFTTT Server
IFTTT
Amazon Voice Services
INTERNET
Blynk App on Phone
Alexa
NodeMCU
Kill Switch
Relay
PC Fan
AC Mains
Lamp

Final Architecture

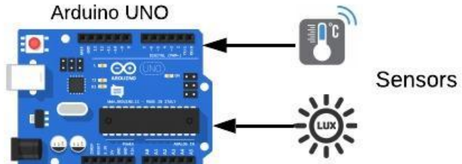


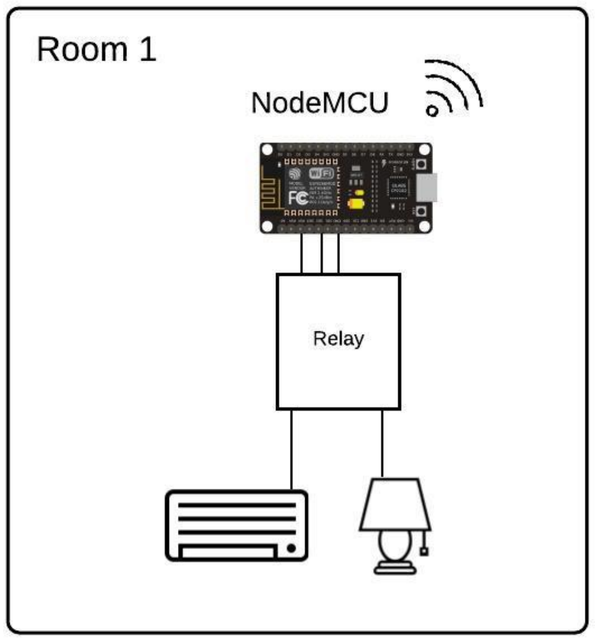
Scalable

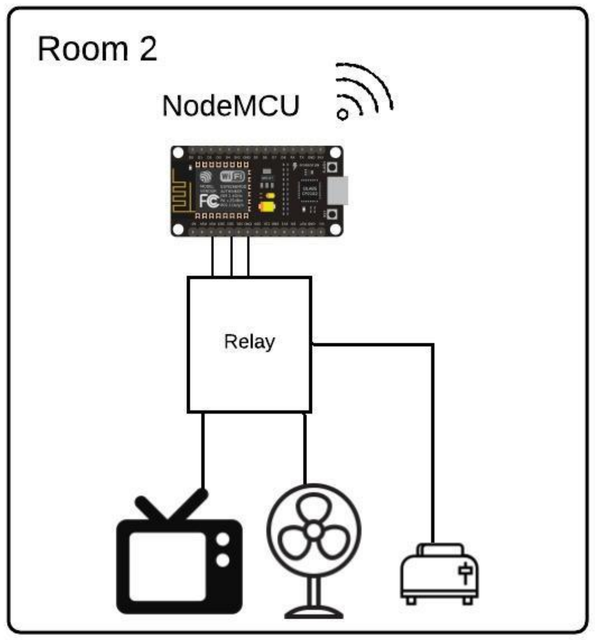
Wifi Router



Raspberry Pi







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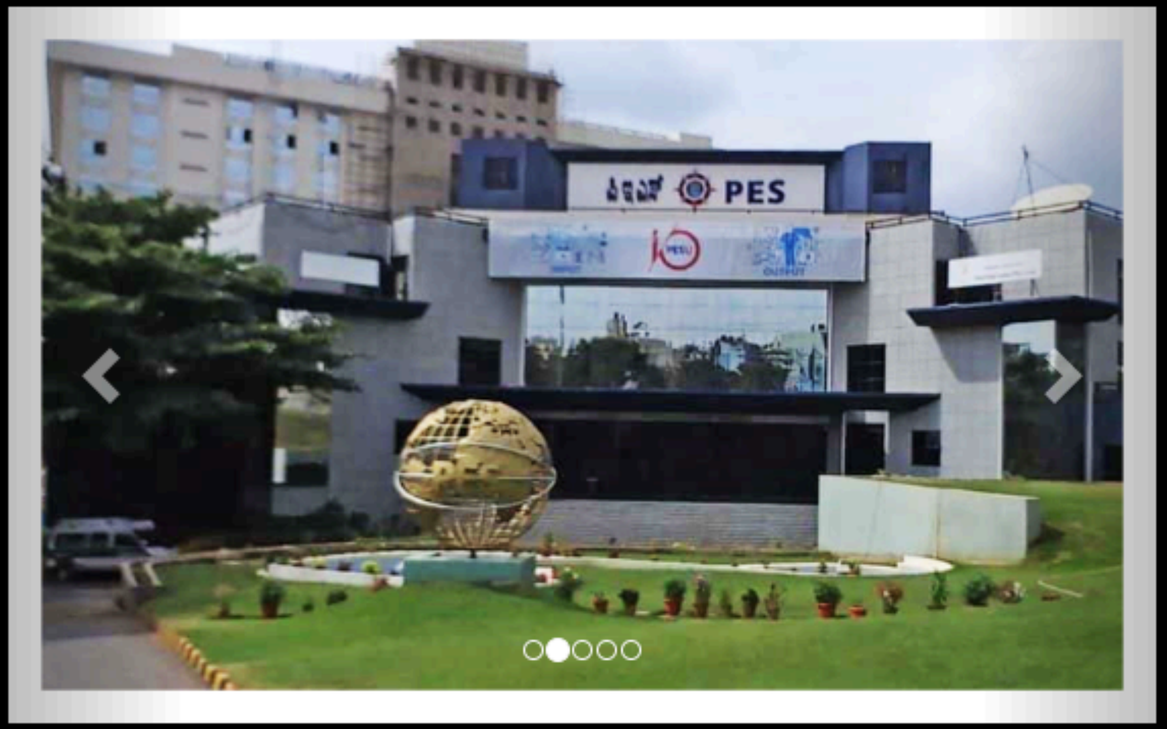
Welcome to

Center for
Information Security, Forensics and Cyber Resilience

Over the past few weeks, we have been working on automating one of the rooms within the Center for Information Security, Forensics, and Cyber Resilience (ISFCR). The end goal is a completely voice-automated room with additional sensors to turn off fans, lights, and other parts of the electrical system of the room when no people are present.



Dashboard

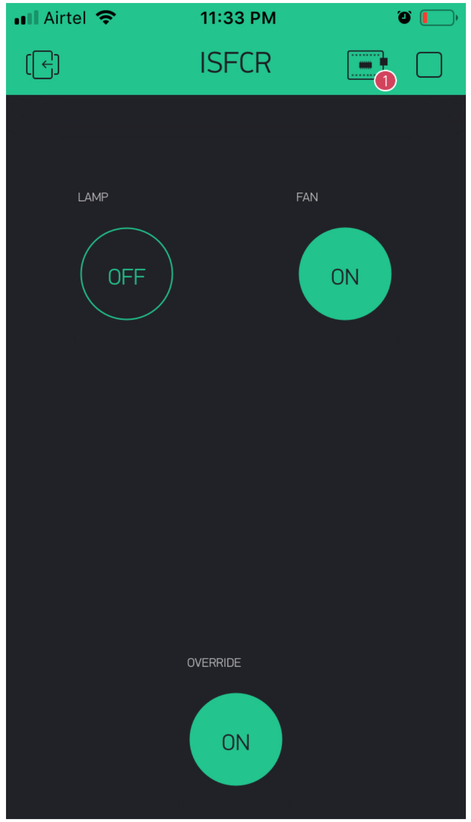
- Temperature: 29.3
- Humidity: 60.29
- Gas Danger: No
- Lamp: On
- Fan: Off

Web UI

Implementation Details

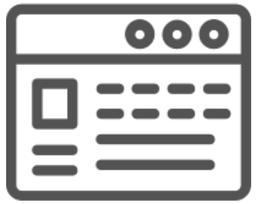
- Arduino UNO script for sensor data collection
- Blynk client on NodeMCU
- Python script on Raspberry Pi for central processing
- IFTTT cloud applets as triggers
- XAMPP Server for web-hosting

Implementation Details



- Manual Mode:
  - Control devices using Blynk
  - Control devices using Alexa
- Automatic Mode:
  - Devices are automatically manage based on sensor readings

Implementation Details



- Sensors detect ambient temperature, humidity, light level and CO levels
- The lamp and fan automatically turn on and off based on certain thresholds
- A dynamic webpage displays a dashboard with sensor readings

Project Results and Learnings

- Results
  - Successful control over connected devices
  - Real-time monitoring of environment and the status of connected devices
- Learnings
  - Variety of platforms learnt
  - New programming style
  - Hands-on hardware and wiring

Shrey Tiwari
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