

# **RIoT**

## **`Regulated Internet of Things`**

### **Team Members:**

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### **The problem statement and its significance**

Ever since the bloom in software sector, each individual has been restyling his/her owned applications in a way to suit their personal needs for better productivity and efficiency. Whether it is the user accounts on any handheld device or personal computers running on Windows or any other Operating System, it has always been convenient for the user to login to his personalised settings with almost zero fuss and backup/port them to another platform on the go, if required. Till date, this has been implemented only on software level but with advent of smart hardware, soon we will require to handle data of hardware devices that can easily setup the user choices to the environment around him/her wherever and whenever needed. If one does not have a IoT enabled device we can make it one.

### **Proposed Solution**

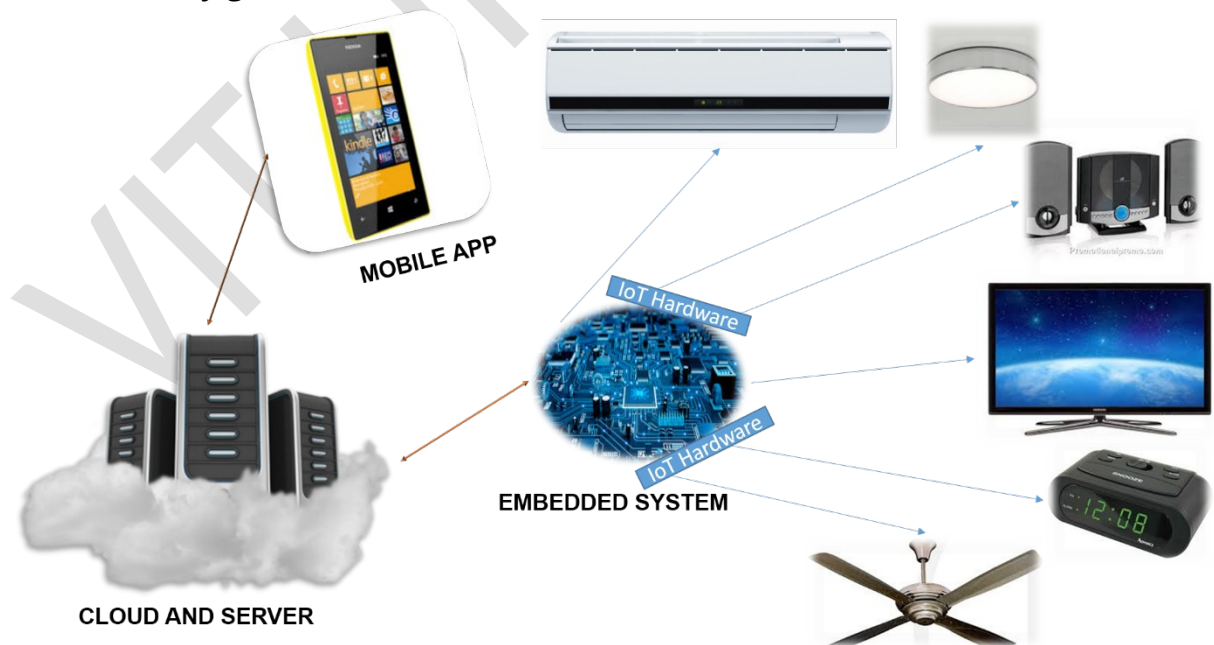
In this project, we plan to design a master-chip that can sync with all the (IoT) hardware devices in the environment to which it is connected. We also plan to design a hardware that will convert some of the non IoT devices to IoT enabled. User can set the modes of all the connected hardware such as home appliances via a Mobile phone application. The settings are then stored on cloud, now irrespective of where the user goes (hotel, home, office etc.) the proposed model will allow his/her personalised settings to be loaded onto all the available hardware present in his/her current environment, connected and controlled by a local master-chip. Also the user can remotely control devices at his home and schedule switching On/Off of devices. For security concerns, we plan to provide access to the profile only when an user confirms his identity.

This hardware will enable the user to control the luminance of light, speed of fan and switching On/Off of other electronic devices. Also this device will give a power consumption feedback helping user to monitor the power consumption by the device connected to the IoT hardware.

## Architecture and Working procedure

Step by step breakdown:

- All the places have a master chipset installed and connected to it's locally addressable devices.
- Master chip is used to relay data between the cloud and devices.
- Smartphone app acts as an universal remote to control all the devices in any environment(s) into which the user has logged in.
- All the changes in settings are continuously monitored and stored on cloud.
- If the user goes to some other location, he can allow the locally available master chipset to retrieve the personalised settings from cloud and transmit them to respective devices.
- Each user will have their own customised settings linked to their secure account which can be loaded on to all the available devices irrespective of where they go.



**fig1:** Schematic illustration of the basic system

# Technical details

## Content of the App:

- The App would be customizable and modular i.e. the user can add or remove devices from his customization list or choose not to set any preferences.
- Using the App the user can switch On/Off and control other settings
  - Lights and their ambience settings.
  - Fan and control its speed.
  - Changing TV Channels.
  - Configure other IoT enabled devices.
- Changes done in the App will get reflected on the server and will get saved in the User profile on the cloud.

## Software Requirements

- Visual Studio 2015
  - Mobile Application Development
  - Server Development (ASP)
- Android Studio
- Parse / Windows Azure for Cloud

## Hardware Requirements

- Smart Phone.
- Embedded System parts:
  - Arduino Yun
    - To connect and share data over the Internet.
  - Arduino Uno/Mega
    - to control the voltage across a electrical device.
  - Relay Circuit - to connect AC devices
  - For the Model
    - LEDs - to simulate lighting in a room
    - DC Motor - to simulate Fan and Air Conditioner in a room.
    - Screen - to display other loaded settings for which simulation is not possible.
  - Password verification device - to verify the user.

## Benefits to the society/ Expected Outcomes

- **IoT interconnectivity** - Provides a platform for all IoT devices to communicate with each other.  
If feasible, we can combine/connect all the IoT devices that other teams develop also.
- User can move with his personalised hardware settings. Single click procedure to restore to his favoured settings anywhere.
- A step towards a Smart City.

## Approach

- get all hardware
- install all required software and get used to them
- setup cloud
- databases structure on cloud
- cloud connectivity procedure with devices
- connectivity of devices with Yun.
- enable wifi connectivity on the chipset
- program chipset to relay data to and from
- create simulation environment
- mobile app
- its connectivity with cloud
- authentication protocol

## Further Extension scope of project

- **Data analysis** - Data at every time frame can be recorded (if permitted by the user) to provide automatically adaptive settings to users for their new location based on outside environment. When a user moves to a new location we can suggest him/her to adapt to a certain setting based on other user(s) settings in that location.
- **Targeted advertising** - With availability of user's preferred settings, targeted ads can be used on app for revenue.
- **Parallel cloud/ cloud merging** - Merging data with other services that offer user details (eg. Aadhar) will enable us to create a detailed profile of each individual.
- **Firewall** - With the rise of M2M devices, IoT malwares are also gaining popularity. The intermediate master chip can be programmed to detect

and deny access to such malicious programs from being executed on the devices.

- More features can be added for wifi protocol to enable easier sync with IoT devices.

## Challenges

- The idea takes IoT to it's next level. It's based on the fact that in near future we will be having most of our nearby devices IoT enabled which can connect with the proposed masterchip.
- Continuous internet connection availability for the master chip.
- This idea will be possible only if manufacturer of the device configures it with an open protocol that can be used to connect with other IoT devices(master chip in our case) and not only company's server. This can be overcome by gaining access rights to the company server with a contract or purchase.
- We might face difficulty in transmission of data as the changes will be updated on the server first then on the system.