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Implementation of Secure Home Automation System using Android Phone & Wi-Fi

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Abstract: *Internet of Things or shortly known as IoT can be described as the intelligent linking of various appliances to provide for a new form of communication between technology and people. IoT has advanced significantly in last decade due to the comfort and privilege it provides to the end users. Iot has been increasing at a tremendous rate in the past decade. Smart Homes can be made using IoT by connecting the home devices to the internet and controlling them using another device like a smartphone or a computer. Phones can be connected to the devices via a server by using Bluetooth [5], Cloud Networking [1] and Wi-Fi. We propose a Home Automation system which makes use of Wi-Fi and ESP 8266 Wi-Fi Module which can be controlled using Android Application. This proposed system is secure, safe and cost efficient.*

Keywords: *Android, ESP 2866 Module, Internet of things, Smart Homes, Wireless Security, Wireless Networking*

I. INTRODUCTION

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities.

II. IMPLEMENTATION

We implemented the Home Automation system with the help of ESP 8266 Wi-Fi module and Android. In our implementation we use ESP Wi-Fi module which is an easily available, cheap and reliable module. We have developed an Android application which connects to the internet which is further connected to the Wi-Fi module. The users can send data to turn on/off devices with the help of the application. This data will be received by the ESP Module via Wi-Fi.

Our implementation is better than the existing systems based on the following parameters:

- A. *Access Range* - Can be accessed from anywhere with a Internet connection.
- B. *Data Transfer speed* - 7.2 Mbps(Average Wifi speed around the world)
- C. *Security* - Google sign in + SSL 256 bit encryption layer
- D. *Simple* - Very simple implementation. Use of only ESP 8266 Wifi module.

III. JAVA ALGORITHM

```
if(WifiConnectButtonPressed)
{
    toggleWifiConnection();
    notifyUser();
}
if(LED1ButtonPressed)
{
    toggleLED1Power();
    notifyUser();
}
```

```

if(LED2ButtonPressed)
{
    toggleLED2Power();
    notifyUser();
}
if(LED3ButtonPressed)
{
    toggleLED3Power();
    notifyUser();
}
    
```

IV. XML CODE

```

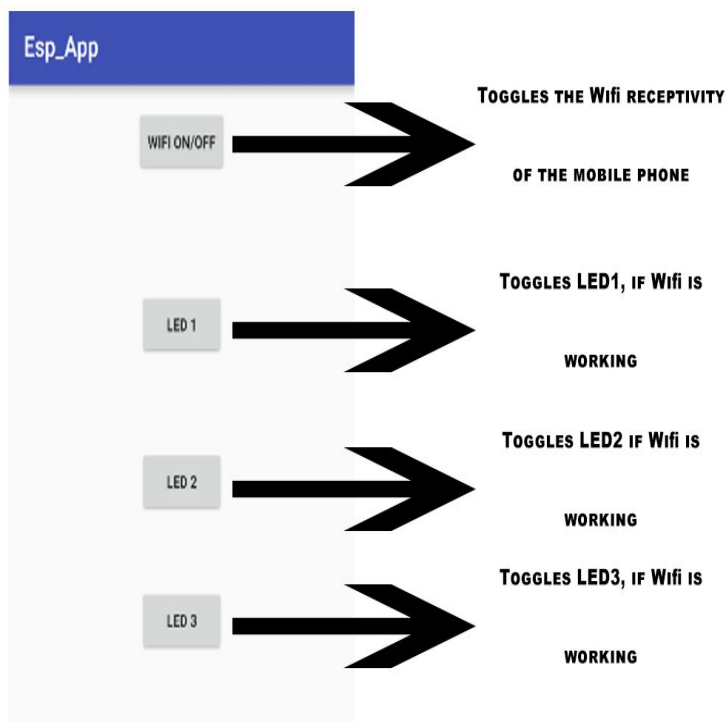
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="16dp"
    android:paddingLeft="64dp"
    android:paddingRight="64dp"
    android:paddingTop="16dp"
    tools:context="com.app.esp_app.MainActivity">

    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="WiFi ON/OFF"
        android:id="@+id/button"
        android:onClick="wifi_connect"
        android:layout_centerHorizontal="true" />

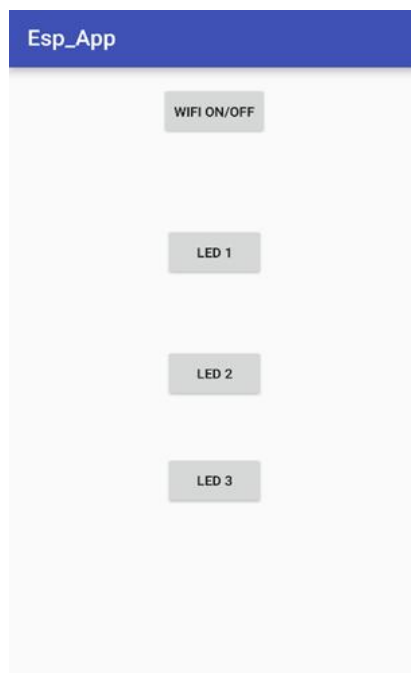
    <Button
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="LED 1"
        android:onClick="led_1"
        android:id="@+id/button2"
        android:layout_below="@id/button"
        android:layout_centerHorizontal="true"
        android:layout_marginTop="81dp" />

    <Button
    
```

V. BLOCK DIAGRAM



VI. APP LAYOUT



VII. CONCLUSIONS

Our implemented system is a fast, simple and cost effective Home Automation system which can be easily installed in traditional homes. Our system is secure enough to keep the control of Control of the devices to the authorised users. In future we aim to increase the security of the application and further reduce the cost of installation of the system in homes and convert as many homes in India to smart homes.

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