

IoT Enabled Smart Air conditioning System

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Abstract : In this fast paced world, it is essential to cope up with technology. IoT is one such technology that emerged from necessity. IoT is Internet of Things which enables the machine to machine interface. Many of the daily used devices are being coupled with technology for human comfort. Smart AC is one such human comfort which turned out to be a radical thinking. Smart AC enables effective use of energy. A mobile app is designed to control AC. Automatic ON and OFF feature is provided to AC by enabling microcontroller to detect occupant's presence. A web page is designed for user enrollment. Access to the smart AC can be done by authorized user only which intern reduces the miscreant utilization. With the help of microcontrollers, mobile app and relay the existing ac is transformed into a smart AC unit.

IndexTerms - nodemcu,esp32,android studio, android mobile,relays.

I. INTRODUCTION

The Internet of things (IoT) is the system of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators and connectivity which enables these things to connect, collect and exchange data. IoT extends Internet connectivity beyond standard devices, such as computers, smart phones and tablets, to any range of traditionally dumb or non-internet-enabled physical devices and everyday objects. Embedded with technology, these devices can communicate and interact over the Internet, and they can be remotely monitored and controlled. With the arrival of driverless vehicles, a branch of IoT, i.e. the Internet of Vehicle starts to gain more attention. In present days in order to manufacture a electronic device we need to manufacture another electronic component called remote controller. Although remote operating a device is a machine to machine interaction, it is an extra component which includes additional material and manufacture cost. To avoid this problem remote is replaced with a mobile app and installed to the customer at the time purchase.

OBJECTIVES:

The main objective of this work is to convert the existing ac into a smart ac unit with the aid of iot technology and to reduce the material utilisation by avoiding manufacturing of remotes by incorporating the below features.

- 1) Automatic on/off of AC
- 2) Operating AC with mobile app
- 3) Allowing authorised user to access the mobile app

HARDWARE DESCRIPTION:

- 1) **Nodemcu:**

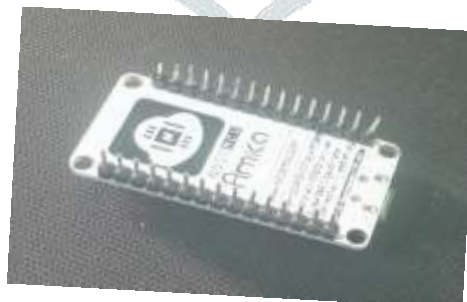
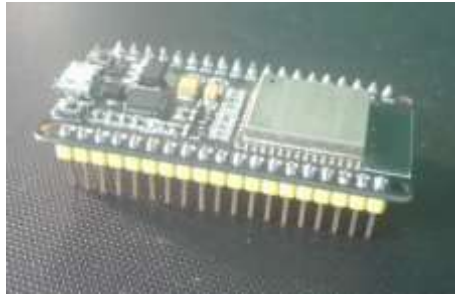
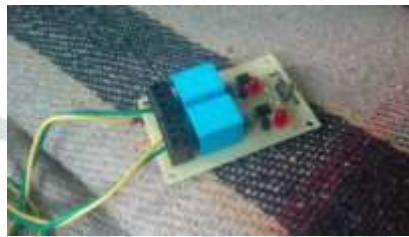


Fig.1.NODEMCU

It is a single board microcontroller with 128kb memory, which provides access to GPIO (general purpose input output).

2)Esp32:**FIG.2. ESP32 Integrated Circuit**

It is a microcontroller with 520kb memory with integrated WI-FI and Bluetooth. This device detects another similar kind of device and stores the information and transmits the same to relay if necessary.

3)Relay:**FIG.3. RELAY CIRCUIT CHIP**

It is an electrically operated switch. It finds applications where it is necessary to control a circuit by a power signal.

SOFTWARE DESCRIPTION:**1. ANDROID STUDIO:**

Android Studio is an open source web application which was originally developed by Google and Jetbrains designed especially for Android development. It transforms the coding of complex languages like java into a simple drag and drop based coding. In present work this android studio is used to design an mobile application.

2. ARDUINO IDE:

The Arduino IDE (Integrated development environment) software was downloaded and installed on the hardware (laptop). Arduino IDE provided a perfect platform to write and burn the program on to the Arduino board. It consists of libraries and source code with it. Using this arduino ide software in present work two programmes are designed one for automatic control option and one for manual option control.

3. HTML:

Acronym of html is hyper textMarkup language, which is used to create a web page. In this work also a page is created for users to register in order to use the mobile app. The designed page contains information about iot technology, beacon technology api keys used for talk back services employee registration and admin login.

WEB PAGE INTERFACE:

In this work a web page is created for the registration of users at employeeTracker.theSmartBridge.com. User has to visit this page and register for authentication.

CREATE EMPLOYEE ACCOUNT HERE

First Name: <input type="text" value="Enter First Name"/>	Last Name: <input type="text" value="Enter Last Name"/>
Mobile: <input type="text" value="Enter Mobile"/>	Email: <input type="text" value="Enter Email"/>
Designation: <input type="text" value="Enter Designation"/>	Employee ID: <input type="text" value="Enter Employee ID"/>
Address: <input type="text" value="Enter Address"/>	Mac Address: <input type="text" value="Enter Mac Address"/>
Password: <input type="password" value="Enter Password"/>	Confirm Password: <input type="password" value="Enter Confirm Password"/>
<input type="button" value="Submit"/> <input type="button" value="Reset"/>	

FIG.4.WEB PAGE INTERFACE

All the user registrations will be displayed to the admin at manage employee section, After admin acceptance the user is now allowed to use mobile application.

Admin
LOGOUT

All Menus

List of all Employees

SNo	EmployeeID	Full Name	Email	Mobile	Address	Designation	Status	Registered On	Actions
1	160012113105	vishnu vardhan	vyishnuvardhan325@gmail.com	8574294299	tinupati	student	1	2018-08-24 00:00:00	<input type="button" value="Accept"/> <input type="button" value="Deny"/>
2	23456	Swathi A	swathi@gmail.com	7702602236	Kamala Nagar 111	Developer	1	2018-07-28 00:00:00	<input type="button" value="Accept"/> <input type="button" value="Deny"/>
3	1234	Surya Tej	testuser@gmail.com	8686519993	4th floor, Above HDFC Narmada Arcade , HMT nagar, Nacharam	Programmer	1	2018-07-26 00:00:00	<input type="button" value="Accept"/> <input type="button" value="Deny"/>

FIG.5. ADMIN ACCEPTANCE PAGE

WORKING OF APP:

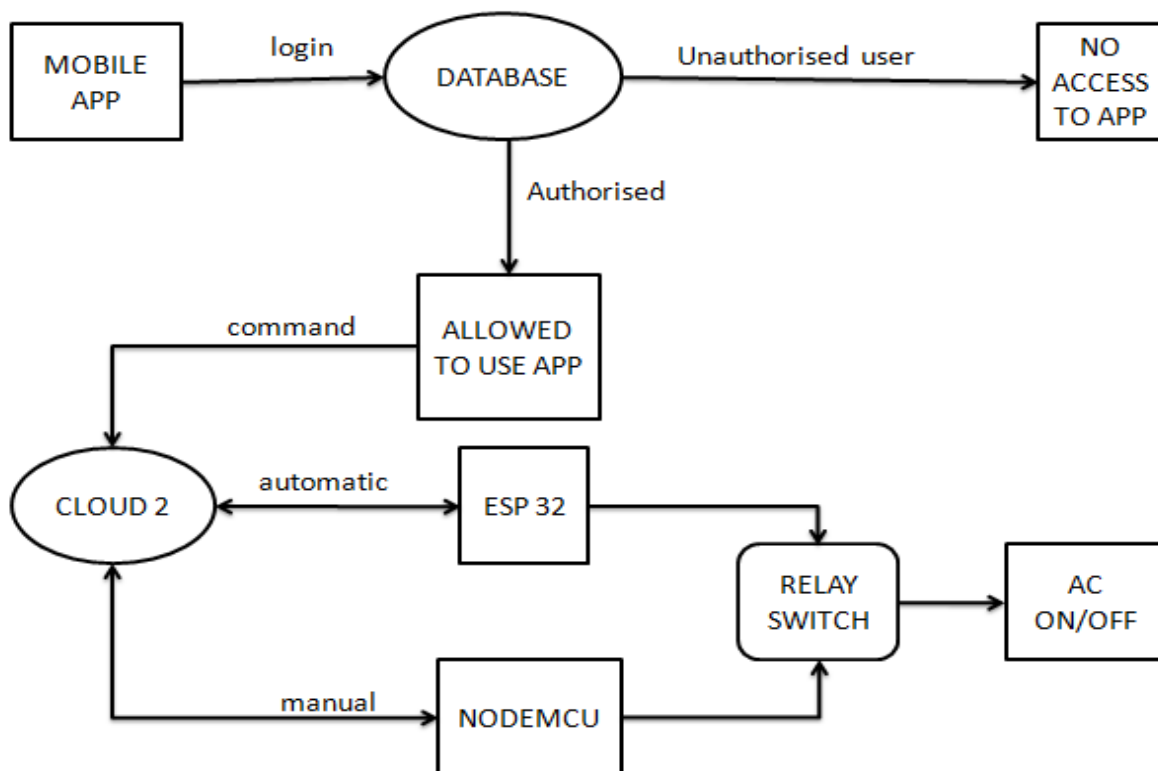


FIG.6. BLOCK DIAGRAM OF APPLICATION COMMUNICATION INTERFACE SYSTEM

Pre registration of user at employeetracker.thesmartbridge.com is required to access the mobile app. The app asks the login credentials of user to confirm whether the user is authorised or not.

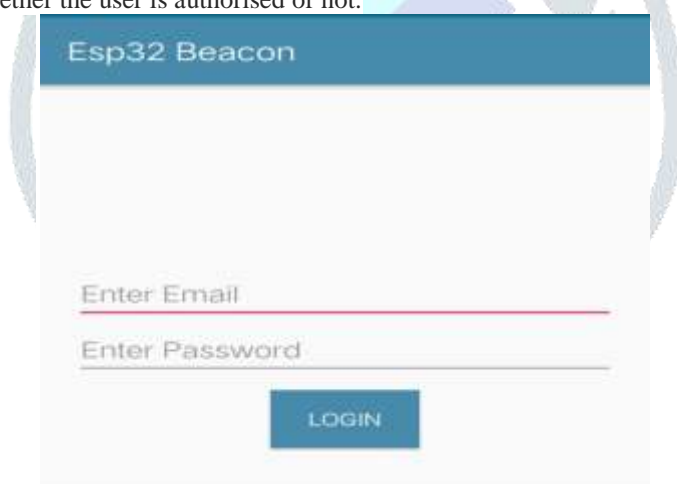


FIG.7.USER LOGIN PAGE

After confirmation, the app allows the user to use the applicaton. After successful login the application displays the type of control options (automatic and manual).



FIG.8. APPLICATION CONTROL SELECTION PAGE

To perform these options two microcontrollers are used one is ESP32 to perform automatic control option and NODEMCU for manual control option.

If the given control is automatic, the cloud receives the signal and passes it to microcontroller esp32, after esp32 receives the signal it checks whether there is presence of user in space or not, based on that information the controller sends the ON or OFF signal to the relay and AC works accordingly. Microcontroller sends signal ON if it finds at least one user in space and sends signal OFF after the last user left from the space.



FIG.9. APPLICATION CONTROL SIGNALS SELECTION

If the given control is manual, the app displays options like AC ON/OFF and LIGHT ON/OFF. It is completely the duty of microcontroller NODEMCU to perform the further inputs given by the user until the command is automatic.

ADVANTAGES:

- Unauthorised personnel cannot access the device
- This is user friendly
- Device will automatically turns off when the room is detected as unoccupied.

FUTURE SCOPE:

The present app is developed for manual and automatic ON and OFF control of AC and LIGHTS. In future the app is developed in such a way that it can control fan speed, direction of wind flow and temperature changing options of AC in manual control option, and self adjusting comfort temperature based on number of occupants and outdoor conditions in automatic control mode.

CONCLUSION:

With the aid of hardware like nodeMCU, esp32 and relays and software like arduino IDE, android studio, and HTML a web page is created and a mobile application is designed perfectly. The same is connected to Air conditioning unit and tested successfully.

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