

DESIGN OF SMART CHATBOT WITH IOT FOR HOME AUTOMATION

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Abstract

In the fast growing world, consumers are getting technological help in all facets of their life. The internet provides various ways to get information and has radically changed the way we communicate. Keeping this in view this project has been designed to control the household appliance through chatbot with IoT using ESP8266 and Facebook Messenger. Some AI is integrated into the chatbot. This paper brings an approach towards bridging the gap between social networks and Internet of Things which enables the connection of people towards ubiquitous automation universe based on Social Internet of Things (SIoT).

Keywords: Adafruit IO, MQTT, IFTTT, Internet of Things, NodeMCU, Social Internet of Things, Relay

INTRODUCTION

Internet of Things has been the hot topic for the last decade. The ability to control physical devices over the internet and monitor the sensor values with live feed from anywhere in the world gives us that simplicity, transparency, efficiency and security that is required in both home and industrial automation that our present system lacks. Now a days, as sensing, actuation, communication and control become even more sophisticated and ubiquitous; there is a significant overlap in the field of IoT, sometimes from slightly different perspectives. The gadgets could wave themselves in to the fabric of our everyday life to support us in carrying out daily life activities, tasks and rituals in an

easy and natural way by using information with intelligence, hidden in the network connecting the gadgets. With the advent of smart phones, more people are connected with social network, so why not shift the control of devices to a simple chat on Face book to perform the task.

In this paper, for the prototype demonstrated, Adafruit MQTT broker [1] is used for communication among devices, IFTTT (If This Then That) [2] services is used to configure our Ai and chatfuel [3] is used to create a simple Chatbot. The system developed is also the cheapest platforms. For microcontroller NodeMCU [4] is used which have an inbuilt Wi-Fi support and arduino IDE is used for programming the NodeMCU.

LITERATURE SURVEY

R. Piyare [5] et al; and team has introduced design and implementation of a low cost, flexible and wireless solution to the Home Automation using Bluetooth. But, Blue tooth has range limitation.

Deepali Javale [6] et al; and team proposed Home Automation using GSM and Arduino which is costlier than the system proposed in this paper and is also based on platform dependent technology.

Chandrappa D N [7] et al; and team implemented a similar concept using MQTT protocol but the paper lacks any direct discussion on using Artificial Intelligence in IoT Automation.

Niranjan M and team [8] et al; illustrated an IoT based Industrial Automation scenario describing the use of sensors and actuators that can automate the process

with minimum human intervention and the process can be monitored live over the internet.

Antonio M. Ortiz and team [9] et al; beautifully described the concept of S IoT starting from a general architecture description and going to a deep review of challenges and open research issues that must be solved to make SIoT a reality.

METHODOLOGY

Let us take the example of turning on light, when we give the command "Turn on the light" to the configured AI of Facebook.

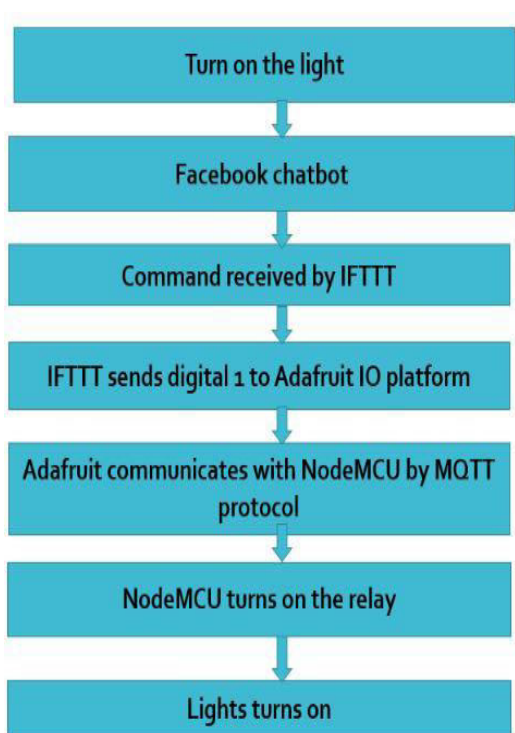


Fig1: Flow chart of turning on light with AI

ARTIFICIAL INTELLIGENCE SETUP

To begin with, a Facebook page is created for the appliances and the service of Chatfuel is used to program the page. With few AI rules it is possible to make an autonomous chatbot which can respond and send http request to IFTTT platform.

The webhooks service on IFTTT is used to accept the request and send corresponding data to Adafruit IO cloud. For switching purposes 1 and 0 are the values send from IFTTT to Adafruit IO.

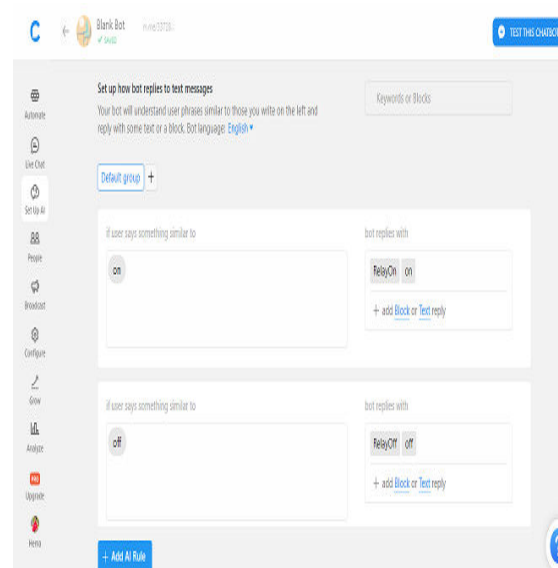


Fig 2: An AI rule on chatfuel to turn on and off the relay

Chatfuel on receiving command from facebook would send a **post** type http request to IFTTT using the JSON API.



Fig 3: http request to IFTTT using the JSON API.

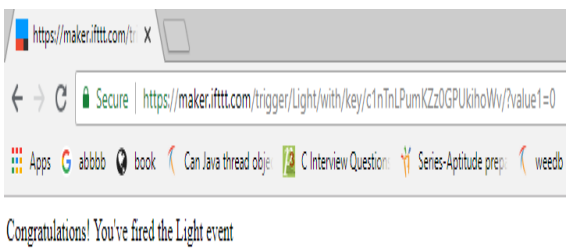


Fig 4: Successful communication between Chatfuel and IFTTT

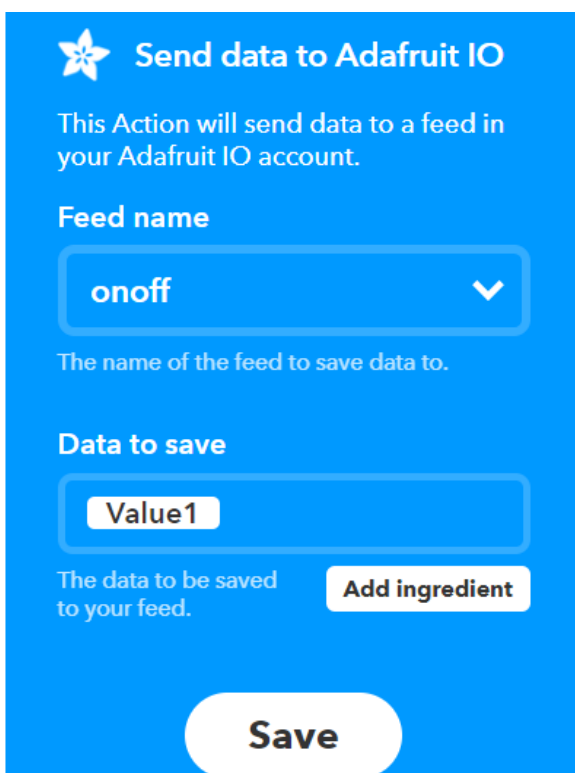


Fig 5: Configuration of Adafruit to IFTTT

MQTT

MQTT or Message Queue Telemetry Transport is an extremely lightweight communication protocol developed by IBM. MQTT have a publish/subscribe design to communicate among machines. In this project MQTT is used as a message transfer binding protocol. MQTT consists of broker and client. A client is denoted as a subscriber or publisher to a certain topic. A subscriber

listens to the server where as a publisher sends value to the server. For the prototype Adafruit service is used MQTT as a broker and NodeMCU as the client. Adafruit provides the cloud platform and control dashboard as well. While programming the client, subscriber and publisher are defined. Relay is the subscriber as it listen to the server for external command whereas the sensor is the publisher as it reads data and releases it to the server.

SOFTWARE IMPLEMENTATION

1. We need a Virtual human to chat with. For this, we create a Facebook page.
2. Go to chatfuel Platform and sign up with the same Facebook profile and then create the blank bot and setup AI into it.
3. Server ports are defined for Adafruit setup. For security purpose Adafruit also provides a unique key which is defined in the program.
4. An ESP8266 Wi-Fi client class is create by passing in the login and server details for MQTT server secure client access.
5. Feeds are defined for MQTT paths in the form `<username>/feeds/<feedname>`. A feed may be defined for publishing values or for subscribing to certain topic. Likewise, a sensor feed is defined as publisher and relay feeds are defined as subscribers.
6. Feeds are updated accordingly on Adafruit cloud platform and state of device can be monitored and controlled directly from there.
7. Arduino IDE is installed.

8. From preferences ESP8266 board package is installed and NodeMCU 1.0(ESP 12E) module is selected as the preferred board. Adafruit MQTT library is also included.
9. Baud rate is set to 115200 and COM port is selected accordingly.
10. Pin number is defined for the relay. The SSID and Password for Wi-Fi for the internet connection are mentioned in the program.

Open Facebook Chatbot, open the respective page of the project and type the command. Each service has their layer of security and can be accessed only via user's account. But the user if required can add multiple people on the platform. This adds security of devices that is mostly feared in the field of Internet of Things.

HARDWARE DESIGN

Node MCU is the heart of the project. It is the cheapest available microcontroller with inbuilt Wi-Fi support running on ESP8266, open source platform for developing IoT projects. GPIO(General Purpose Input Output) pins are used for connecting to the relay.

Relay is a switching device as it works to isolate or change the state of an electric circuit from one state to another.

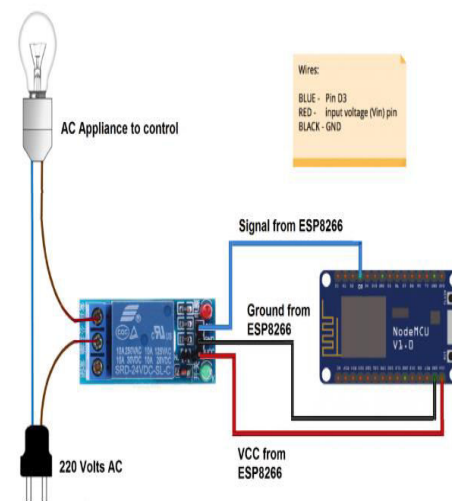


Fig 6: Circuit Diagram

RESULT

After preparing a setup, end user may communicate with the hardware from anywhere in the world using the configured AI. It should be made sure that the hardware receives adequate power supply. In this case, a simple Facebook chat command from any Smartphone device can trigger the hardware as shown in Fig.7

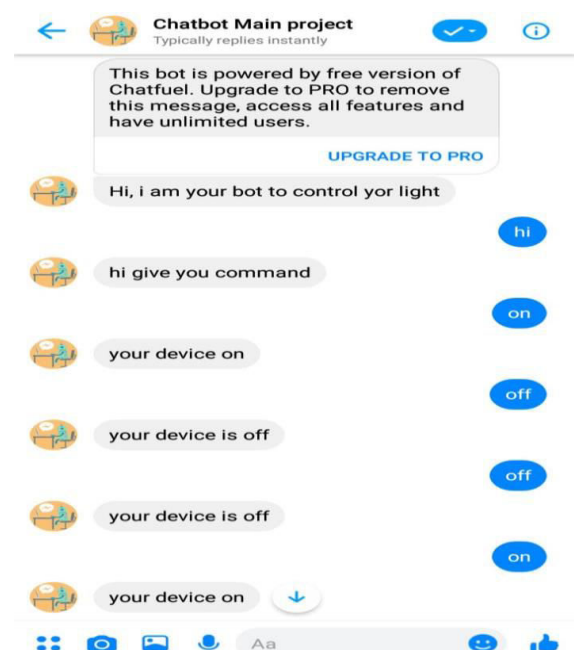


Fig 7: Real time Facebook chat with device

The AI of choice would channel the request of end user via IFTTT (If This Then That) service to Adafruit cloud platform. Adafruit is integrated in to the hardware using MQTT protocol as explained before. So, we can monitor any connected devices to NodeMCU and their live status on Adafruit dashboard. We can also control our devices from Adafruit Toggle button as shown in Fig.8

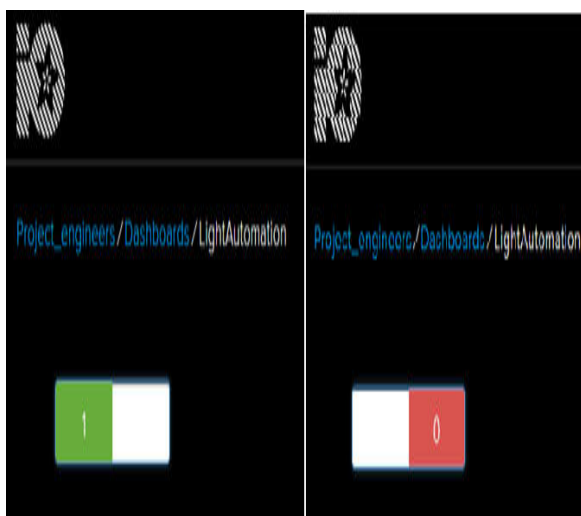


Fig 8: Adafruit control dashboard

FUTURE SCOPE

Social internet of things: With their last decade spent on connecting people with each other, social media giants and other organizations are now looking at the coming ten years to connect people to their devices and gain valuable insight from it. As enterprises around the world seek an efficient way to monitor, listen, and analyse data gathered from social media, IoT offers them a convenient method for social data aggregation without affecting their time and energy. By gathering valuable insights with the help IoT connected social media monitoring tools, business can make informative and crucial

decisions across a variety of internal departments.

In order to practically integrate the ubiquitous computing in our future daily life with high quality of experience, we need to improve the connectivity of all the relationships between the users and things, and to enhance the availability of computational power via sets of things surrounding us. Therefore, we take into consideration social networks of all entities for ubiquitous computing as an evolution beyond the IoT. In other words, things should be socialized for allowing humans to establish relationships with them in an easy way. It does not only mean physical connections between humans and things, but also logical configurations of social communities involving humans as well as things. This logical configuration can be realized through exhibiting features from people's SN and adopting them for the suggested universal SN and adopting them for the suggested universal SN of all entities. The future SN will include the interactivity scheme, profiling system, recommendation, and mash up of services that include both human and machine on the same platform.

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