ABSTRACT

Digital electronic maps are usually used for tracking the location at outdoor and indoor environment. Most of electronic maps are useful in outdoor environment but not feasible in indoor. The main focus of the available electronic maps like Google maps is the outdoor locations whereas the indoor navigation and locations are neglected to a large extent. In today's world there is no efficient technology for indoor navigation. Sometimes it is hard to find informative boards which navigate us to the required destination, so this project gives an elegant solution by using a navigation system on our portable device which is connected to the same network as that of the navigation server to access indoor locations. By developing a navigation chat-bot app we aim to achieve user-friendly indoor navigation system which directs a suitable path for the desired indoor location to the user.

Indoor navigation and local communication is very important in many of today's IoT deployed device. IoT enabled devices mainly communicate amongst neighboring nodes i.e, amongst local networks for controllability and operability.

Our project mainly concentrates in indoor communication(Local network) using server-client model. It uses TCP-IP as its transport layer communication protocol. Since it needs a guaranteed response and secured communication TCP-IP is best suited. It initially sets up a communication path by using logging-in systems. Then for further communication it uses client-server model.

1. INTRODUCTION

Many university campus, shopping malls and organizations are very enormous in size and area of land, so the people find it difficult to find the location inside the shopping malls, university campus and many other large organizations. There are no many effective features for finding the location inside the buildings. Usually in any immense institutions which extend over large areas, it becomes quite difficult for any person to find his way inside the institution who is unacquainted to the place. But he can take some help from the persons present around. But when there is massive crowd who are also unacquainted with the place then this becomes uncomfortable to navigate. To overcome this problem we use here a human like interactive bot which is customised to cater over to requirements.

So in this case the chat-bot database is remodelled according to the institution's geography. So the auditory commands are remodelled specific to the problem.

Finally the chat-bot helps us not only in navigating the institution but also provides us the necessary information about the different events happening in the institution. This makes the person comfortable and makes him to efficiently navigate through the large of extents of the institutions.

2. LITERATURE

The term "ChatterBot" was basically and originally coined by Michael Mauldin (creator of the first Verbot, Julia) in 1994 to describe these conversational programs. Today most of the chat-bots are mostly accessed using virtual assistants such as Google Assistant and Amazon Alexa.

A chat-bot (also known as a talkbot, chatterbot, Bot, IM bot, interactive agent) is a software program connected to database which conducts a conversation via auditory and textual methods. Such programs are oftenly designed to convincingly simulate how a human would behave as a conversational partner, thereby passing the Turing test. Some chatbots use advanced versions like sophisticated natural and lingual language processing systems, but many simpler and feasible systems scan for predominant keywords within the input sequence, then pull a reply with the most matching keywords, or the most similar wording pattern, from a standard database.

The indoor navigation as described in [3] is completely based on routing and navigating via routers that offers high degree of latency(delay). Our project mainly eliminates those and deploys client-server based response.

3. CHAT-BOT DESIGN AND DEVELOPMENT

The process of creating a chat-bot follows a pattern similar to the development of a web page or a mobile app. The Figure 4.1 depicts the architecture of chat-bot and its dataflow.

Design:

The chat-bot design is the process that defines the interaction between the user and the chat-bot. The chat-bot designer will define the chat-bot personality, the questions that will be asked to the users, and the overall interaction. It can be viewed as a subset of the conversational design. In order to speed up this process, designers can use dedicated chat-bot design tools that allow for immediate preview, team collaboration and video export. An important part of the chat-bot design is also centred on user testing. User testing can be performed following the same principles that guide the user testing of graphical interfaces.

Figure 1: Depiction of architecture of chat-bot and its dataflow.

Building:

The process of building a chat-bot can be majorly characterized into two main tasks: understanding the input and producing the correct answer. The first task involve characterizing the user input. In order to properly get a users input in a free text format, a Natural Language Processing system can be used. The second task may involve different approaches depending on the format of response that chat-bot will generate to communicate.

Analytics:

The usage of the chat-bot can be monitored in order to spot potential flaws or problems. It can also provide useful insights that can improve the final user experience.

Chat-bot development platforms:

The process of building, testing and deploying chat-bots can be done on cloud based chat-bot development platforms offered by cloud Platform as a Service (PaaS) providers such as Oracle Cloud Platform and IBM Watson. These cloud platforms provide, Artificial Intelligence and Mobile Backend as a Service for chat-bot development.

4. PROBLEM STATEMENT

It becomes difficult for a person who is unacquainted to the institution, to navigate in premises of the institution. Indoor communication amongst a large crowd becomes very tough as latency increases with crowd. Using traditional communication methods like Bluetooth, Wi-Fi takes many resources like routers, switches etc. When there is massive crowd then it is hard for everyone to reach their required destination without any ambiguity. New comers find it tough to move around the institution. Hence, the main aim is to solve this problem of navigation.

5. PROPOSED SOLUTION

We want to solve this by using human like interactive bot which dynamically answers to questions that are asked by any human. Bot is opened by getting your mobile phone connected to the institute's network. In this we are creating a server on raspberry 3 which is placed in a remote area. This will be handling all the clients (i.e: mobile phones connected to the network of the institution), raspberry 3 will also be connected to same network and it has all the database related to the institution.

So in this case the chat-bot database is remodelled according to the institution's geography. So the auditory commands are remodelled specific to the problem.

Now the bot interacts by using the application of android which is created by MIT app inventor software. So this provides all the information regarding the institution.

6. MOTIVATION

Going to new places can be tough. New places can be overwhelming and tricky landscapes. We find it hard to find some places inside big institutions, offices, malls, etc.

To help overcome the uncertain terrain of the unknown, we decided to give a solution to this problem by developing a human like interactive bot.

When we visit historical/tourist places we often employ a guide, this gave us an idea of developing a virtual personal guide which aims to guide people through a new and unknown place. This solution was also inspired from the concepts of personal assistants like Cortana, Siri and Google Assistant.

7. OBJECTIVES

1. To communicate in a indoor environment with minimum delay(latency).
2. To completely eliminate the use of written navigation boards.
3. To provide a user-friendly experience.
4. To create economic and efficient navigation system inside an institution.
5. To implement micro-controllers as navigation servers.

8. BLOCK DIAGRAM

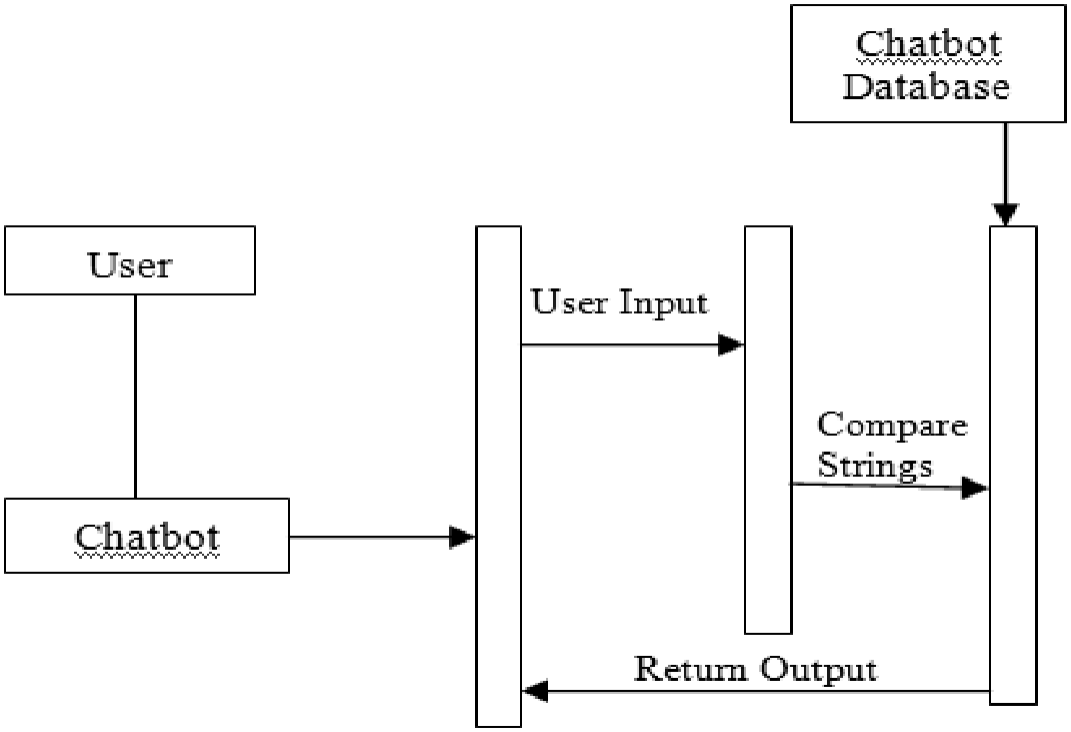

Fig 2: Chatbot block diagram

There are basically 2 parts

1. Mobile device as client
2. Rasp-pi as server.

The mobile device sends connection request over TCP-IP which is received by Pi. On searching its database sends response on the TCP-IP link to the client(Mobile). We can increase the database as per the requirement. We can also deploy speech-text feature for user convenience. Even advanced methods of machine learning can be deployed so that the bot learns new texts and automatically updates its dataset and responds to new commands and texts.

9. HARDWARE AND SOFTWARE IMPLEMENTATION

Raspberry-pi

It is a mini-computer on system used for interfacing database and various computation for our system.

Data link over TCP/IP:

Information exchange between a program running on the Raspberry Pi and a partner program running on remote computer systems becomes important when the Raspberry Pi is a front end of a measurement system and transfers sensor data in real-time to a control station or when a remote PC sends commands to a RPi based robot (remote control mode). In most situations the data link is established via TCP/IP and the well-established client/server technology based on socket programming is used.

Python server on Raspberry pi handles all the requests from the client. Make sure Raspberry & android phone should be connected to same wi-fi network. You can also access your server outside Your Home wi-fi network by Port forwarding.

Python Programming:

Python is advanced general-purpose interpreted, interactive, object-oriented, and high-level objected oriented programming language. Python list is a most versatile data-structure that is available in Python language which can be written as a list of comma-separated values (items) between square brackets for database. Important thing about a python list is that items in a list that need not be of the same type. Creating a list is very simple as putting different comma-separated values between square brackets.

For example: greetings = ['hola', 'hello', 'hi', 'hey'],

questions = ['how are you', 'how are you doing'],

responses = ['okay', 'i am fine'] etc.

PYTHON IDLE(Integrated development and learning environment):

We are using Python-2.7 Idle platform to run the code which is programmed to run the Chat-bot. Python-2.7 is pre-installed with Raspbian Stretch O.S. This tool allow us to record the history of clients connected to the Python server. Here Raspberry pi-3 is acting as a Server and user phone is acting as a client.

Database:

Database is the set of all possible input and output data given to the Chat-bot so that it will respond to the client based on what data the user will enter .It will respond accordingly as coded in output database. We are collecting the data from verbot-5 software and few are created on our own as per the college map, so that the Chat-bot will be able to show the direction of class, seminar hall etc. inside our College campus.

Simulation:

Raspberry pi-3 works as server and our app created using mit app inventor-2 acts as client. Python server on Raspberry pi handles all the requests from the client. Both Raspberrypi-3 and mobile should be necessarily connected to the same wifi network. After the client is connected to the Raspberry pi's IP address they can be able to chat with the chat-bot via the voice assistant or via the text option provided by the application named Rpi-chatbot built using mit app inventor-2 tool. Based on the input greetings or questions asked by the user chat-bot will respond to the user for that particular list which is a data-structure in python.

10. OUTPUT

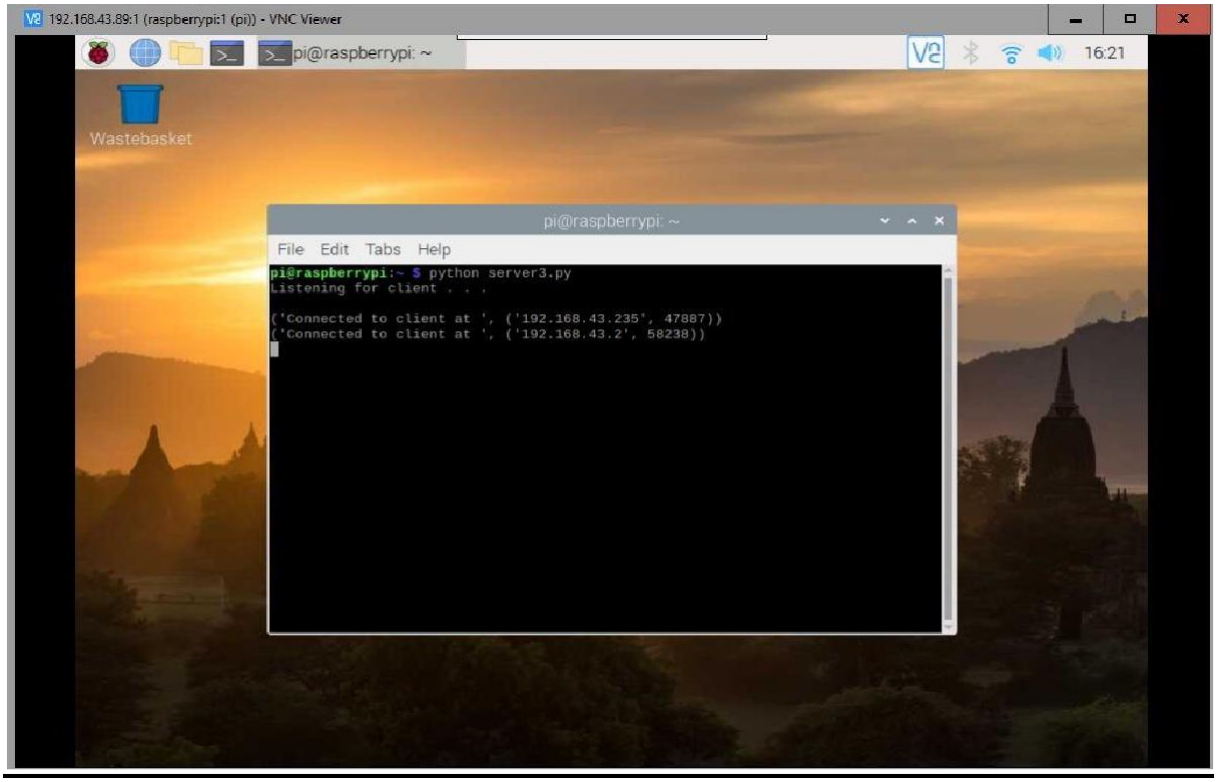

Fig 3 : Logging In to chat-bot(IP assigned)

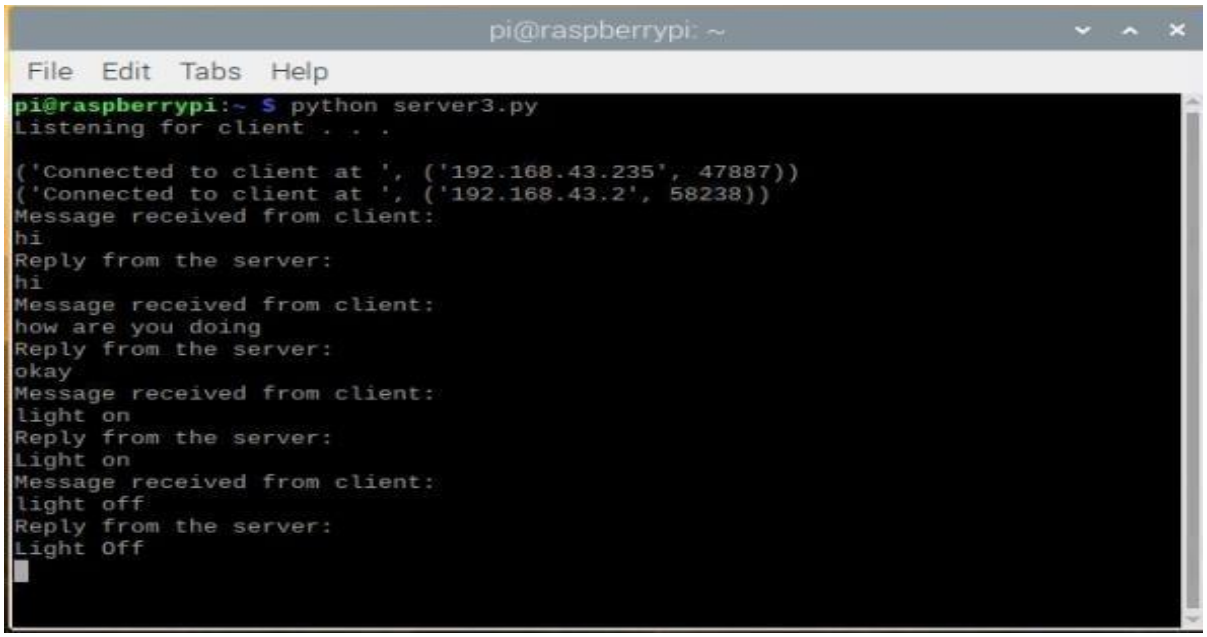

Fig 4: Chats between Server and Clients

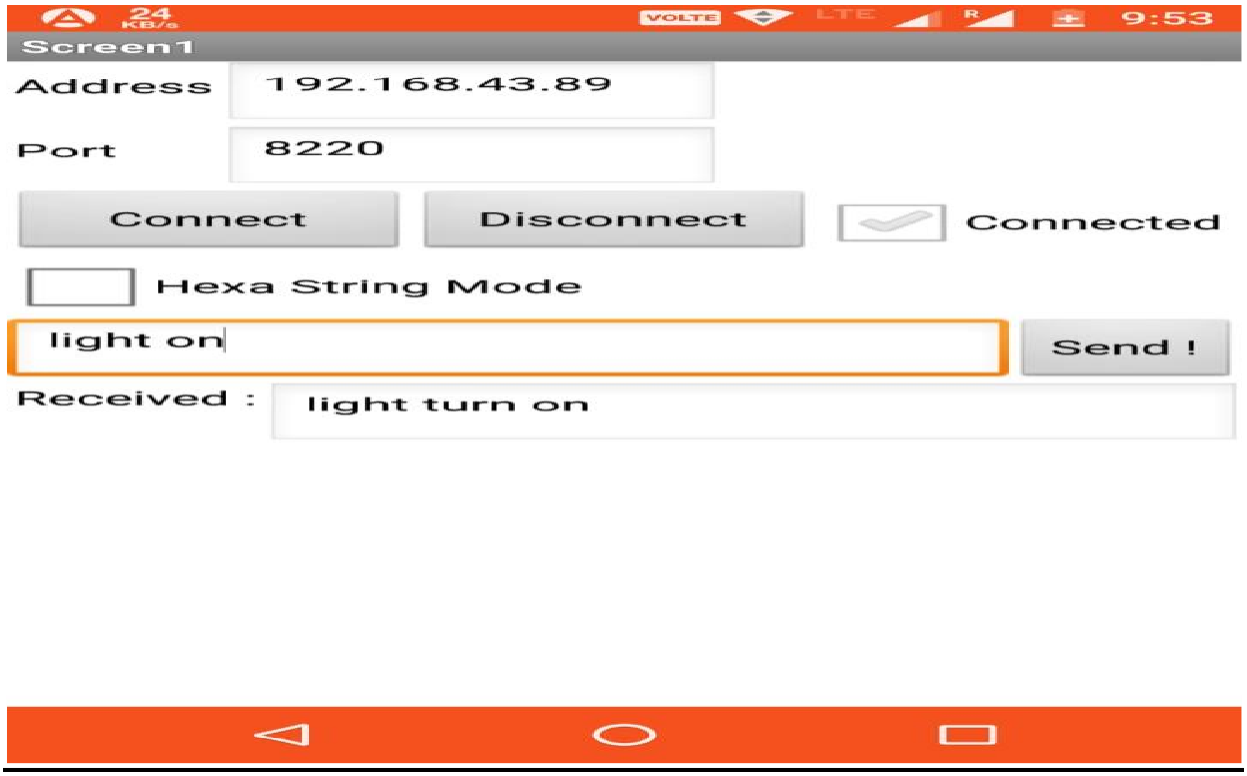

Fig 5: LED STATE CONTROL(ON STATE)

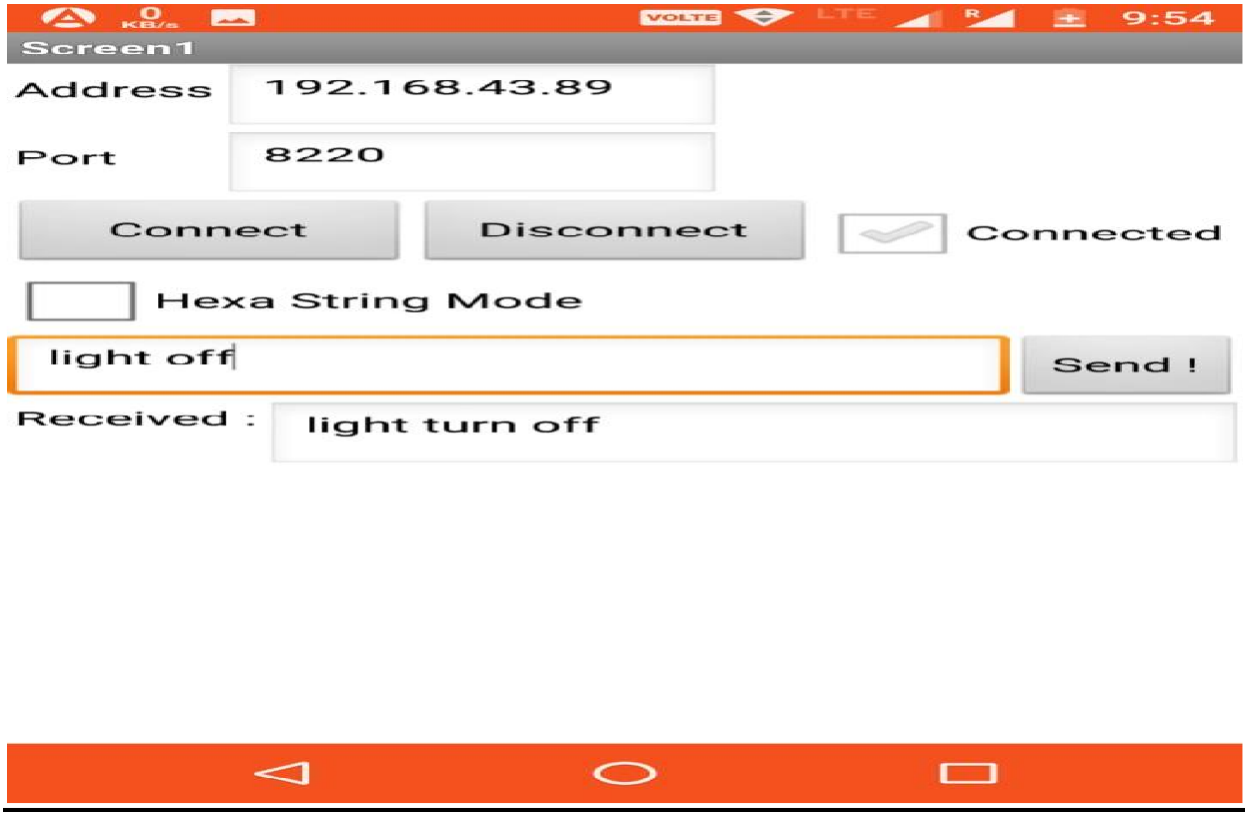

Fig 6: LED STATE CONTROL(OFF STATE)

11. CONCLUSION

Using client-server based communication model we get a latency of less than 1second. But whereas using other models yields us more than 5-6 seconds. Hence this would provide us fastest and accurate response. Only limitation in this project is that all the devices and server must be in the same network.

In the recent years with the help of Google maps and the location searching becomes a new trend, when people are not aware of their accurate present location. Google maps provide lots of functionalities like showing any location, alternative path from any location to other location and that estimates time to reach the location. But it is not well developed for indoor navigation. It is very difficult to find and get shortest path using various algorithms from current location to any location inside university like entrance gates, departments, canteen, library, playground and parking lots etc. for the new admitted students and visitors for tracking and navigation purpose. To reduce this pain inside the campus, implement the campus indoor location tracking system on android platform has been designed, implemented and tested successfully in this work. This application provides shortest route using various algorithms to guide the users from his/her own location to desired location and event updates with its proper place.

12. REFERENCES

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