

Review on Alexa as a Hospital Receptionist

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Abstract: *A hospital receptionist is the first point of contact between a hospital or medical facility and patients. These receptionists play a vital role in a medical facility because they perform customer service and administrative-related duties like scheduling appointments, answering patients' questions, answering phone calls and placing calls to confirm patients' appointments. A questionnaire was designed for the expectant patients, to design the Alexa. The inputs were captured to verify the feasibility, relevance, and technology acceptance for the use case. Chatbot designs are slowly changing from voice-to-voice communication like an alexa which was tested on Echo dot, a smart speaker device supported by Amazon Voice Service (AVS). Designing a chatbot on top of a custom Alexa skill allows developers to use multiple Amazon Web Services. The design has used AWS for hosting voice server and Azure for hosting Back-end which is created in c#. After that we connect Echo device with our created system. The concept of connecting smart devices, makes the chatbot solution accessible at any time and from anywhere.*

Keywords: Chatbot; Hospital Receptionist; Alexa; Amazon Web Services; Azure.

I. INTRODUCTION

The day to day of a medical receptionist is busy. Between scheduling new appointments, greeting patients and filling outpatient forms, taking and delivering messages, they have to fit in ordering medical equipment, daily contact with nurse and doctors, the list goes on. Most of the time the receptionist gets exasperated by the workload. The paper describes a design of chatbot based on innovative hospital receptionist to assist the patients in resolving their queries about appointment tracker. Chatbots are getting used efficiently in many applications [4]. Changes in science and technology resulted in a gradual transformation of the information access methods. Artificial intelligence and the latest computing solutions have made them much more efficient, simpler and user interactive.

Interaction between the human user and the computing machine is the main part of the information exchange process. Chatbot simplifies this interaction and makes it user friendly. Intelligent conversation between humans and machines is the prominent feature of a chatbot. The chatbot is programmatically trained so that it can communicate with the user through text-based interaction [1]. The chatbot can be effectively used as an assistant to perform functions which are traditionally carried out by humans, or as a boundary tool to control a system of connected devices. Text or messaging based chatbot designs have been gradually changing to voice communication-based designs. Voice interaction enabled microphones and smart speakers have played an important role in the chatbot evolution. Internet of Things, a concept of connected smart devices has transformed the chatbot interaction. The hospital receptionist faced so many challenges while doing the responsibilities like Welcoming patients and visitors, answering the telephone and answering any inquiries, scheduling appointments and keep those appointments on time. While the shortage of time is the major problem in emergency task. Chatbots that works like an alexa resolve these concerns, helping patients with appointment tracker. Chatbots or conversational agents come under the modern category of mHealth services. They use natural language and voice-based interaction while communicating with the patients, through a 'voice to voice communication model' [2].

II. BACKGROUND & RELATED WORK

[1] The model help person about their anxiety and fear in that design chatbot is slowly changing from text-based interaction to voice-based interaction. Designing a chatbot on top of a custom Alexa skill allows developers to utilize a range of Amazon Web Services like AWS Lambda, Simple Email Service (SES), Simple Notification Service (SNS) and DynamoDB. AWS DynamoDB is a NoSQL database service providing higher scalability and quick performance. Alexa could be implemented on LAN through Android Application for better utility [3].

Developers don't have to worry about the management of hardware provision, replication, software patching, setup, and configuration, or cluster scaling as this is handled by DynamoDB [5]. It also secures the sensitive data by encrypting it at rest, reducing the burden on the developer. It allows the creation and maintenance of any amount of data. More on, DynamoDB serves incoming requests are any traffic level.

AWS SNS is a cloud-based notification service that can be used for generating message notifications from serverless and distributed applications. It is a durable and secure platform that offers higher throughput with higher availability. An authentic and reliable data source is needed to extract the backend data which is used for the chatbot design.

Considering these features a platform recommended by healthcare practitioners, the National Health Service (NHS) website was selected as a dataset source. NHS is the national healthcare system in the United Kingdom. The website offers information content about pregnancy such as weekly guides, recommendations, and suggestions about relevant miscellaneous topics.

III. DESIGN AND METHODOLOGY

3.1 Survey of Technology Acceptance by Users

It is important to study the technology acceptance for a practical use case and to analyze the user acceptance of this technology or its content. Researchers have already used the model in the context of M-Health applications. It focuses on aspects such as Effort expectations, Performance expectations, Facilitating conditions, social influences, Price values and Trust. A survey questionnaire was designed using these features for Receptionist to study the feasibility and acceptance of a voice interaction based chatbot in assisting them during the daily work receptionist. A set of questions were framed to verify the primary familiarity of the user with the smartphone or chatbots and to predict how frequently they are using them. Multiple questions were asked to record user opinions while accepting the Alexa as a Hospital Receptionist and as a replacement of Receptionist of the Hospital. Almost all users were having a primary exposure for technology, but some of them accepted that they don't use chatbots more frequently. As most of the interviewees often feel the need for a Hospital Receptionist in a day, they admitted that sometimes they can't raise their queries or questions with device like Alexa. Although they prefer seat quietly until anyone not come from management of hospital; they were in favor of an alexa to replace with receptionist for only some sort of work not want to eliminate completely.

Users were asked to provide their consent for parameters on the scale of 1-5 (strongly disagree, disagree, neutral, agree, strongly agree) while looking at the feasibility of an Alexa as a receptionist. Figure 1 shows a statistical summary of the survey, which highlights the positive user inclination towards an Alexa as a receptionist. The survey analysis interpreted factors resulted in a fairer analysis of the technology acceptance. The responses from the users were helpful in structuring the chatbot design features, making it a relevant and engaging tool for the users. The survey analysis [2] interpreted from UTAUT2 factors resulted in a fairer analysis of the technology acceptance. The responses from the users were helpful in structuring the chatbot design features, making it a relevant and engaging tool for the users

3.2 Design and Block Diagram

Alexa is a popular virtual voice assistant application developed by Amazon. Devices like Amazon Echo Plus, Echo Studio or Echo dot are enabled with Alexa. Alexa provides multiple functionalities like real-time data extraction, voice interaction, weather forecast, broadcasting, smart audio-video streaming, tasks list management, home automation control and others.

Third-party users can also configure these functionalities by designing and installing a custom 'skill' on Alexa enabled smart speaker. The skill, just like a mobile phone application allows the user to perform certain defined tasks that involve features such as service assistance or voice interaction. Alexa has become a popular tool in realizing the concept of intelligent and interactive chatbots. Designing a chatbot on top of a custom Alexa skill allows developers to utilize a range of Amazon Web Services. It also manages the administration of cloud computing resources, capacity provisioning and automatic scaling, maintenance of the server and operating system, code logging and monitoring. The developer just supplies the skill code in one of the supported languages, and the other services are handled it for that Azure which provides a range of cloud services, including compute, analytics, storage and networking. Voice communication can be observed between the User and the Alexa enabled Echo dot device. Alexa Skills Kit (ASK) handles user requests captured in as an audio signal. It converts the audio input into the equivalent text to detect the



'intent' or context of the request. Corresponding to the detected intent, the associated API which is created in .net gets evoked. Request response interaction between skills and ASK takes place. Suitable actions are performed by created backend for the raised request, such as extraction of the data or generation of a response.

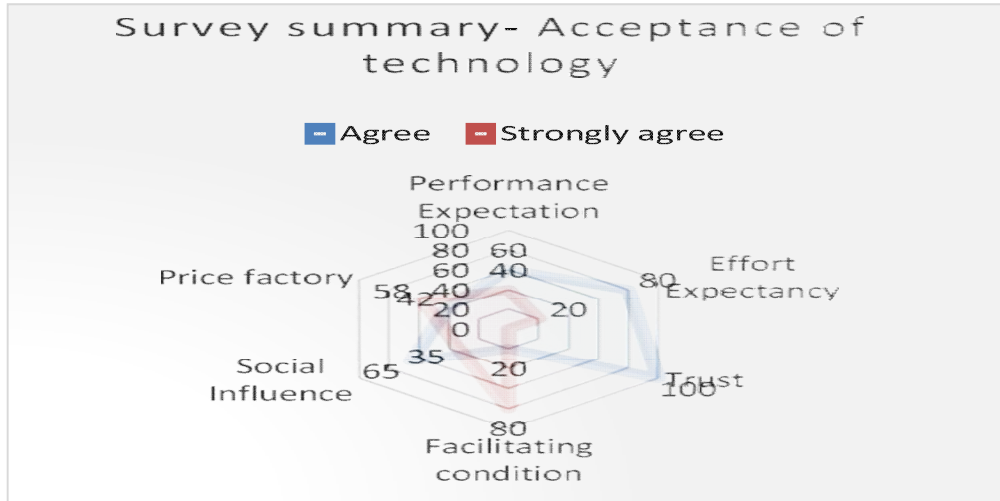


Figure 1: Acceptance of Technology

3.3 Methods for Creating System

The following steps follow for creating fully functioning Alex.

START

Building our skills, Create Backend in C#,

Hosting the services on Azure,

Make the backend talk to the Alexa skill, Build the Data Model,

Adding More Intents, Testing.

IV. IMPLEMENTATION & VERIFICATION

AWS Developer account and AWS Management console account are needed to configure an Alexa skill with Amazon Web Services [6]. ASK Developer Console enables the programmer to configure and publish a custom Alexa skill. On the other side, the AWS Management console enables the programmer to utilize multiple AWS services, monitor cloud services, user and roles management, handle costing and configure a custom dynamic skill using the ASK custom interaction model [7]. The implementation logic for the voice interface interaction is defined while configuring the Alexa skill. The following sections were configured:

Invocation: A specific keyword or a phrase said by users while starting an interaction with the Alexa skill.

Intents: Intent is a structural model for a particular functionality where steps for voice interaction, list sample user requests, and corresponding actions are defined. Intent can have optional arguments such as slots. Slots are like variables that can take values specified by some common characteristics like slots for exercise activity, day or time duration. A custom slot type can also be configured if the intended slot is not there in the list of Amazon built-in slots [8].

Sample utterances: Sample utterance is a list of probable phrases which likely to be said by users to invoke a specific intent or as a response to certain defined questions. ASK searches for the best possible match of the input request in the lists of sample utterances, to identify the intent. Dialog model: Dialog model is a structure where the conversational steps are defined for the interaction between Alexa and the user to capture the mandatory data required to invoke a particular intent. The importance of Decision making has been reported by many researchers in varied fields. Some of them being E-LEACH protocol, Smart Home Appliances Controller Using IOT [9,10]. The Lambda function was configured on top of a custom inbuilt template available in the AWS Serverless App Repository, to support ASK and NodeJS for the Lambda [11].

OUR SKILL'S ARCHITECTURE



Figure 2: Skill's Architecture

V. TESTING AND VALIDATION METHODOLOGIES

Initially, the Echo dot device was tested after its setup by the awaking words and with commonly asked questions. 'Utterance profiler' can be used during the 'Build' phase to test the defined utterances before actually deploying the skill. Utterances are tested to verify if Alexa can identify or invoke the desired intent or not. As the user is also asked to enter the inputs, the working of defined slots and dialog delegation can also be tested through the utterance profiler. However, it is not possible to verify the functioning of subsequent actions as the Lambda function is not triggered while testing the utterances. Once the skill is deployed, 'Alexa Simulator' is useful to test the functions without using any Alexa enabled smart speaker. Alexa Simulator supports text messaging as well as voice interaction, maintaining the session just like an actual device. AWS Management console can be referred to verify the functioning of subsequent actions triggered by the Lambda billing and execution permissions. The developer can function code. function code.

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