Lucy

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Abstract: The number one problem our seniors (over 80) face today is loneliness and isolation. According to the U.S. Census Bureau, 11 million, or 28% of people aged 65 and older, lived alone at the time of the census. As people get older, their likelihood of living alone only increases. Additionally, more and more older adults do not have children, reports the AARP, and that means fewer family members to provide company and care as those adults become seniors. In such cases, senior isolation increases the risk of mortality. This loneliness can negatively affect both physical and mental health. Perceived loneliness contributes to cognitive decline and increased risk of dementia. Also, social isolation makes seniors more vulnerable to elder abuse. Loneliness in seniors is a major risk factor for depression. Socially isolated seniors are more pessimistic about the future. Lucy is a skill developed for Amazon Alexa echo devices which sits in a senior's room. A group of student volunteers write personal emails to our seniors . Lucy reads those emails to seniors as they come or at a certain time.

Keywords *- Amazon Alexa, Alexa,, Senior Citizen, e-mail, Alexa Skill Kit, Google Gmail API, AWS Lambda, Google Apps Script*

I. Introduction

Amazon Alexa echo devices have a huge range of skills available for every user. Lucy is one such skill designed for Amazon Alexa echo devices. The main idea behind Lucy is the isolation of seniors in the country. This project looks to reduce the effects of isolation and loneliness. A group of volunteers write emails to seniors and this skill reads out these emails as requested.

II. Architecture

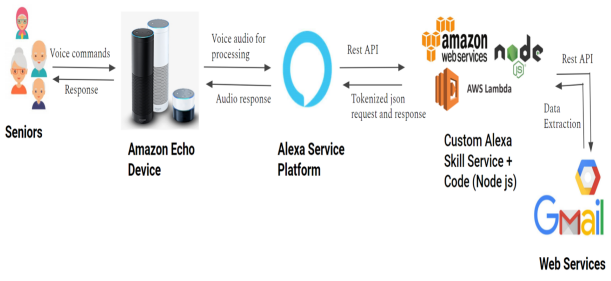

Fig 1. Lucy Skill Architecture [6]

The high level overview of how the Lucy Alexa skill works is simple:

1. The user talks to an Alexa supported device, and that speech is sent to the Alexa Service Platform.
2. Here, the speech signals are processed by using speech recognition and are mapped to JSON intents depending on phrases/utterances.
3. The Alexa Service Platform sends a JSON request via a REST API to the endpoint - AWS Lambda where our code for Lucy skill is present
4. Our Lucy skill, on receiving the JSON request, does some processing by mapping the called intents to the correct function.
5. These functions will then call the respective functions in the google apps script which fetch and return the emails from the GMail account.
6. After our Lucy Skill application is done processing, it will send a JSON response back to the Alexa Service Platform.
7. The Alexa Service Platform will translate the JSON response from text to speech, and send the speech signal to the Alexa supported device.
8. The Alexa supported device will play the audio back to the user.

III. Features

Lucy is a simple email reading skill, but it has features which work around emails.

- Pin Verification
  - Verifies PIN from the user before accessing the email for privacy protection. This feature can be disabled for easier use.
- Custom Replies
  - The skill contains certain in-built custom responses to emails for ease of the user.
- Filtering of emails
  - The skill can filter emails based on received date, subject, sender, or a combination of any of the above.
- Navigate between emails
  - The skill allows users to navigate through the emails.
- Count of emails
  - The skill gives a count of all emails received, and also the count of filtered emails.
- Starring emails
  - The skill allows the user to mark the emails as important and allows them to be filtered accordingly.
- Wait for user input

- The skill takes a ‘wait’ input from the user and gives additional time to the user to perform tasks.

- Checking for attachments
  - This skill also tells the user whether the email has an attachment or not.

IV. Technology

Lucy involves the use of Node.js, Alexa Skill Kit, AWS Lambda and Google Apps Scripts.

1. Node.js

   To build Alexa custom skill Lucy, we used JavaScript(JS) on Node.js. The entire code for Lucy is written in JS. The JS code hosted on AWS.

2. Alexa Skill Kit

   The Alexa Skills Kit (ASK), a software development framework, is what you use to create skills. , which is a model that describes how interactions between the user and Alexa occur. The Alexa Developer Console is a platform that allows developers to build, test, distribute and certify Alexa Skills. This is where the developers define the invocation name, different intents and utterances for each function.

   The invocation name is how you invoke and start the skill by saying a simple command like ‘Alexa, start <invocation name>’. In our case, we would say ‘Alexa, start Lucy skill’.

   Then, we have the custom intents, another core part in the interaction model. An intent represents an action that fulfills a user’s spoken request and can have slots associated with them. We implement each feature as an intent.

   Another essential aspect of the interaction model are slot types. There are two types of slots, built in and custom. For a full list of the built-in slot types, please see Reference [1]. Custom slot types are created when the built-in AMAZON slots are not sufficient in storing certain crucial arguments. For example, there is no slot type for custom replies, which justified creating a new custom slot type for these words.

   To complete the custom interaction model, an endpoint is necessary. Alexa sends JSON requests to this endpoint, and the endpoint should be where your code is. We chose AWS Lambda as our endpoint. The AWS Lambda function is an event driven, serverless computing platform, and is production ready. See Reference [4] for more information.

3. Google Apps Script

   Google Apps Script is a rapid application development platform that makes it fast and easy to create business applications that integrate with Google Workspace. You write code in modern JavaScript and have access to built-in libraries for favorite Google Workspace applications like Gmail, Calendar, Drive, and more.

V. Usage of Lucy

To start the skill, say a simple invocation phrase, such as the following listed below:

Starting Phrase	Example
<invocation name>	Alexa, Lucy Skill
Ask <invocation name>	Alexa, Ask Lucy Skill
Open <invocation name>	Alexa, Open Lucy Skill
Start <invocation name>	Alexa, Start Lucy Skill

To start and hear the available features and how to invoke them, you can say the following:

“Alexa open Lucy skill”

The following utterances are used for invoking Lucy alexa skill:

- **To count no of emails**

How many emails are there are from the last {dateFilter} with {subjectFilter} in the subject from {fromFilter}

- **To read emails**

Read my {readFilter} messages with the subject {subjectFilter} from {fromFilter} from the last

- **To mark email as starred**

Mark this email as important

- **To reply to email**

Reply to this email with message as {replymessage}

See References [5] for more utterances.

The video link for the working demo of alexa lucy skill is :

https://drive.google.com/file/d/1PGuLLyUvrA3-0xM4I3X39sEkiULzbMM1/view

VI. Conclusion

Loneliness in seniors is a major risk factor for depression. This loneliness can negatively affect both physical and mental health. Creating a personalized, private platform where seniors facing loneliness can feel connected to people and loved was the purpose of this project. If this skill helps at least one senior, then the goal of this project would be met.

This Alexa skill cannot completely replace the interaction of seniors with their visitors, but it can be of great help when it is not possible to have in-person visits.

Acknowledgment

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