Third Eye

Final Presentation

Alexander Devano Aryasena 72275050
Diona Angelica Manurung 72275730

Project Overview

Application assistant for blind and visually-impaired people

Combining Near-field communication (NFC) technology, Speech Recognition (Text-to-Speech and Speech-to-Text), and Chatbot (Chat GPT API)

What value do we provide to the target audience?

Visually impaired individuals gain the ability to independently access and understand detailed information about products

Enhancing their autonomy in daily activities like shopping and using household items

Inclusive Technology and User-Friendly Design

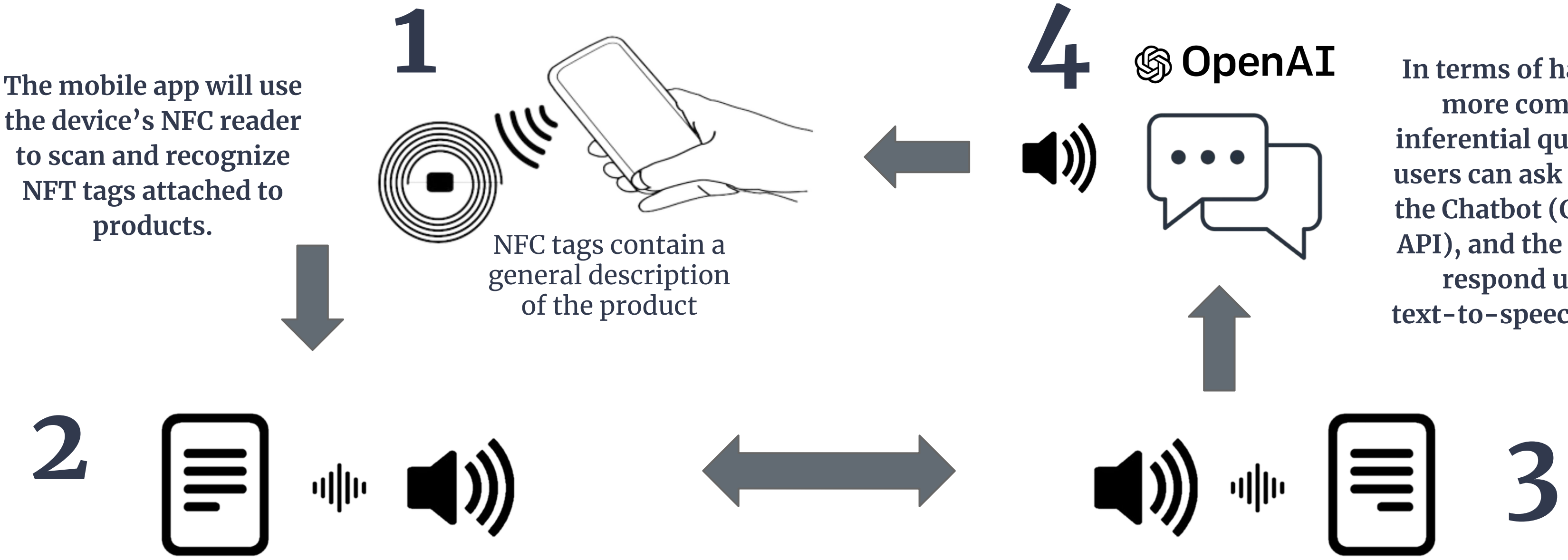
Comparing Progress: Problems Addressed

1. **What if there are multiple things in the same display area?**
2. **What if they want to ask for things that cannot be scrapped from the tag?**

1. In cases where multiple items are displayed in the same area, it is likely that only one item will have a price tag. Given that similar items are often grouped together, personal judgment can typically be used to distinguish between them, even for individuals who are visually impaired.

2. We added ChatGPT for prompt comparison between things

Interaction Flow



The mobile app will use the device’s NFC reader to scan and recognize NFT tags attached to products.

NFC tags contain a general description of the product

The app will include an open-source TTS engine to convert the retrieved text data into audible speech for the user.

Users can ask further informational questions by voice command to get more detailed information (Speech-to-text through personal device)

In terms of handling more complex inferential questions, users can ask through the Chatbot (ChatGPT API), and the app will respond using text-to-speech (TTS).

Software Communications

Client

User Interaction: Users interact with the HTML interface by clicking buttons or entering text

JavaScript Functions: These functions respond to user interactions. For example, *scanNfcTag()* initiates when a user clicks the "Scan NFC Tag" button.

API Requests: The client sends requests to the server via API endpoints:

- */api/nfc-scan* for scanning NFC tags,
- */api/query* for querying specific information
- *api/ask* for interacting with a chatbot.

Server

NFC Data Handling: The */api/nfc-scan* endpoint receives NFC data, logs it, and sends back a confirmation message.

Query Handling: The */api/query* endpoint processes queries based on the NFC data, like extracting and sending information about the object's attributes

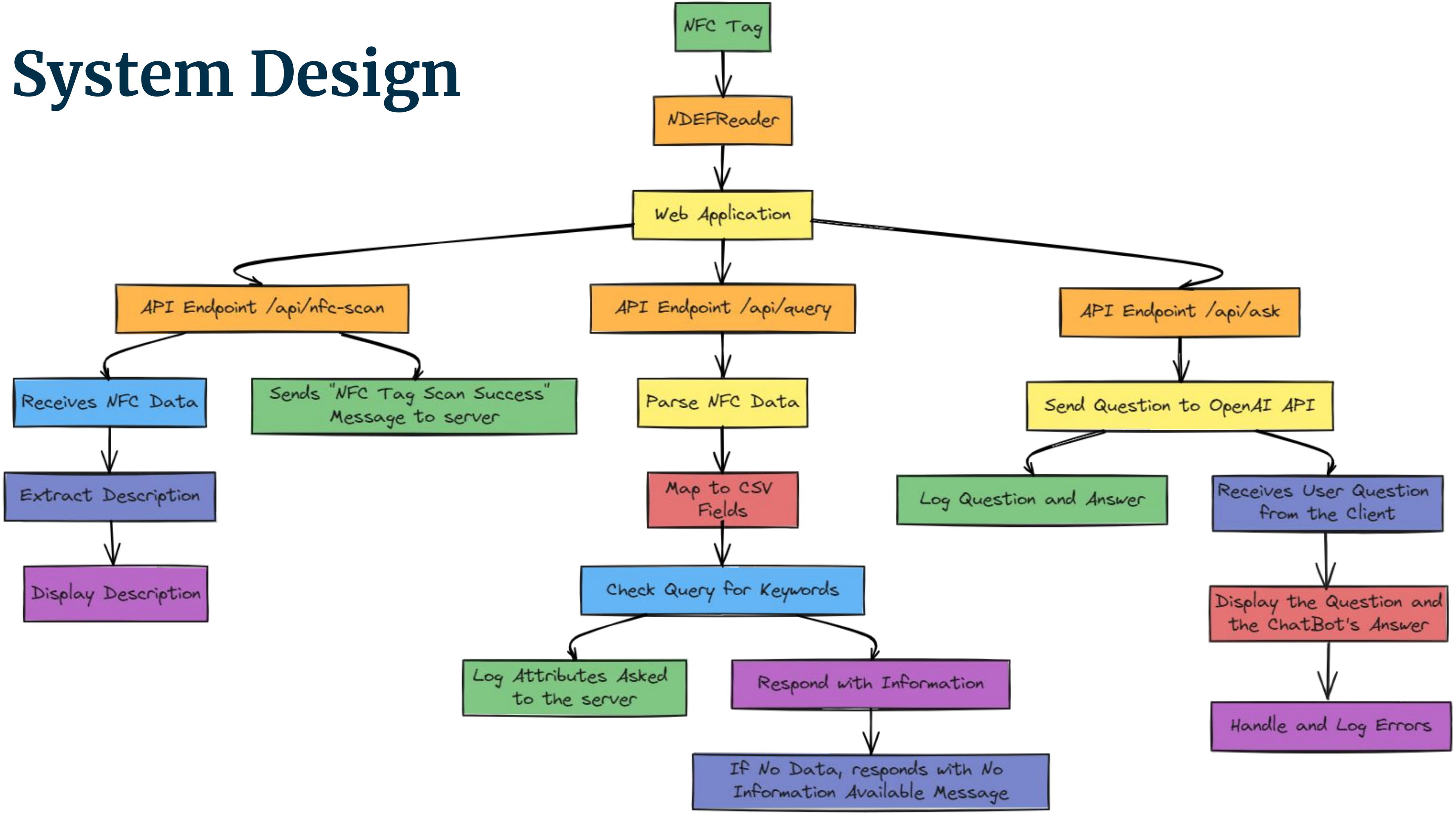
Chatbot Interaction: The */api/ask* endpoint sends user questions to the OpenAI API and returns the responses.

API

Chatbot Queries: The server sends user questions to the OpenAI API via the /api/ask route and receives answers.

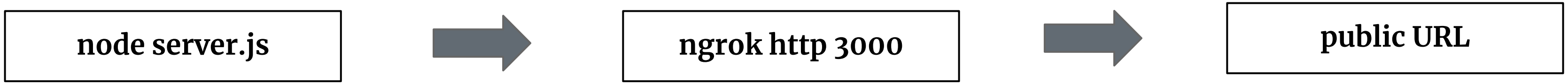
Response Handling: The server processes the responses from OpenAI and sends them back to the client to be displayed.

System Design

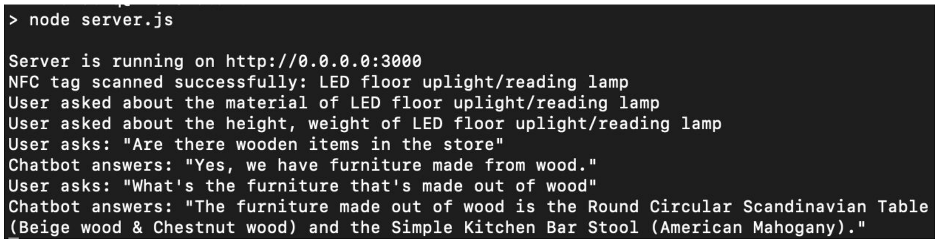

NFC Tag
NDEFReader
Web Application
API Endpoint /api/nfc-scan
API Endpoint /api/query
API Endpoint /api/ask
Receives NFC Data
Sends "NFC Tag Scan Success" Message to server
Parse NFC Data
Send Question to OpenAI API
Extract Description
Map to CSV Fields
Log Question and Answer
Receives User Question from the Client
Display Description
Check Query for Keywords
Display the Question and the ChatBot's Answer
Log Attributes Asked to the server
Respond with Information
Handle and Log Errors
If No Data, responds with No Information Available Message

Server: ngrok

Ngrok is a tool that provides a secure way to expose a local server to the internet by creating secure tunnels. Ngrok is used to expose your locally running Node.js server to the internet, allowing external users and services to interact with it through a secure and publicly accessible URL

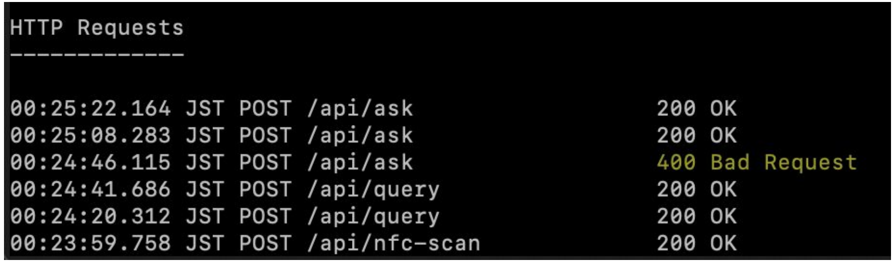


node server.js → ngrok http 3000 → public URL



```
> node server.js

Server is running on http://0.0.0.0:3000
NFC tag scanned successfully: LED floor uplight/reading lamp
User asked about the material of LED floor uplight/reading lamp
User asked about the height, weight of LED floor uplight/reading lamp
User asks: "Are there wooden items in the store"
Chatbot answers: "Yes, we have furniture made from wood."
User asks: "What's the furniture that's made out of wood"
Chatbot answers: "The furniture made out of wood is the Round Circular Scandinavian Table
(Beige wood & Chestnut wood) and the Simple Kitchen Bar Stool (American Mahogany)."
```



```
HTTP Requests
-------------


00:25:22.164 JST POST /api/ask                    200 OK
00:25:08.283 JST POST /api/ask                    200 OK
00:24:46.115 JST POST /api/ask                    400 Bad Request
00:24:41.686 JST POST /api/query                  200 OK
00:24:20.312 JST POST /api/query                  200 OK
00:23:59.758 JST POST /api/nfc-scan               200 OK
```

Open AI API Fine-Tuning (Chat-GPT)

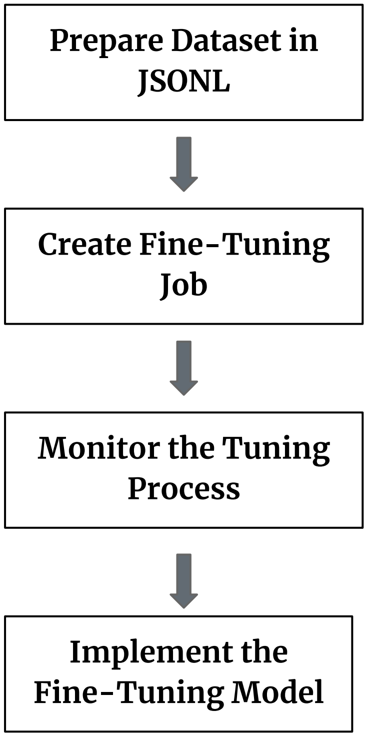
Fine-tuning helps tailoring a pre-trained model like ChatGPT to better suit specific needs or preferences by training it further on a custom dataset.

Enhanced Accuracy in Responses
improve the relevance and accuracy of the model's responses to user queries

Customized User Interaction
align the chatbot interaction style and tone with your target audience

Efficient Response to Specific Queries
able to handle niche or inferential questions, especially related to the products, with greater precision and efficiency

Fine-Tuning Process



Prepare Dataset in JSONL

```
{"messages": [{"role": "system", "content": "You are a product information assistant limited to six specific items in the store.
"}, {"role": "user", "content": "Can I have a list of products that are below 20000 yen?"}, {"role": "assistant", "content":
"Yes, we have an LED floor uplight/reading lamp, which is priced at 6400 yen, and the Round Circular Scandinavian
Table for 4 People, which is priced at 15000 yen."}]}
```

Create Fine-Tuning Job

```
Fine-tuning job created:  {'object': 'fine_tuning.job', 'id': ftjob-BM6zjCYRm19o43D8oSuEkZtO, 'model': 'gpt-3.5-turbo-0125',
'created_at': 1721915813, 'finished_at': None, 'fine_tuned_model': None, 'organization_id': 'org-ST3FEAbO9uhhoTR2raiva8KQ',
'result_files': [], 'status': 'validating_files', 'validation_file': None, 'training_file': 'file-eubA6IJd9rSjEfuyXQxZrowe',
'hyperparameters': {'n_epochs': 'auto', 'batch_size': 'auto', 'learning_rate_multiplier': 'auto'}, 'trained_tokens': None, 'error': {},
'user_provided_suffix': None, 'seed': 40411992, 'estimated_finish': None, 'integrations': []}
```

Monitor the Tuning Process

```
Fine-tuning job status: succeeded
Fine-tuning job completed successfully
Fine-tuned model ID: ft:gpt-3.5-turbo-0125:keio-university-sfc-nakazawa-and-okoshi-lab::9on9ljoY
```

Implement the Fine-Tuning Model

```
const chatCompletion = await openai.chat.completions.create(
{ model: "ft:gpt-3.5-turbo-0125:keio-university-sfc-nakazawa-and-okoshi-lab::9on9ljoY", messages: [ {"role": "system", "content": "You
are a product information assistant limited to six specific items in the store.."}, { role: "user", content: question }] });
const answer = chatCompletion.choices[0].message.content;
console.log(`User asks: "${question}"`);
console.log(`Chatbot answers: "${answer}"`);
res.status(200).send({ answer });
```

Project Requirement

Some sensing / recognizing technologies on the client side ✓

Some communication between multiple software components (e.g., between the clients and the server) ✓

Use of ChatGPT via ChatGPT API ✓

Future Goals and Aspirations: For an Ubiquitous Digital Experience

Explore
iPhone 11
From £19.49/mo. with eligible trade-in.*
Talk to a Specialist for a trade-in estimate on your current device.
What would you like to do?
Compare all models
See models and pricing
Explore
iPhone 11 Pro
From £29.99/mo. with eligible trade-in.*
Talk to a Specialist for a trade-in estimate on your current device.
What would you like to do?
Compare all models
See models and pricing
Explore
iPhone 11 Pro Max
From £34.99/mo. with eligible trade-in.*
Talk to a Specialist for a trade-in estimate on your current device.
What would you like to do?
Compare all models
See models and pricing
iPhone 11
iPhone 11 Pro
iPhone 11 Pro Max

Future Goals and Aspirations: For an Ubiquitous Digital Experience

DEMONSTRATION