Cooking Assistant

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PROBLEM & INSPIRATION

Cooking, for most of us, is hard enough without the added complication of trying to learn a new recipe at the same time. Between the unease of knowing what steps to take or how long to cook the new dish, the lack of focus due to attention being split between cooking and reading adds more complexity than there already is in the kitchen.

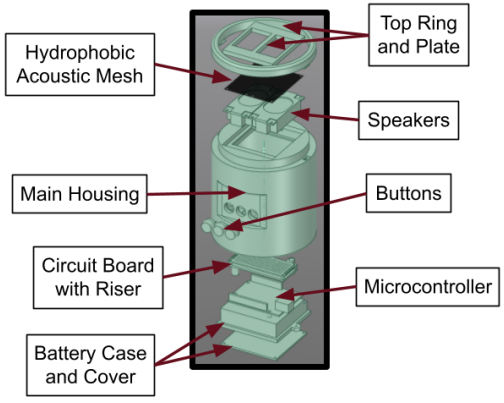
In addition, there are many family recipes handed down throughout the years which are worn out, with the paper they are written on crumbling apart. Without a digital format with which to store these recipes, they will eventually be a lost part of history.

PROPOSED SOLUTION

For our group's solution, there were two main goals, which were (1) an eyes-free solution to utilizing recipes and (2) the ability to add custom recipes to the device. Our team decided to solve (1) by utilizing a text-to-speech functionality which would read the recipe aloud to the user, while (2) was solved by creating a smartphone application with custom recipe support which would interface with the device via Bluetooth.

Some additional goals for the device were to provide a rechargeable battery backup, on-device storage of the custom recipes added to the app, waterproofing to keep the device safe in case of spills, and speech recognition to keep the experience hands-free.

EXPLODED SCHEMATIC



DEVICE DESIGN

Device Casing

The device casing was 3D printed out of PETG, which is also known as polyethylene terephthalate glycol. This was done to provide the device with better water, heat, and impact resistance. Holes with space for NBR o-rings were cut into the case to provide access for the microphone, power cable, and buttons, while the two speakers holes were covered using a hydrophobic acoustic mesh.

Text-to-Speech Conversion

Initiated in a virtual environment software, the TTS conversion would establish a connection between the phone application and the Arduino. Once the application orders the Arduino to initiate a recipe, the Arduino would send the text from the recipe to the TTS converter, converting it to a sound file to be played through the speakers.

Speakers

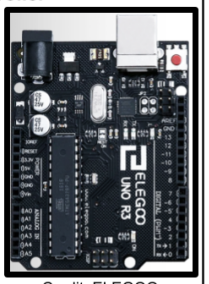
The two speakers on top of the device are used to output the converted audio files to the user.

Bluetooth Module

The devices uses the HC-05 Bluetooth Transciever to communicate between the device and application. The recipe data is then sanitized and parsed once received by the device to prepare it for conversion using the Text-to-Speech code.

Microcontroller

The Elegoo Uno R3, a third party version of the Arduino Uno R3, was used as the microcontroller for this project. Compatible with all Arduino software, it allows for flexibility via a large number of libraries while also being RoHS compliant so our device can be environmentally friendly.

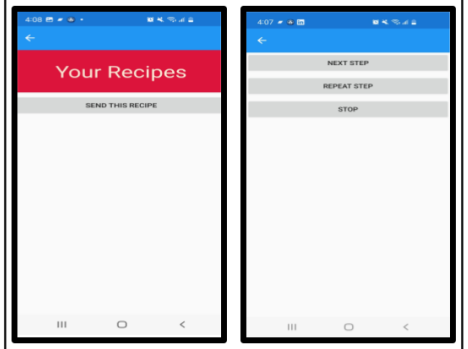


Credit: ELEGOO

Power Supply

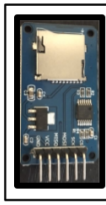
Power to the system is delivered via a 9V power adapter wired to the microcontroller's external voltage pins. In addition, four rechargeable NiZc batteries are included, but not currently connected, to serve as reserve power for the device.

Android Application



The application created to control the device was made using the Xamarin Forms UI framework. It works by creating recipe data to send to the device. It also includes a simple menu which can be used to control the device via Bluetooth.

SD Card



The Micro SD card module connects to the microcontroller to provide additional storage space for the device. This is used to store recipe data or the converted sound files and takes any standard Micro SD card.

FUTURE DIRECTION

- Add Arduino code to store the recipe database device-side using the SD card and tweak existing code to better sanitize incoming recipe data.
- Adjust the size and measurements of the casing in order to better fit the internal parts.
- Improve the waterproofing of the case by securing the hydrophobic mesh and adding gaskets.
- Finish the charging circuit with new 9V batteries to match the power supply.
- Create versions of the application for iOS, Windows, and Macintosh.
- Implement speech recognition so the device can be used without the application.

ACKNOWLEDGEMENTS

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CONTACT INFORMATION

Feel free to contact our group via our school emails at jacob.kelly@mnsu.edu, matthew.romleski@mnsu.edu, or mohamed.siddik@mnsu.edu for any questions, input, or other information.