Voice Vault

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Product Pitch

Voice Vault is a customizable, privacy-oriented home assistant made for tech savvy users who want full control over their data and complete privacy. Critical requirements include:

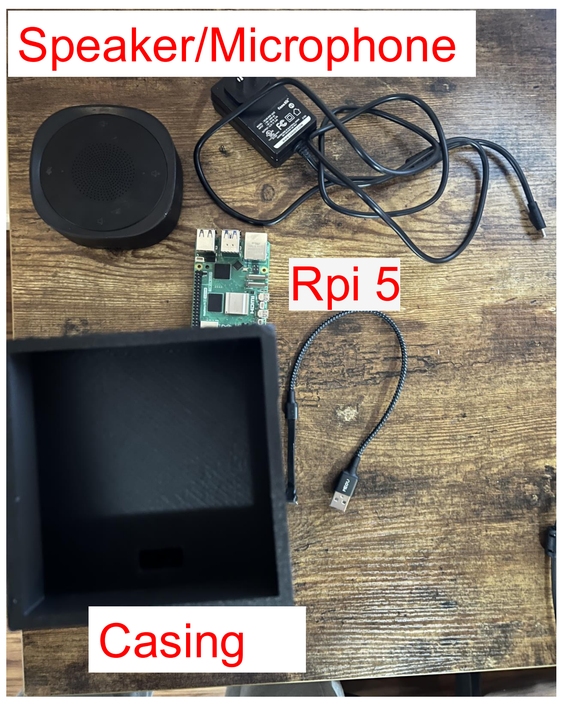
- Chat with device, play music, and set an alarm
- Choosing your own wake word
- End to end responses under 5 seconds
- Complete data privacy: communication encrypted with TLS, media stored on device, no data shared with third parties
- Setup takes less than an hour
- Should have at least 95% accuracy in quiet environments

Testing showed we accomplished all these requirements.

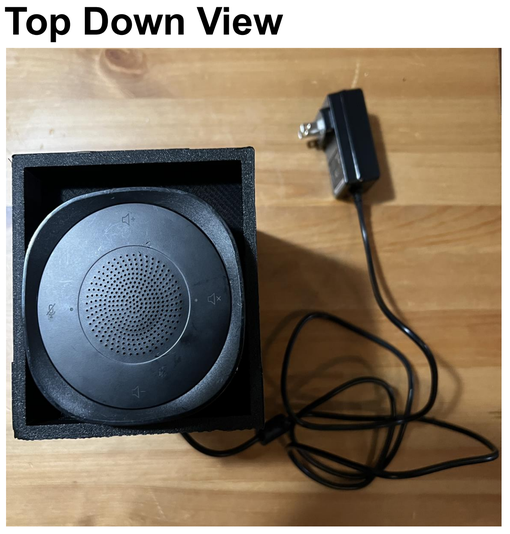
System Description

Software Components:
Voice processor with speech to text – processes wake words and key words and sends to flask server; uses microphone hw
Flask server – server that data gets sent to which is then run through Ollama model; uses vm
Text to speech handler – receives data from server and outputs through speaker; uses speaker hw
Timer/Music - module to handle timer/music
Voice vault website (for downloads) - website that gives info on how product works along with downloads
Raspberry pi config website – allows user to modify the configurations like wake word

Disassembled view

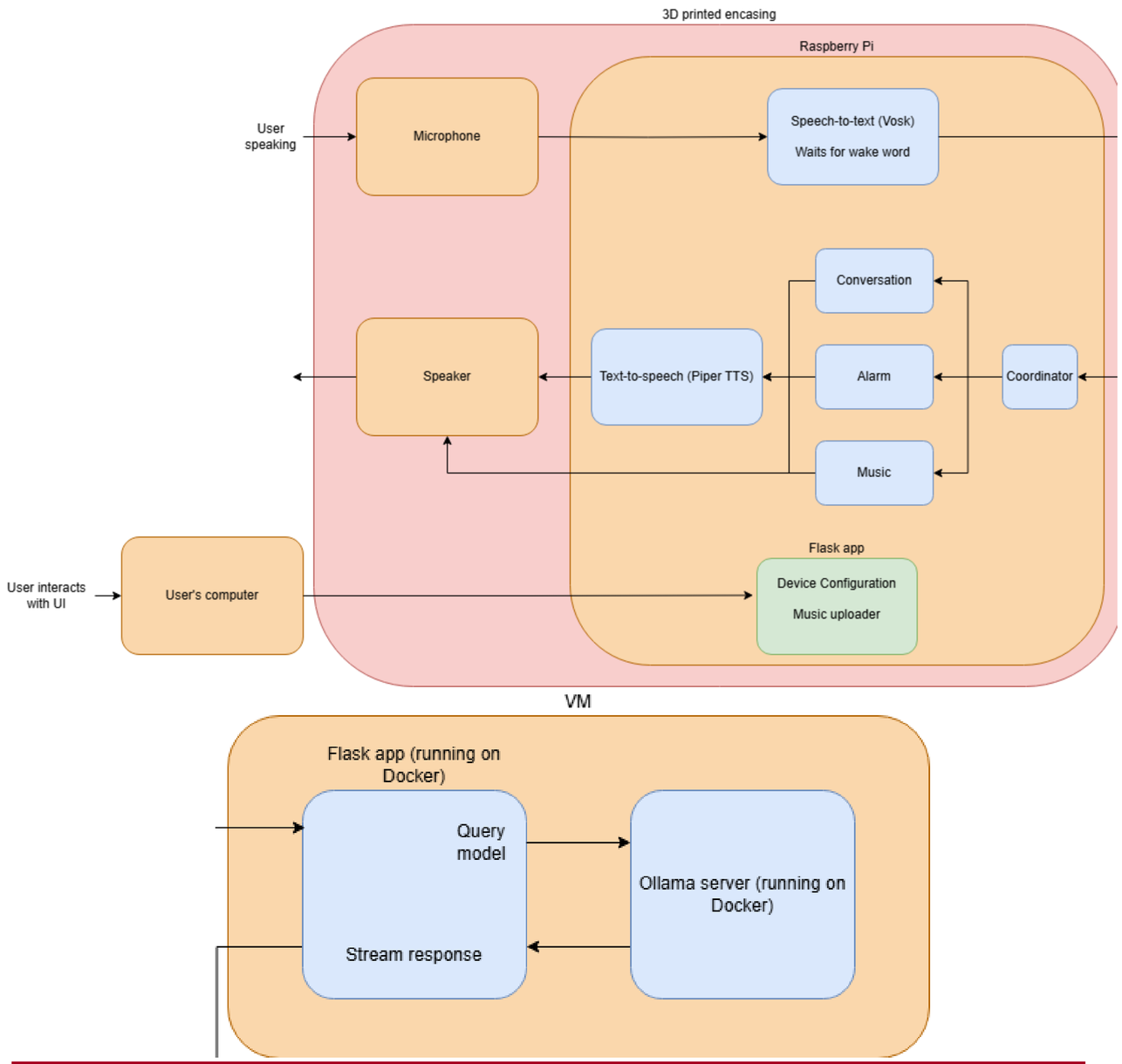


Top Down View



System Architecture

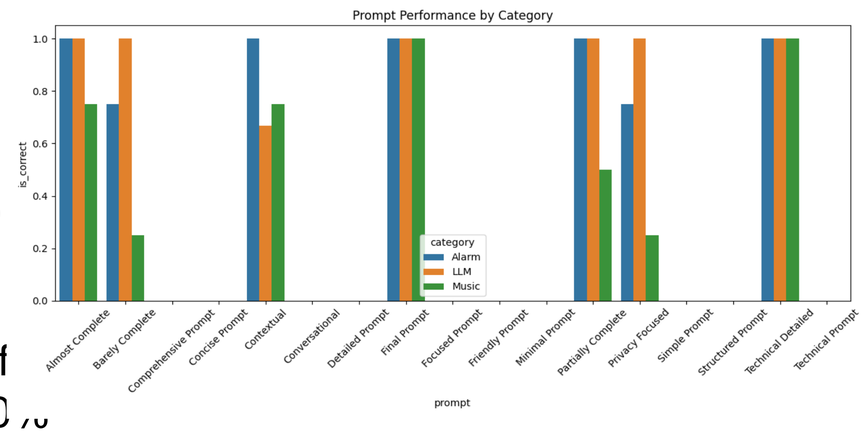
Raspberry Pi captures voice input, sends it as text to a Flask app on a VM, which forwards it to an Ollama server; the response is streamed back, routed (as conversation, alarm, or music), and played to the user with text-to-speech.



System Evaluation

- Took all 10 users under an hour to fully setup. We also validated our product and features
- All data usage information is in terms of service
- Model has 100% accuracy
- Alarm went off within 1 second of specified time 100% of time

System Prompt Testing Performance



Use-Case Requirements:

Metric	Target	Actual
Assistant Query	Variable Wake Word	User able to change Wake Word <1s latency
Response Time	≥ 5 seconds	* Varied, typicaly less than 5s
Timer/Music	Can Set Timer/Upload/Play Music	User can upoad multiple songs. Play/Pause/Stop. Set Timer

Conclusions & Additional Information

- We learned how to plan out, execute, and integrate a product with multiple different independent subsystems
- Gained knowledge of how to navigate team dynamics, while balancing stakeholder needs and pushing through, even amid disagreement
- Overall, we were able to design/create a usable system that met out intial goals

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