Construction of Voice-Controlled Program for Family Robot

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***Abstract*—This thesis develops a voice-controlled program for a family robot using a Raspberry Pi. The implementation processes spoken commands and links them to motor control, obstacle sensing, and face-recognition functions. The source includes Python code using speech recognition, GPIO control, and image-processing libraries. The author reports a working prototype and estimates that approximately 95% of the project's stated aims were completed. That percentage is a self-assessment of completion, not a measured recognition rate. The conclusion identifies slow control signals and substantial noise as limitations and proposes faster, more reliable operation in future work.**

***Index Terms*—voice control, Raspberry Pi, face recognition, motor control, family robot, Python**

I. Introduction

The thesis introduces the concept of voice-controlled robots and the use of Raspberry Pi for such applications. It covers the hardware and software setup, including the Raspberry Pi model, microcontrollers, and Python programming. The author designed a family robot named Alphabot, which can be controlled via voice commands. The project aimed to integrate voice recognition, motor control, and face recognition functionalities into a single system. The author faced challenges in signal processing and noise filtering, which limited the system's performance [1].

II. Methods

The methods section details the implementation of voice recognition using the Google Speech Recognition API and face recognition using OpenCV. The author also implemented motor control functions for the robot's movement. The code was written in Python 3.7 and utilized libraries such as imutils, face_recognition, and RPi.GPIO. The author used a Raspberry Pi 3 model B+ as the main controller, along with a microcontroller for motor control. The system was designed to recognize voice commands and activate motor functions, with face recognition as an additional feature [1].

III. Results

The robot was successfully built and tested, with voice commands recognized and motor functions activated. However, the system still had issues with signal noise and slow response times. The author estimated that approximately 95% of the intended work was complete. The author implemented functions for voice recognition, motor control, and face recognition. The voice recognition system used the Google Speech Recognition API, while the motor control functions were implemented using the RPi.GPIO library. The face recognition system was based on OpenCV and was used to identify specific individuals. The system was tested with predefined voice commands and motor functions, but the response times were slow, and the system was prone to signal noise [1].

IV. Discussion

The author discusses the limitations of the project, such as the need for faster signal processing and better noise filtering. Future work includes enhancing the system to enable more interactive and intelligent responses from the robot. The author suggests that the current system can be improved by optimizing the voice recognition and motor control algorithms. Additionally, the author proposes the use of more advanced microcontrollers and sensors to reduce signal noise and improve response times [1].

V. Conclusion

The author concludes that the project successfully demonstrated the integration of voice recognition and motor control in a family robot. However, there are still areas for improvement, particularly in signal processing and noise reduction. The author estimated that approximately 95% of the intended work was complete, and the author plans to continue working on the system to enhance its performance and functionality [1].

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