Face Recognition on Hexapod with a Low-Cost Raspberry Pi

Shakil Akhtar
CS/IT Department, Clayton State University, Morrow, GA 30260, USA

Md Sazidul Islam
CS/IT Department, Clayton State University, Morrow, GA 30260, USA

Mudasser Wyne
Department of Engineering, Data and Computer Science, National University, San Diego, CA 92123

Abstract

The design and implementation of a real-time face recognition and control interface for a Hexapod robot using a PyQt5-based GUI is presented. Leveraging DeepFace with FaceNet model for robust facial recognition and a Raspberry Pi-based video stream, the system enables seamless interaction between users and the Hexapod robot. Different commands are sent from a controller PC with a user interface to the Hexapod for a controlled movement, status monitoring, and user recognition. In addition, other sensors on the robot are controlled by the interface as well. The system implements a modular architecture with separate client-server components, ensuring scalability and maintainability. The client-side GUI provides intuitive controls for robot movement, sensor monitoring, and face recognition operations, while the server-side handles hardware interfacing and command execution on the Raspberry Pi. The system achieves 93.02% accuracy in face recognition with an average response time of 380-420ms. Experimental results confirm the effectiveness of the system in accurately identifying known individuals and maintaining responsive control with comprehensive error handling and multi-threaded processing.

Keywords

DeepFace, FaceNet, Face Recognition, Hexapod, Raspberry Pi, Robotics.