Motion Detection with Raspberry Pi and Firebase

Introduction:
This report presents a simple motion detection system implemented on a Raspberry Pi using a PIR (Passive Infrared) sensor. The system utilizes Python code to collect data from the PIR sensor and then pushes this data to a Firebase real-time database. Additionally, it incorporates a piezo buzzer for audible feedback when motion is detected.

Hardware Setup:
1. Raspberry Pi: A Raspberry Pi single-board computer, running Raspbian OS.
2. PIR Sensor: A Passive Infrared sensor used to detect motion.
3. Piezo Buzzer: A simple buzzer for generating sound feedback.
4. Connecting Wires: Used to establish electrical connections between components.

Software Setup:
The code leverages Python and two key libraries: `gpiozero` for interacting with the PIR sensor and controlling the piezo buzzer, and `pyrebase` for Firebase integration.

Motion Detection Loop:
- Continuously monitor the PIR sensor for motion.
- When motion is detected (`current_state == 1`), the code:
  - Prints a message indicating motion detection.
  - Activates the piezo buzzer for 1 second to provide audible feedback.
  - Pushes a data entry to Firebase indicating "detected."
- When no motion is detected (`current_state == 0`), the code:
  - Prints a message indicating no motion.
  - Pushes a data entry to Firebase indicating "not detected."

Data Collection:
The code collects motion detection data and stores it in a Firebase Realtime Database. The data structure consists of timestamped entries, with each entry having a "status" field indicating whether motion was detected or not.

Conclusion:
This project demonstrates a simple yet effective motion detection system using a Raspberry Pi, a PIR sensor, and a piezo buzzer. The collected data is sent to a Firebase Realtime Database, enabling remote monitoring and data analysis. This system can be extended and customized for various applications, such as home security, automation, or occupancy detection in smart buildings.