Video capturing using Raspberry Pi and storing it in cloud

MINI PROJECT REPORT

SUBMITTED BY

Sanjith V   **1MS23SCS22**

As part of the Course
Real time Application Development using Python Programming Laboratory MCSL18

SUPERVISED BY
Faculty

Dr.Parkavi.A

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M S RAMAIAH INSTITUTE OF TECHNOLOGY

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Department of Computer Science and Engineering
M S Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)
Bangalore – 54

CERTIFICATE

This is to certify that **Sanjith V (1MS23SCS22)** have completed the **"Video capturing using Raspberry Pi and storing it in cloud"** as part of **Real time Application Development using Python Programming Laboratory** course. I declare that the entire content embodied in this M.Tech CSE semester report contents are not copied.

Submitted by   Guided by

Sanjith V – 1MS23SCS22   Dr.Parkavi.A

                                                              (Dept of CSE, RIT)

Evaluation Sheet

USN	Name	Literature study & Implementation (10)	Documentation & Plagiarism checkup (10)	Total Marks (20)
1MS23SCS22	Sanjith V			

Evaluated By

Name: Dr. Parkavi.A
Designation: Associate Professor
Department: Computer Science & Engineering, RIT
Signature:

Table of Contents

Problem Definition

Develop a system for video surveillance using raspberry pi circuit and through raspberry pi camera and periodically uploading it in cloud. The cloud storage used for storing is Google firebase which provides real-time storage facility that can be connected through its pyrebase api with proper credentials.

Literature Study

This paper portrays the surveillance system which comprises a Raspberry Pi 4 circuit board and Pi camera to monitor as well as stream the feed live in real-time.

The components used to create in the paper were Raspberry Pi 4 which is a fast and versatile device that provides results quickly and precisely. The Raspberry OS and code were stored on a 16GB memory card. The 8MP raspberry camera was used, for providing the users with a very clear image. The paper was for developing home surveillance security system. It features the motion detection capability to detect any suspicious activity inside a room. The OpenCV library was applied for motion detection since it facilitates quick and simple motion detection. SMTP mailing service setup was implemented to send suspicious activities which had registered both the sender and recipient email addresses. The users had feature to stream and watch live feed to assess the situation at the house using the Raspberry Pi's IP address.

The proposed system focused on home surveillance. It presents a real time video surveillance system wherein live streams and records of the video footage are provided to the concerned user whenever an unexpected motion is detected in the house. The implementation of so is done using OpenCV for coding, Raspberry Pi 4, and Raspberry Pi camera for motion detection. The operating system used for this

project is Raspberry Pi OS. It sends an alert along with the image the camera captured when motion was detected.

With the development of technologies in every area of life today, the risks to safety and security have also risen. Security and monitoring are now essential components of society to ensure that people are safe. And as a result of this need, video surveillance cameras are being installed everywhere. Video surveillance is now the go-to method for keeping an eye on and controlling everything. The act of viewing a scene or scenes and looking for specific behaviors that are wrong or that may signal the emergence or existence of improper behavior is known as video surveillance. From observing the public at the entrance of sporting events, to checking the public transportation (train platforms, airports, etc.), and around the perimeter of secure institutions, particularly those that are directly delimited by communal spaces, are all common uses of video surveillance. The identification of regions of concern and the identification of individual cameras or groups of cameras that may be able to observe those areas are all part of the video surveillance process. A few years ago, the security cameras were checked and watched over manually each day. However, with the advancement of technology, systems are now designed so that no humans are needed to sit still for long periods of time in order to check security cameras. Video surveillance has become the most reliable way to keep an eye on people and events happening in specific places since the invention of video cameras and recorders. Thanks to the internet and wireless connections, surveillance can now be viewed from anywhere in the world. The crime rate has dramatically increased in recent years. Numerous incidents, including theft, break-ins, and unwanted intrusions, take place without warning. This calls for the installation of a security system that can guard against unauthorized entry into both a person's home and high-security locations like casinos, garages, military bases, and locker rooms at banks. Creating smart homes is one approach to securing our homes. The primary driver of such homes' corporate-based automation is surveillance.

Implementation

The System aims to record the video of the setup scenery and storing it in cloud. The system records video clips using pi camera of raspberry pi, through raspberry pi circuit board. It makes use of Google firebase cloud storage service for storing recordings. Programming of this task is done through python programming language and google firebase api.

First raspberry pi operating system, a port of debian bookworm, linux based OS is installed on 32 GB SD card. Later all the software and firmware are updated to make sure all the latest features are supported and for security and performance. 8 MP Raspberry pi camera is connected through cable to raspberry board for interfacing/connection and this connection details are updated in raspberry pi configuration file. Connected pi camera is tested prior to make sure it is working properly and able to capture images and videos.

Google firebase account is created and real time storage is setup for storage purpose. The credentials, project details, storage details of this creation are used for setting up cloud storage for storing videos recorded. pyrebase python module is installed using pip (python package manger), which is a python module that provides api features for the firebase connection. It is imported and configured with necessary details and storage setup is done. Python program is written to start recording and store it in cloud with the time of creation as the name of the file stored.

Code:

```
import pyrebase
from picamera import PiCamera
from datetime import datetime
```

```python
from time import sleep

firebaseConfig = {
  "apiKey": "AIzaSyAHz3uxdA16oFtBFsxau0hHFkoD2XRr2VA",
  "authDomain": "python-raspberry-pi-proj-2b608.firebaseapp.com",
  "databaseURL": "https://python-raspberry-pi-proj-2b608-default-rtdb.asia-
southeast1.firebasedatabase.app",
  "projectId": "python-raspberry-pi-proj-2b608",
  "storageBucket": "python-raspberry-pi-proj-2b608.appspot.com",
  "messagingSenderId": "312393792580",
  "appId": "1:312393792580:web:291111ef703f5fa3e85011",
  "measurementId": "G-E0D5BCEVQE"
}

firebase = pyrebase.initialize_app(firebaseConfig)
storage = firebase.storage()

camera = PiCamera()

now = datetime.now()
timestamp = now.strftime("%d-%m-%Y %H:%M:%S")
name = timestamp
file = name + ".h264"

try:
    print("Recording started..")
    camera.annotate_text = timestamp
```

```python
    camera.start_recording(f'/home/rasp/pythonproject/{file}')

    sleep(10)

    camera.stop_recording()

    print("Record ended..")


    print("Video with filename " + "\"" + file + "\"" + " has been saved..")


    print("File is being uploaded to cloud.. Please wait..")

    storage.child(f'{file}').put(f'{file}')

    print("File uploaded to cloud successfully..")


    #os.remove(file)

    #print("File removed from local storage..")


    sleep(2)


    camera.close()


except Exception as err:

    print(err)

    camera.close()

    exit()
```
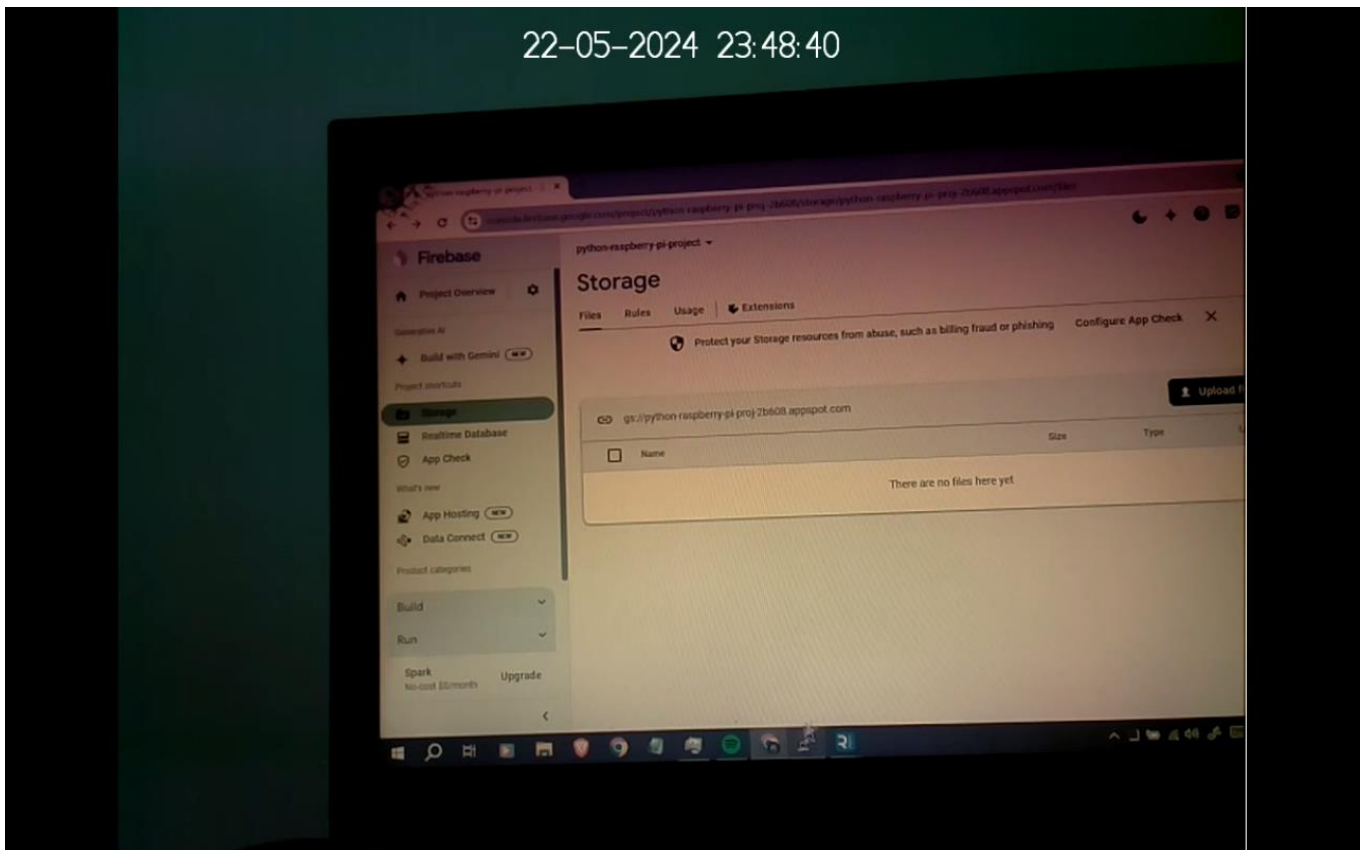
Results

This screenshot is from the raspberry pi os terminal, showing the execution of program to record and store the recorded video in cloud.
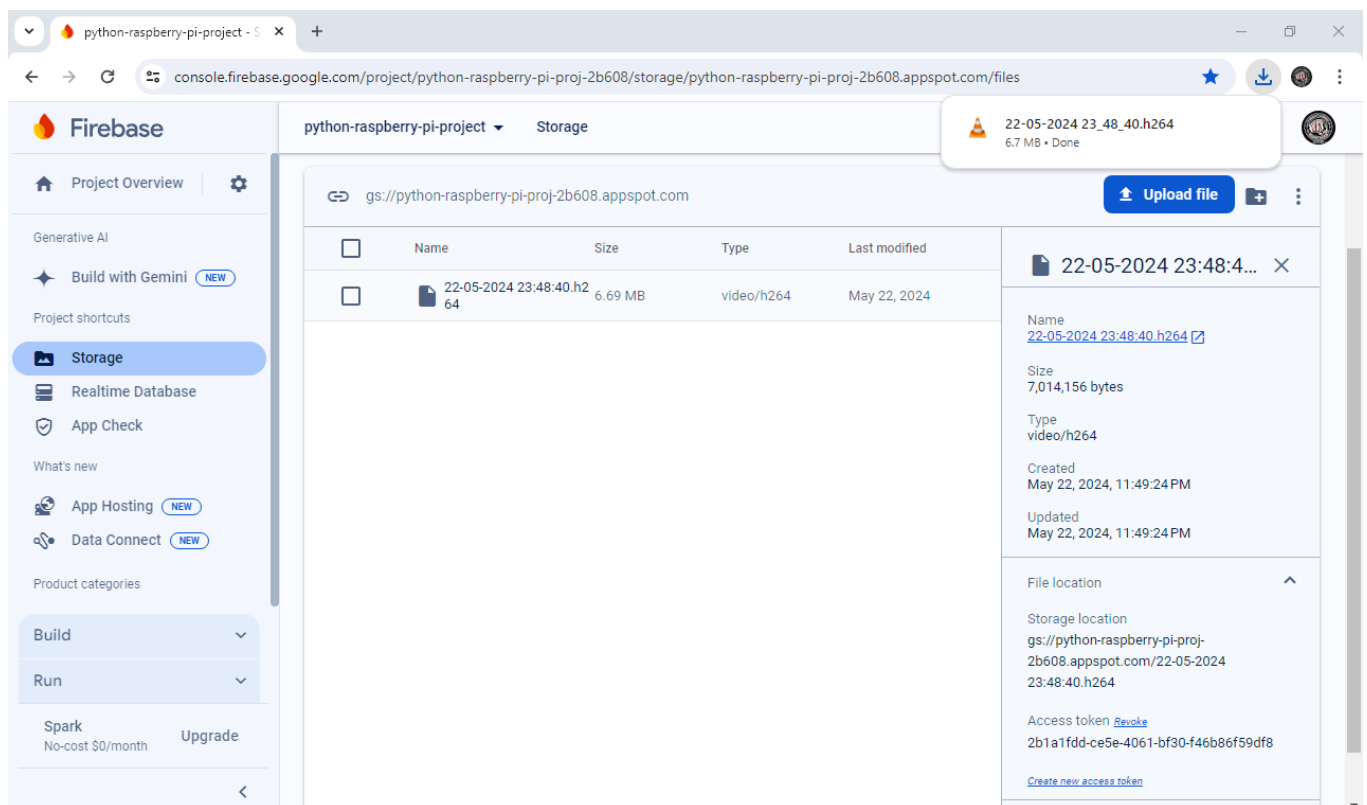
This is the google firebase storage web page, showing the recorded file from raspberry pi.

This is a snapshot of the recorded video file accessed from firebase cloud.

This is the screenshot showing the creation of the recorder file on the local raspberry pi system storage.

Conclusion

This project is real time application of raspberry pi, which is a cheap computer that runs on linux. The Raspberry Pi Zero 2 was used for this project. It is a fast and versatile device. We get results quickly and precisely. The Raspberry OS and code were stored on a 32 GB memory card. The raspberry camera has an 8MP resolution, which provides the user with a very clear image. Python programming language was used to program thhe system. Google firebase cloud account was created for storage purpose. Using firebase api and python "pyrebase" module, configuration and setup for storage facility through the created account's credentials was made. Program can be run to capture video and store in cloud. This project is for home surveillance security systems.

References

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