

Monitoring System on Neighborhood Based on AWS

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Introduction

Motivation:

- Trespassing, break-ins and stealing are serious problems for residents.

Traditional Solution:

CCTV (closed circuit television)

- need the owner to actively log into the system to check the videos.
- Time delay. Can only get the information after the crime has already happened.

Our Solution :

Automation based on cloud computing and edge computing.

- Very fast response. (Edge Computing + Cloud Service)
- Highly intelligent and more information. (Cloud Computing)
- Keep history records as much as possible. (Cloud Storage)

Introduction

- Our work is uploaded to github:

- <https://github.com/xs2445/HouseSecuritySystemAWS-6770-project>

- If you want to learn more about the project, welcome to visit our website:

- <http://monitor6770.click/>

System Structure

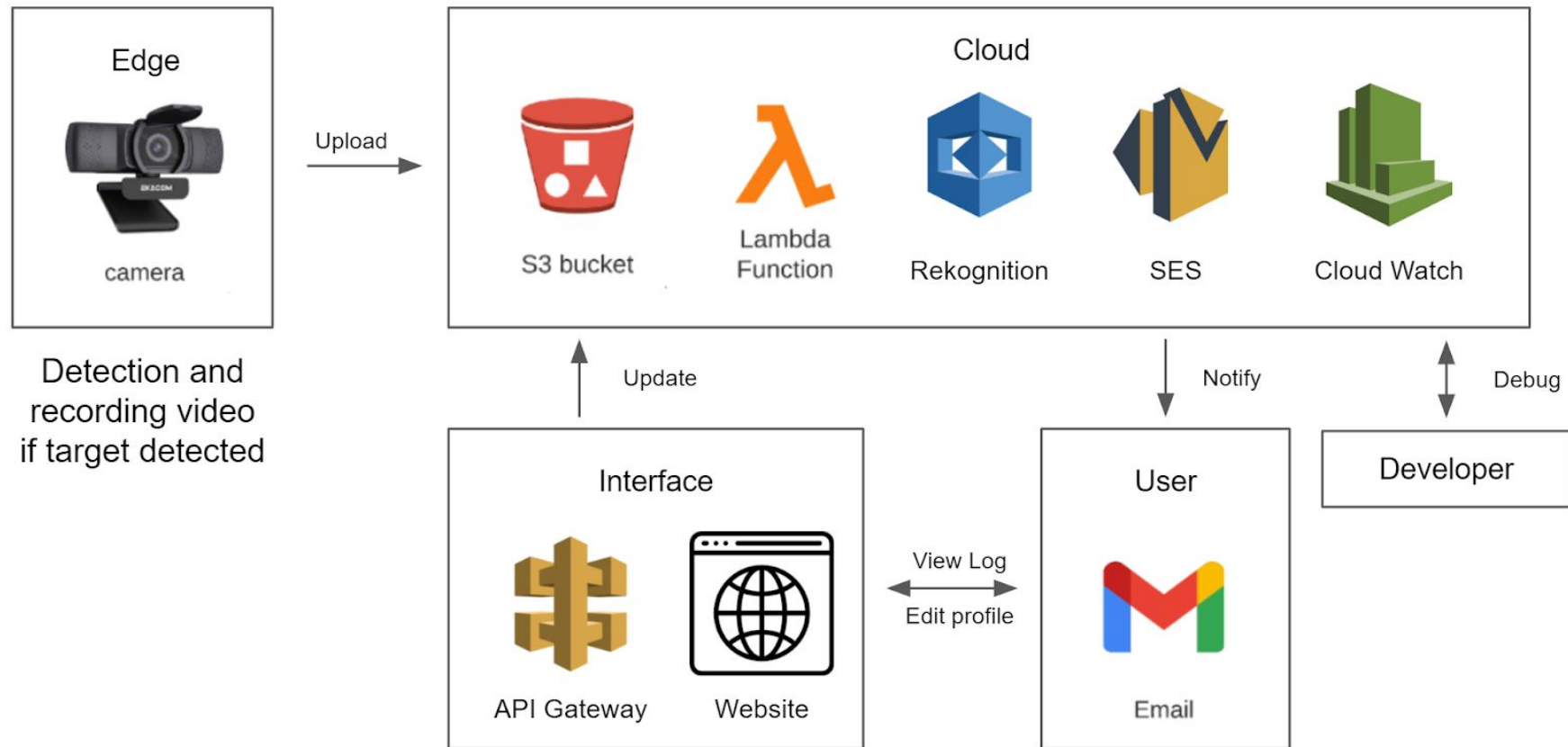


Fig 1 System Structure

System Construction

- Detection and Uploading
- Analyzing
- Email Sending
- User Interface

Detection and Uploading

Detection:

- High response speed on the edge:
 - Real-time human detection. (YOLOv5 nano version)
 - Do not do analysis. (Limited computational resources on edge)

Uploading:

- High storage volume and uploading speed
 - AWS S3
- Image + Video
 - Image is for detail analysis and displayed in the notifying email.
 - Video is for future check. (Video analysis is relatively slow, response speed)

Analyzing

Based on AWS service Rekognition and face detection:

Pros:

- Relatively high accuracy.

Cons:

- Depends on the frame we took.
- Can't work without face detected.

Stranger identification:

Detect faces and compare faces function:

- Target image.

Violence detection:

Detect moderation labels:

- Detect if there is any dangerous or weapons.

Analyzing

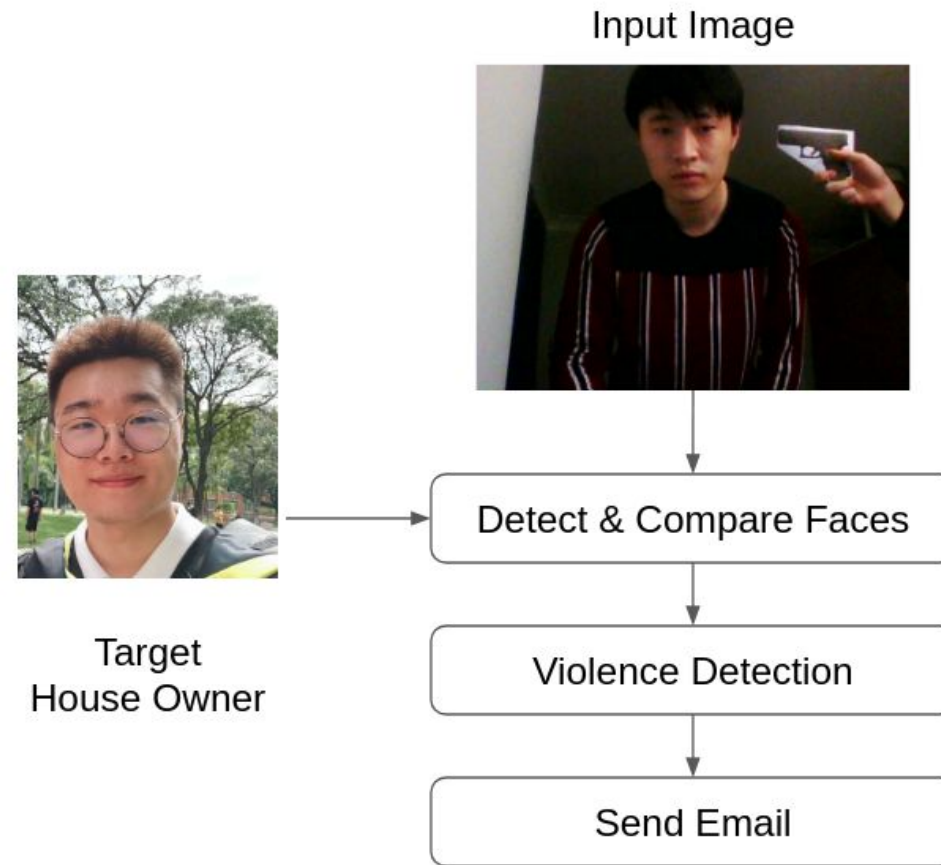


Fig 2 Logic Flowchart

Email Sending

- **Email Sending:**

Finally, we use Lambda and SES services to send an email to make an alert. We design the subject of the email to be security alert, and the context to be “ ‘number of strangers’ Strangers Just Passed By Your House”. We also attach the picture of the strangers to the email. The sent email will be like this:



Fig 3 Received email when no violence detected

System Construction

- If violent behavior is detected, then different email content will replace the original one:



Fig 4 Received email when violent behavior is detected

User Interface

Static website:

- Deployed on AWS S3.
- Visualize results and logs.

API invoking: (AWS API gateway, lambda function)

- Update target image.
- Append receiving list.

Convenient use:

- Fixed domain (registered using AWS route 53)
- monitor6770.click (global available & always online)

Deploying the System

1. Install dependencies for the detection algorithms and amazon web services.
2. Create an S3 bucket.
3. Change the global variable TARGET in Lambda , then upload the photo of the house owner and name it “target.jpg”.
4. Run python script detection.py with the name of S3 bucket.

Work Cited

- Deglint, Jason. “Jetson Community Projects.” *NVIDIA Developer*, <https://developer.nvidia.com/embedded/community/jetson-projects#mavis>. Accessed 5 December 2021.

Thanks You!