

# **EEES 406 – DATA ANALYTICS FOR IoT**

## **FINAL REPORT**

**Project Title:** Home Security System

### **Project Members:**

Member #1

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### **Abstract:**

Our goal was to build a home security system which informs the user whenever an unknown person comes to user's front door. We have managed to build a face recognition system that can recognize only the users of the system and upload it to the cloud server if an unknown appears on the camera.

### **Problem Definition:**

We spend most of the day out of our houses. While we are outside our houses are defenseless and we are not informed until we come back home. We could solve such worries by implementing IoT based Face Recognition System on the front door against intruders or any unknown people. It can even be used to inform you the people you already know waiting for you on the front door.

It is worth to build our project which let's you check your home anytime you want and also when you are not checking the home, the system can inform you by a message sent to your phone and show the pictures of unknown people who are coming around your front door. In addition, the members of the house in the database can easily enter home just by looking at the camera. All of these offer people an easier and safer lifetime.

There are few weaknesses about our project mainly privacy and security. Our project collects human face datas and sends them to the cloud. So it is important to build the system considering privacy and security policies. Also in physical manner, system might be tricked by an intruder who uses a some pictures of the users.

The system we provide is not going to consume too much power since we are not going to use powerful motors or devices just raspberry pi, camera, motors for the locking mechanism. System is able to run with batteries but mostly we want the system connected to the grid of the house. However, when powers gone we want to system keep running. So we might have batteries connected to raspberry pi if ever power is gone.

# EEES 406 – DATA ANALYTICS FOR IoT

## System Design and Features:

This section should contain the answers to following questions:

- We have used LCD screen, servo motor and raspberry pi(We only worked on the pc since we could not come together and try every task at once.)
- We could not combine our system elements cause of the quarantine
- We used pydrive library to communicate with google drive cloud system which uses HTTP protocol
- Our camera collects image data of the people
- Our method to process image data was the algorithm called LBPH(Local Binary Pattern Histogram) face recognizer provided by OPENCV library. LBPHFaceRecognizer performs facial identification using KNN, LBPH is used to extract facial features.

Local Binary Pattern (LBP) is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Using the LBP combined with histograms we can represent the face images with a simple data vector.

- We could not add any extra features but it is open for future work of this project so we are considering improving the project later.

## Results and Conclusion:

Provide any information about your results. For example,

client_secrets.json	12.05.2020 17:44	JSON File	1 KB
credentials.json	27.05.2020 15:59	JSON File	2 KB

  

Drive			
Drive'im			
Yeni	Drive'im		
Benimle paylaşımlar	En son		
Yıldızlı	Çöp kutusu		
Depolama alanı	Toplam 15 GB depolama alanının 1,4 MB kadarını kullanılıyor		
Depolama alanı satın al			
Ad	Sahibi	Son değiştirilme tarihi	Dosya boyutu
sendMails	ben	27 May 2020 ben	—
Unknown1.png	ben	11:14 ben	71 KB
Unknown2.png	ben	11:14 ben	72 KB
Unknown3.png	ben	11:14 ben	69 KB
Unknown4.png	ben	11:06 ben	54 KB
Unknown5.png	ben	11:06 ben	58 KB
Unknown6.png	ben	11:06 ben	60 KB
Unknown7.png	ben	11:06 ben	60 KB
Unknown8.png	ben	11:06 ben	56 KB
Unknown9.png	ben	11:06 ben	53 KB

## EEES 406 – DATA ANALYTICS FOR IoT

ler > PROJECTS > Home Security System > Face Recognition

Ara: Face Recognition

Ad	Değiştirme tarihi	Tür	Boyut
Dataset	27.05.2020 16:14	Dosya klasörü	
recognizer	27.05.2020 16:14	Dosya klasörü	
dataset_generator.py	27.05.2020 16:13	PY Dosyası	3 KB
detector.py	28.02.2020 18:57	PY Dosyası	3 KB
haarcascade_frontalface_default.xml	25.02.2020 14:24	XML Belgesi	909 KB
Steps.txt	25.02.2020 13:49	Metin Belgesi	1 KB
trainer.py	27.05.2020 15:53	PY Dosyası	1 KB
trainer_a.py	27.05.2020 14:13	PY Dosyası	2 KB
user_infos.txt	27.05.2020 16:13	Metin Belgesi	1 KB



## **EEES 406 – DATA ANALYTICS FOR IoT**

29.68769236723056  
60.466450535569344  
78.30192615423198  
33.60989907012216  
32.38627318859617  
80.35184800033666  
92.82732365423792  
33.047401843953935  
34.370634581935114  
101.88017976174076  
33.83567767111043  
33.73748038403615  
34.28410099141173  
36.33348108886232  
37.10381643799859  
33.582939161341976  
34.84797061193037  
35.45575282723859  
35.13171285460715  
133.2542797762306  
33.781734790556094

Confidence values of the recognition printed. When below 50 confidence system recognizes which user on the camera from user info file(Closer to 0 means better recognition).

We only managed to build our project on pc so we could not complete every task mostly hardware parts. We completed backbones of the project but yet not everything go as we want it. Main reason is the quarantine because of that we could not work together with my teammate.

We are just begun to create email sender on the cloud server. We actually thought that it would be a better informer and only requires 1 bot email to send data to all users other than sending infos to individual user's drive directly but we do not have enough time to complete it so we are going to finish it after sending this report.

We need modifications to make the system more elegant other than it is working quite promising.

It is a world wide project which is used by many people. Even there are better algorithms and approaches exists.

We need to build a desktop app to gather user data elegantly and simply and keep working on the background. We might want to improve our algorithm to increase the accuracy. And the email sender bot will be a better approach also a mobile app with a push notifications works verywell, too.