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Smart Patriarch: Home Security and SMS Security Using IoT and Machine Learning

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Abstract: ***A large fraction of the old in our society live away from nears and dears. Newspapers of today are flooded with attacks towards them. These attacks are not only physical, they are technical too. This paper presents a system employing fraudulent message detection wiping out the chances of old beign victims of fraud SMS ,and face detection, home automation, health monitoring system ensuring their physical security. An android application and a blynk application installed in both old users and child's mobile are the two applications employeed. The fraudulent message detection module classifies SMS delivered to the old using SVM classifier. Spam SMS alerts are displayed in the android application. Face detection module uses ESP32Cam to capture video frames and thereafter OpenCV to crop faces and a face recognition model to classify obtained faces as known and unknown. Unknown face alerts are given via the android application. The old might be unable to turn ON/OFF lights and fans everytime. Home automation system uses two PIR sensors one for light and other for light. PIR sensors detect motion and pass signals to relay modules and accordingly fan and light turn ON and OFF. Lights and fans can also be operated manually via the android application. Most importantly health is what that matters .A health monitoring system in the form of blynk application collects data from temparature and pulse sensors and displays in the application. Alerts are displayed once the vitals exceed the preset threshold value.***

Index Terms: SVM, Home Automation, Convolutional neural networks, OpenCV

I. INTRODUCTION

An elderly person at home is a living treasure.We live in an era where thousands of people leave abroad for better career opportunities and increased standard of living.No doubt, this is why a large fraction of the old are left home alone.As the number of attacks on homes where old people live alone increases, we need to incorporate technology as an important element of home security. There are various systems and electronic devices that help people stay safe at home. This paper focus not only on physical security, but also on online security. For online security, a fraud message detection module is implemented that uses the svm algorithm to detect spam messages received in the old user's mobile phone.The old is at a higher risk of blindly accepting messages requesting OTP,personal information etc.This module prevent this risk to a great extent.Older people may forget or not be able to turn ON/OFF. Automatic fans and light control is implemented to reduce the possibility of this situation.Physical attacks can be from people entering the premises with various excuses. Such people do not have the right intention. If an unknown face is detected, an alert will be sent. To live a healthy life, we need to monitor our body changes daily, especially heart rate and temperature. The health monitoring module uses a pulse sensor and a temperature sensor to capture heart rate and body temperature and is displayed on the blynk application. Hence, Smart Patriarch ensures both their physical and technical security via a system employing Home Automation System, Spam SMS Detection using SVM,Face Detection and Health Monitoring.

II. PROPOSED METHOD

The proposed system encompass an android application and a blynk application and four modules namely Fraudulent Message Detection, Face Detection, Home Automation and Health Monitoring. Alerts from fraudulent message detection system ,face detection module and manual option for checking spam messages and, controlling of fan and light is provided in the android application. Blynk application is only for health data display. Android application and blynk application is installed in both old user's and child user's mobile.

A. Fraudulent message detection

The module classifies SMS as Spam and Normal (ham)by means of the SVM classifier. Spam message alert will be displayed in the android application named Smart Patriarch.
Delivered SMS is directed to the application by SMS manager.

B. Face detection

The module is based on Convolution Neural Network algorithm . Faces are captured using ESP32cam and OpenCvis used.

C. Home Automation

The module comprises of two PIR Sensors and relay modules. NodeMCU ESP32 microcontroller is the hostcontroller and motion detection via PIR Sensors.Homeautomation can be employed both automatically and manually.

D. Health monitoring module

Temperature and heart rates are monitored using tempera- ture and pulse sensors .Health data is then displayed in blynk application and alerts are given in the same.

III. LITERATURE SURVEY

Arshith Suresh[1] proposed a framework having a face acknowledgment highlight at entryway step that helps in observing who and when somebody has visited the house withcautions being sent assuming an obscure individual is viewed as at the entryway step. This paper additionally presentsa component that empowers the user(owner) to control the section of vehicles by adding a RFID based approval of vehicles and permitting the client to add and erase approved vehicles and a movement location detecting gadget and an AI calculation to identify whether an individual has gone into the house premises during security hours.

J.I. Sheeba,B.Sri Nandini [2] researched on CyberbullyingDetection The most common way of recognizing cyberbully exercises starts with input dataset from interpersonal organ- isation. Input is given to information pre-handling which is applied to work on the nature of the examination information and ensuing insightful advances, and eliminates stop words followed by Feature Extraction. The cyberbullying words are given as preparing a dataset.. Lavenshtein distance calculationdistinguishes the cyberbully words. For cyberbully Classifica- tion, Na¨ıve Bayes classifier is utilised

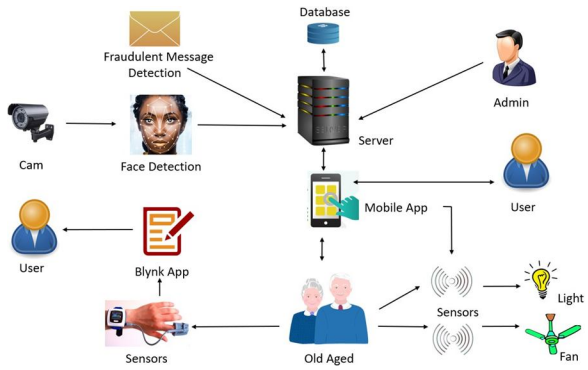
Hsiao-Tzu Hsu, Gwo-Jia Jong, Jhih-Hao Chen, Ciou-Guo Jhe [3] coupled the existing smart-home concept with machine learning technology.This paper first creates a set of basic criteria, then classifies a portion of data collected by traditionalInternet of Things of smart-home by manual means, such as the opening and closing of doors and windows, the starting andstopping of motors, and the time of sending each data to label, before using the Support Vector Machine(SVM) algorithm to classify and build models, and finally training it.

G.Bharath [4] implemented a model for seeing made news messages from twitter posts, by sorting out how to imag-ine precision assessments, considering mechanizing formed news recognizing verification in Twitter datasets. A relation- ship between five striking AI estimations, like Help Vector

Machine,Innocent Bayes Technique, Calculated Relapse and Intermittent Brain Organization models,autonomously to show the adequacy of the gathering execution on the dataset and concluded that SVM and Guileless Bayes classifier beats different estimation

Ranjith Kumar R, Rathish Ganesh, Ram Vikash k, M.Manikandan [5] proposed a unique home automation sys- tem.The system comprises with node MCU which is a Wi-fi module used to transmit data over internet, electromagnetic relays, and the PIR sensor. The system work depends mainly upon the motion within the defined sensor range and it canalso be controlled through the mobile application.

IV. SYSTEM ARCHITECTURE



Android Application provides two widgets namely manual SMS checking, control of fan and light

1) The SMS delivered to old user's phone will be directed to the application through SMS manager, which is then passed to the back end (django). SVM classifier now classifies the received SMS as SPAMor HAM and the result is passed to the front end (android application). The result is displayed as SPAM or Normal. Manual checking of messages for spam is also provided inthe application.
2) ESP32 Cam captures video frames from which faces are cropped using OpenCV. Obtained faces are then compared with the trained model .Unknown faces if any encountered, alerts are immediately sent to both old and child user's application via MQTT server. Running NodeMCU ESP32 as MQTT client and sending data to MQTT server.
3) Two PIR Sensors interfaced with NodeMCU ESP32 is used for motion detection. PIR sensors monitor surrounding temperature and send signals to the relay modules.Relay mod-ules will then switch ON and OFF accordingly. This automaticcontrol can be switched to manual mode by disabling theautomatic option in the application and choosing FAN or LIGHT or both.
4) Blynk application displays temperature, heart rate and alerts in the case of exceeding preset values. Temperature sensor interfaced with NodeMCU ESP8266 using One wire protocol,Pulse rate sensor interfaced with NodeMCU ESP8266using ADC pin.

V. SYSTEM ANALYSIS

1) *C, Python 3.0:* Languages that serve as the foundationfor machine learning analysis and programming.
2) *SmsManager API:*
3) *Android studio (Version 4.0):* It is the official integrated development environment (IDE) for Android application development. System uses android as the front end. The IDE and app are connected using the USB debugging mechanism
4) *Python Django Framework:* Django is a high-level Python web framework that promotes rapid development and simple, practical design. The application in this paperis built using Django as the back end.
5) *Arduino IDE 1.8.12:* Writing code and uploading it to theboard is simple with the open-source Arduino Software (IDE). Any Arduino board can be used with this software.
6) Embedded Devices :

a) ESP32 Cam

ESP32 Cam : Used to capture video frames for the facedetection.

b) NodeMCU ESP32

Acts as host controller for automation purposes.

c) PIR Sensor

Used for the motion detection using the temperaturechanges in the sensing range

d) NodeMCU ESP8266

Microcontroller used for collecting vital body parameters.

e) DS18B20

Used as the temperature sensor.

f) Pulse rate sensor

Used for measuring heart rate.

g) Two 5V Relay Modules

Controls the light and fan by acting as a switch.

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VI. RESULTS AND DISCUSSIONS

This paper reinforces a security system for old age peoples to protect them from cyber offenses such as fraud messages, build an automation security to detect face, detect movement and alert to owner and control their home devices. In addition, vital body parameters such as temperature and heart rate are monitored.

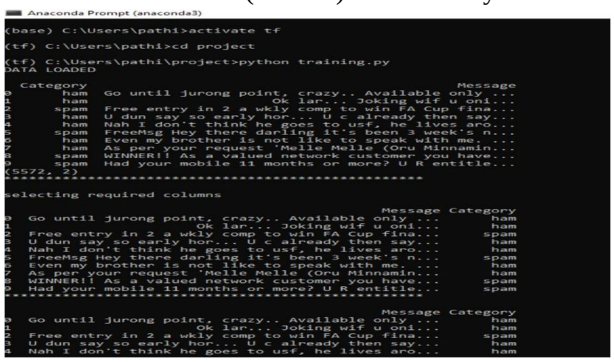
VII. DATASETS

Spam dataset from Kaggle is used to train SVM model .Thedataset has two columns, first specifying HAM or SPAM, second consisting of textual data. This data is preprocessedand then used for training the model.

Dataset for face recognition model is a collection of imagesof different individuals. Several images of each individual is collected and converted to RGB format from BGR format. Faces are then cropped and model is trained.

VIII. CLASSIFIER

SVM Classifier is used for classifying SMS as SPAM or HAM(Normal). An accuracy rate of 0.985 was observed.



IX. ANDROID APPLICATION

An android app has been developed to verify integrity of SMS, control of fan and light and to give alerts on the arrival of strangers. The app is easy to use and has user friendly interfaces where a few taps are enough to access the required services.The app is compatible with Android OS version 9 andabove.

X. BLYNK APPLICATION

Easy to use application with an interface showing tempera-ture and pulse rates.

XI. RELEVANCE

1) Protecting the old, respecting the old, and loving the old are just as important as caring for the newborn.
2) Most of our population is separated from our parents for professional reasons.
3) Elderly people are more likely to receive fraudulent mes- sages about transactions in this technologically advanced world.
4) SMART PATRIARCH plays an important role in protect- ing old parents from intruders, both in the home and in the tech world.

XII. FUTURE SCOPE

We live in a world where people go before better career opportunities and technology grow day by day. No doubt a large number of parents and will be left alone in their home and a lot are not aware of emerging malicious attacks retriev- ing their info. This paper address these issues by providing physical security, to let the children know the basic health status of their parents and a barrier against unwanted SMS bywhich information could be disclosed.

XIII. CONCLUSION

This paper focus on providing physical security to the old and ensure that they do not get cheated on fraud messagessuch as request for account number,OTP's etc..Face detection module and health monitoring system assure security in the physical sense, automation of fan and light eases their access for the same and fraudulent message detection module wipe off the chance of old to reveal personal information to un- known and suspectible sources.

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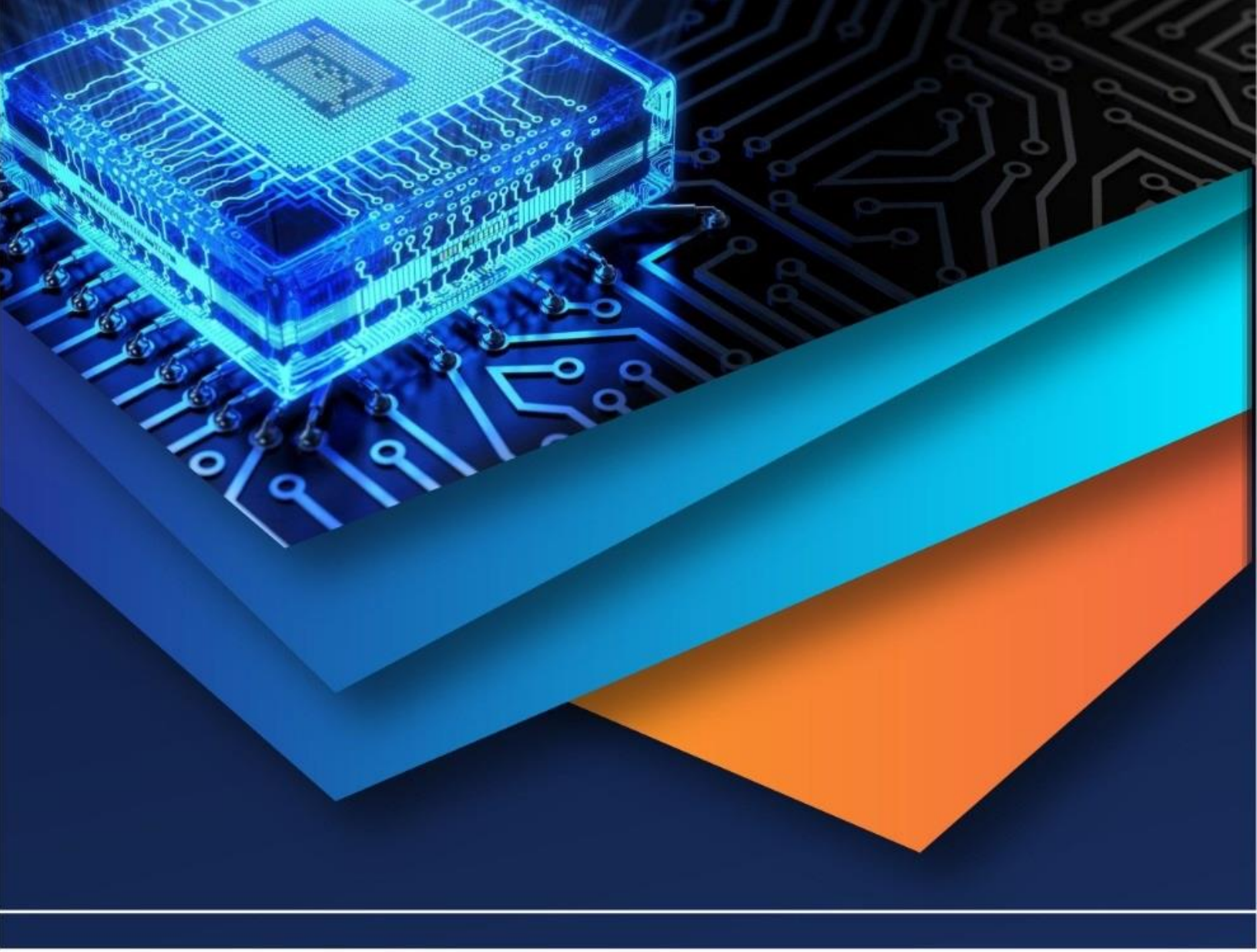

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