Tech Saksham

Final Project Report

Track Name

"HOUSE SECURITY "

MIT ARTS AND SCIENCE FOR WOMAN"

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ABSTRACT

IntelligentHomeSecuritySystemusingArtificialIntelligence is the project undertaken to replace traditionalmeans of security with modern IOT and A.I. based systems.Some commercial products based on image recognition arereadily available, but such single security level systems can beeasilybreached.Toovercomethesedrawbacks, wehaveimplementedanA.I. based2levelsecuritysystemthatcanbeeasily scaled and can be packed with more features withoutlossinperformance.

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CHAPTER 1

INTRODUCTION

Therearecurrently7.6billionpeopleonEarth[1]:3.7billionareconnectedtotheinternet;almost50% ofthatconnectedpopulation lives in Asia, 24% of whom reside in India [2] forwhich the number comes up to 440 million. Investment indigitisationandurbanisationandfriendlyregulatorypolicieshold key to ensuring that India continues to advance on itspathofsocioeconomicprogress. Themarketpotentialofallthings IOT in India alone is predicted to be $9 billion by2020[3]. India is one of the key countries poised for large-scaleimplementationofIOTprojects-notonlytobeabletosetnewstandardsbutalsoasakeygeographytoanticipatethe emergence of a new humanism embracing people anddevices.[4]A.I. has become a thing of magic now a days andalmosteverycompanywantstointegrateapartofitintheirproject. A.I

CHAPTER 2

Methodology

As home security is the issue of this paper, we went with atwo-tier security approach with image identification beingone and voice identification being second. The system thatwedesignedisaserver-clientmodel, whereaRaspberry-Piand a NodeMCU are clients and an Acer laptop being aserver. The Raspberry Pi is a series of small single-boardcomputers developed in the United Kingdom bythe RaspberryPiFoundationtopromoteteachingofbasic computerscience inschoolsandin developingcountries [5]. The Raspberry Pi 3 used is this project is aRaspberryPi3ModelB+whichhostsaBroadcomBCM2837B0 SOC which has 4x Cortex-A53 cores and runs on1.4GHz.[6]Italsohasa10/100Mbit/sEthernet,802.11b/g/n/ acdualband2.4/5GHzwireless,Bluetooth4.2BLE.[7]Raspberry Pi isresponsible for acquiring data from thesubject and transmit the data through TCP sockets to theserver. NodeMCU is an open source IoT platform whichincludes firmware which runs on ESP8266 Wi-Fi SoC fromEspressifSystemsandthehardwareisbasedontheESP-12module.[8][9][10] Due to cost restraint and low speed internetthe decision of running a “server” on the laptop was made.

CHAPTER 3

System Architecture

The RPi has Raspbian OS running on it with all the usefulpython modules installed. The images are captured using aUSB camera instead of a PiCam so that both the voice andwav files can be captured while keeping the cost of materialslow. The images are processed with the help of on pythonlibrarycalledOpenCV.OpenCV (Opensourcecomputervision) isalibraryofprogrammingfunctionsmainlyaimedatreal-timecomputervision.[12] Thevoicesampleisofdurationof 4 seconds and it is recorded using Pyaudio module. Theimage file is in .jpg format and the voice sample is in .wavformat. Both these files are sent to the server through TCPsocketsfromwhereallthe recognitionandcontrolop erationstakeplace. Afterrecognitiontheserversendstheappropriatecomm andstotheNodeMCU

CHAPTER 4

FaceandSpectrogramRecognition

Image Recognition, in the context of machine vision, is theabilityofsoftwaretoidentifyobjects,places,people,writingand actions in images. In this project we have used imagerecognition to identify the face of the authorized personnelandthespectrogramofthevoiceofthesame.

Toachievethiswe used Google ’ s Inception v3, which is a widely -used imagerecognition model that has been shown to attain on theoriginal paper: “ Rethinking the Inception Architecture forComputer Vision" by Szegedy, et. al. [12] The model itself ismade up of symmetricandasymmetricbuilding blocks, includingconvolutions,averagepooling,maxpooling,concats, dropouts,andfullyconnectedlayers.I

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Conclusion

Thescopeoftheprojectwastoimplementprinciples ofA.I.and IoT in the security sector. We were able to implementour face and voice recognition system efficiently and withlowbillofmaterials. Thecodecanbemorerefined, andmorefeaturescanbeaddedinordertomakeitinto afull-fledgedproduct for commercial use. Instead of an ESP8266 SoC, aBluetoothenabledESP32canbeusedinordertoadd Bluetooth support so that the admin can still enter the houseevenwhenthere isa power outage.

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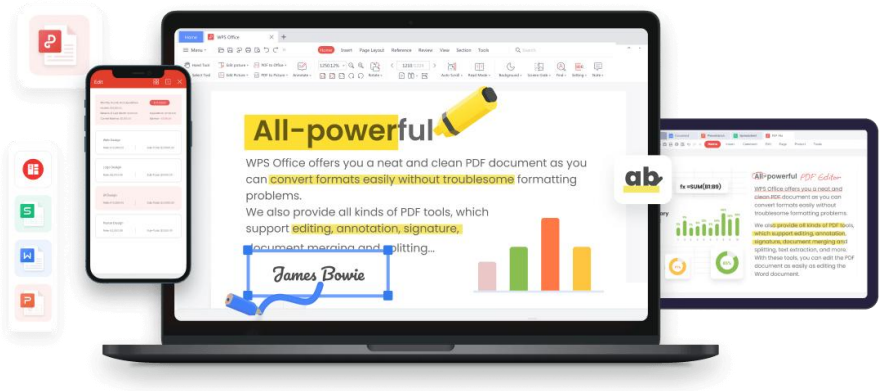

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