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# Review paper of IoT Based Smart Home Security System

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**ABSTRACT**—In recent years, the safety constitutes the foremostimportantsectionofthehumanlife. At this point, thevalue isthat the greatest factorthis technique isextremely usefulforreducing the valueof monitoring the movement from outside.duringthispaper,areal-timerecognitionsystem isproposedwhich will equip forhandlingimages very quickly.Themostobjective of this paper is to protect home, office by recognizingpeople. For this purpose, the PIR sensor is employed to detectmovement within the specific area. Afterwards, the Raspberry Piwill capture the pictures. Then, the face are going to be detectedand recognized within the captured image. Finally, the picturesand notifications are going to be sent to a smartphone based IoT.Theproposedsystemsarereal-time,fastandhaslowcomputationalcost.Theexperimentalresultsshowthattheproposed face recognition system is often utilized in a true timesystem.

**Keywords:**
Internetofthings,ComputerVision,RaspberryPi3,Facerecognition.

## I. INTRODUCTION

Today, the safety system field may be a vital area insmart cities, offices, and homes. Security of the house andthereforethefamily isvitalforeveryone.Likewise,smartsystems canprovideInternetofThings(IoT).

The IoT are often applied in smart cities so as to offer variousbenefits that enhance citizens. In other terms, smart homes areoften made by utilizing the Io T. it's the power to regulate andautomate exactthingsof homeslike lights,doors,fridges,distributed multimedia, windows and irrigationsystems. TheIo T is becoming popular in many sides of life, like smartsecurity, smart cities, healthcare, smart transportation, smartgridsandonlinebusiness.Theobjectivityofutilizing IoTistoshareinformationandknowledgewitheveryoneineverywhere roundtheworld.Computervisioncanpresentmoresecuritysystemwithin theIoTplatformforsmarthouses. it's abilities to acknowledge an individual within theincorrect area and at the incorrect time because this personcouldalsobeamaliciousonefortheenvironment .Facerecognition system grow to be one among the foremost activeresearchareasespeciallyinrecentyears.it'sanassortmentof huge applicationswithinthe ranges:peace,accesscontrol,MasterCard verification, criminal identification, enforcementcommerce, information security, human computer intelligentinteraction,anddigitallibraries.Generally,itrecognizespersons publicly areas like houses, offices, airports, shoppingcenters and banks. This mechanism permits secure access tothe house by detecting motion controlled by the embeddedsystem. The face is that the most vital a part of human's body.So, it can reflect many emotions of an individual. Long yearago, humans were using the non-living things like smart cards,plastic cards, PINS, tokens and keys for authentication, and tourge grant access in restricted areas like ISRO, NASA andDRDO. The foremost important features of the face image arenose,eyesandmouthwhichareassociatedwithfacialextraction. Face detectionand recognitionsystem is easier,cheaper, more accurate, and non-intrusive process because it iscompared to other biometrics.

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The system will fall under twocategories;facedetectionandfacerecognition.The rearemany methods to implementface detectionlike Haar-likefeatures,EigenfaceandFisher-face.Then,analyzingthegeometric features of facial images, such as, distance and siteamongst eyes, nose and mouth were provided by several facerecognitiontechniques [8]. There are acouple of techniquesfor fetching the foremost important features from face imagesto implement face recognition. one among these features isextraction technique called Local Binary Pattern (LBP). LBPtechnique was producedby Ojalaetal.LPB describes theform and texture of digital image. this system provides goodresultsandefficientforreal-timeapplications.Haar-likefeaturesandLBParerobustincomparisontotheothers.Consistentwithmanystudiestourgefastdiscriminatoryperformance and good results, LBP technique was chosen forface recognition. LBP generates the code that describes localtexture pattern. From the LBP face image, the nose and eyesareaareextracted,andforeveryimage'spixeltheLBPhistogramsaregoingtobedrawn.duringthispaper,RaspberryPi4isemployedandRaspberryPicameraisconnected there to. The system will take a picture when PIRsensordetectsanymovement.Then,computervisionisappliedtothecapturedimages.Subsequently,thesystems ends the pictures to a sensible phone via the web. During thiscase, IoT based Telegram application is employed to ascertainthe activity and obtain the pictures and notifications. Withinthe paper, the Raspberry Pi single-board computer may be aheartof the embeddedface recognitionsystem.Itcontrolseachoftheperipherals.

## II. RELATEDWORK

In the present day, researchers and developers have come upwith a wide range of surveillance systems that are used forremotemonitoring,alertingaswellascontrollingtasksthrough affordable and easy to implement hardware systems.Some have so far been realized while others still remain aproposition.

D.Jeevanandworkedondesigningofanetworkedvideocapturesystemusing RaspberryPi.Theproposedsystemworksoncapturingvideoanddistributingwithnetworkedsystems besides alerting the administration person via SMSalarm as required by the client. Their system was designed towork in a real-time situation and based on Raspberry Pi SBC.Contrastingtootherembeddedsystemstheirreal-timeapplicationoffersclientvideomonitorwiththehelpofalertingmoduleandSBCplatform[4].

SnehaSinghdandhisteamdescribedIPCameraVideoSurveillancesystemusingRaspberryPitechnology.The Researchers aimed at developing a system which captures realtime images and displays them in the browser using TCP/IP.Thealgorithmforfacedetectionisbeingimplemented onRaspberry Pi, which enables live video streaming along withdetection of human faces. The research did not include any ofsurveillancereactions[5].

In2014,SanjanaPrasadandhiscolleaguesworkedondeveloping a mobile smart surveillance system based on SBCofRaspberryPiandmotiondetectorsensorPIR.Theirdevelopmentboostsdthepracticeofportabletechnologytooffer vital safety to our daily life and home security and evencontrol uses. The objective of their research is to develop amobilesmartphonehomesecuritysystembasedoninformationcapturingmodulecombinedwithtransmittingmodule based on 3G technology fused with web applications.The SBC will control the PIR sensor events and operates thevideo cameras for video streaming and recording tasks. Theirsystem has the capability to count number of objects in thescene[8].

UdayKumarworkedonimplementationofalowcostwirelessremotesurveillancesystemusingRaspberryPi.ConventionalwirelessCCTVcamerasarewidelyusedinsurveillancesystemsatalowcost.Heandhisteamimplementedalowcostandsecuresurveillancesystemusingacamerawith Raspberry Piand the images acquired have tobe transferred to the drop box using a 3Ginternet dongle. ThiswassuccessfullyimplementedusingRaspberryPiand3Gdongle[9].

Mahima F. Chauhan and Gharge Anuradha offered to designand develop a real time video surveillance system based onembedded web server Raspberry PI B+ Board. Their systemhas lowcost,goodopennessandportabilityandiseasytomaintain and upgrade. Thus this application system providesbetter security solutions. This system can be used to effectsecurity inbankinghalls,industry,environmentandin militaryarts[6].

JadhavG.Jevaluatesin2014theuseofvarioussensors, wirelessmodule,microcontrollerunitandfingerprint moduletoformulateandimplementacost-effectivesurveillancesystem.Heandhisteamadoptedan ARMcoreasabasisprocessorofthesystem.PIRsensoris usedtodetectmotioninthevisionarea,whilevibratingsensorisusedtosenseanyvibrationeventssuchassoundo

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fbreaking.Theintruderdetection technique is proposed by using the PIR sensor thatdetectmotionandtriggerasystemofalertingandsending shortmessageservicethroughGSMmoduleforaspecifiedphonenumber.Theirworkcanbefeaturedbyadoptingnumerous diverse kinds of demanding database and thus it willbemoresecureanddifficulttohack[7].

## III. MOTIVATION

Intrusion,theactofsomeonethatyoudon'tknow,whoentersintoyourareawithoutyourpermission,isontherise. Ahuman intrusion detection system is designed to detect anunauthorized entry into a building or a protected area and denysuchunauthorizedaccessto protectpersonnelandpropertyfromdamageorharm.Securitysystemsaremainlyusedinresidential,commercial,industrial, and military properties forprotectionagainstburglary(theft)orpropertydamage,aswellas personalprotectionagainst intruders. The humanpresenceof security guard may notbecompletely trustworthy.In suchcases,thissystemprovidesproperdetectionofintruderandprovidessecurity.Byusingthissystem,wecanreducerobberybydetectingtheintruder.Sowecanrespondquicklysuchthatnoharmtakesplaceinourhome.

## IV. LITERATUREREVIEW

ThereарealotofSecuritysystemdevelopedonsecuritycamera using Raspberry Pi Significant amount of research andliteratureisavailable.

**1. SmartSurveillanceMonitoringSystemusingRaspberry pi and pir sensor:** The security is a scenario inwhichobjects, animals or people are provided with uniqueidentifiersandtheabilitytotransferdataoveranetworkwithoutrequiringhuman-to-humanorhuman-to-computerinteraction. The webcam has evolved from the convergence ofwireless technologies and the Internet. The security system isthecommunicationofanythingwithanyotherthing,the communicationmainlytransferringofuseabledata,for example,asensorinaroomtomonitorandcontrolthetemperature. To describe a security alarm system using lowprocessing power chips using Internet of things which helps tomonitor and get alarms when motion is detected and sendsphotos and videos to acloud server. Moreover, Internet ofthings-basedapplicationcanbeusedremotely toview theactivity and get notifications when motion is detected. Thephotos and videos are sent directly to a cloud server when thecloud is not available then the data is stored locally on theRaspberryPiandsentwhentheconnectionresumes. Therefore,advantages like these make this application idealformonitoringhomesinabsence.

**2. Smart Motion Detection System Using Raspberry Pi:** Thesecurity is a scenario in which This paper throws light on thesecurity issues that modern day homes and businesses face anddescribestheimplementationofemotiondetection systemusingRaspberry Ipswichcouldbeaneffectivesolutiontoaddress the security concerns. The goal of the solution is toprovide an implementation that uses PIR motion sensors formotiondetectionandsendsnotificationstousers viaemails.

KeyWords:MotionDetection,RaspberryPi,PIRSensor,LED,RaspberryPiCamera,UPPAALModelVerification

**3. DevelopmentOfSmartHomeSecuritySystemusing Raspberry Pi:** In this paper, we are going to interactwith component with the help of Wi-Fi (Wireless Federation).The main advantage of this system is that it can be controlledanywhere with a wider range application. It's easy and allowscommunicationwithset up without wired connection. Thissystem can be further extended for a proper Surveillance ofhomesystem.

**4. IOTBasedSmartSurveillanceSystem:** Internet of Things offers user interoperability and connectivitybetweendevices,systems,services,networksandinparticularly control systems. This paper details the design anddevelopment of Io T based security surveillance system usingRaspberryPiSingleBoardComputer(SBC)with Wi-Finetwork connectivity. Adding wireless fidelity to embeddedsystems will open up various feasibilities such as worldwidemonitoring and control, reliable data storage etc. This systemcomprisesofsensornodesandacontrollersectionforsurveillance.Remoteuseralerts,videostreaming, andportability are the prime features of the system. Wi-Fi enabledmicrocontrollerprocessesthesensor-basedeventsuponreceivingtheeventnotification,thecontrollerenablesthecamera for capturing the event, alerts the user via email andSMSandplacesthevideooftheeventonclientmail. Raspberry Pi eliminates the need fora wireless transceivermodule in a sensor node, thus it makes the node compact,cost-effective and easy to use. The biggest advantage of thesystem is that the user can seek surveillance from anywhere intheworldandcanrespondaccordingtothesituations.

**5. Smart SurveillanceSystem Safeguard SecurityCompany UsingRaspberry Pi:**Theinternetofthingsisbecoming more popular in recent years due to technologicaladvancement. This has given rise to new technologies such asthe internet of things, which make extensive use of the internettoachievethingsthatwerepreviouslyveryexpensiveorunworkable. Several researches have been conducted to comeup withefficientand effective way of getting things done.Thisalsoinvolvestechnologiessuchasclosed-circuittelevision, which have improved vastly due to the adoption ofInternet of things. Physical items are no longer disconnectedfrom the virtual world, but can be controlled remotely and canact as physical access points to Internet services. Withtheadvent of the internet and advances in technology also camemobilephones.Thesedevicesarebecomingsmarterandsmarter and are becoming integrated with the internet. Therehave also be advances in computer vision technology, whichallow computers to perceive the world through cameras. Thisresearch focuses on taking advantage of these technologies toproducealow-costsurveillancesystemforSafeGuardsecuritycompany(Zimbabwe)thatisawareofitssurroundingsandwill onlycapturefootagewhenthereissomething taking place in the surveillance area. The systemwill also alert the guard/user of unauthorized human activity inthesurveillancearea.

**6. Live Video Streaming using Raspberry Pi with FaceDetection:** In today's world, surveillance systems like CCTVareextremelypopularbuttheyrequirehighcostforinstallation and they are not much flexible and scalable. LiveVideo Broadcasting Like Television is also afar complex andhigh cost process for video streaming. On the other hand, ourproposed system of live video streaming using raspberry pithrough cloud server are far more simple and low cost withhigh level of accessibility through internet. This system givesbothflexibility inters of architectural changes and scalabilityintermsofincreaseofuserstoaccessthevideostreaming

## V. CONCLUSION

There are a lot of devices which are developed to monitor thesecuritybasedondeferenttechnologysomeofthem usessensor like PIR Sensor for person detection in PIR false alarmcanoccurwhichprovide wrong information about securitysome system uses camera to capture image and send it overemail. Some systems are sending SMS as alert which requireexternal GSM modem for operation. This system is based onRaspberryPiminicomputerwithIOTintegrationFacerecognition using advanced technology like tensor flow deeplearning this system also provide the live stream of video touser using internet also activates lights and alarm in requiredsituation.

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