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Literature Survey of AI Based Home Automation

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Abstract: In the present scenario the crimes are increasing exponentially, arising a need of security. Security can also be described as a condition so that one can develop and progress freely and with a faith that no harm may be done. Hence we are introducing any automatic door lock security system and home automation for the security purpose. Camera is now enormously being used and with the development of its content that is used in various applications. One of such is automatic door lock security system using camera.

The Internet of Things (IoT) is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine- to-machine communications (M2M) and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to user in automation in nearly all fields, while also enabling advanced applications like a Smart Grid. Things,in the IoT, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, orfield operation devices that assist fire- fighters in search and rescue. Current market examples include thermostat systems and washer/dryers that utilize wifi for remote monitoring.

Interfacing of camera to capture live face images. Create a database of authorized person if they exist. Capturing current image, save it and compare with the database image. Interface GSM module to send alert to authorized person while unlocking the locked door in the form of SMS and CALL. The project can also be used for surveillance. For instance, it can capture the images of unidentified individuals and store it which can later be used to determine the impostors who tried to gain illegitimate access. Interface relay as on output. And additional home automation system is used to control the home appliance like fan and light using mobile application. With help of Wi-Fi connectedfor the model using TCP/IP.

INTRODUCTION

The “Home Automation” concept has existed for many years. The terms “Smart Home”, “Intelligent Home” followed and has been used to introduce the concept of networking appliances and devices in the house. Home automation Systems (HASs) represents a great research opportunity in creating new fields in engineering, and Computing. HASs includes centralized control of lighting, appliances, security locks of gates and doors and other systems, to provide improved comfort, energy efficiency and security system. HASs becoming popular nowadays and enter quickly in this emerging market. However, end users, especially the disabled and elderly due to their complexity and cost, do not always accept these systems.

Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, and Bluetooth. Each of the connection has their own unique specifications and applications. Among the four popular wireless sections that often implemented in HAS project, WIFI is being chosen with its suitable capability. The capabilities of WIFI are more than enough to be implemented in the design. Also, most of the current laptop/notebook or Smartphone come with built-in WIFI adapter. It will indirectly reduce the cost of this system.

LITERATURE SURVEY

Y. Januzaj [1] proposed real time access control for face recognition using,Raspberry pi instead of GSM services and relay. The limitation of the work was it couldn’tcontrol the background light situation and ambient light conditions.

H.Lwin [2] has proposed a door lock access system which consists of three subsystems: to be specific face recognition, face detection, and automated door access control. Face recognition is actualized by using the PCA (Principal Component Analysis).The door will open itself for the known person in command of the microcontroller and caution will ring for the unknown person. Demerit of this system is input images are taken through a web camera continuously until the ‘stop camera’ button is pressed. Somebody is required at the location to check unauthorized

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person's images or status of the system andtake further appropriate action. Personal computer (PC) is associated with the microcontroller, the entire system will not work if PC is crashed or Non-Function.

G. Senthilkumar, Gopalkrishna K, Sathish Kumar [3] proposed a work on Embedded Image Capturing System Using Raspberry Pi. In this work, they captured the image and compared it with the database but the limitation was the system couldn't work properly in the ambient light condition.

M. Carikci, [4] proposed a work on A Face Recognition System based on Eigen face method in which they used Eigen method for face recognition and Euclidean distance method to compare the image of the person concerned with the images in the database. Itwas very efficient and fast method and also gave high accuracy.

S. Jogdand.et.al [5] proposed a work on Implementation of Automated Door Accessing System with Face Design and Recognition in which they used Viola Jones method for face detection and PCA (Principal Component Analysis) for the comparisonof images. The limitation of this work was that it is not robust and the efficiency is less.

U. Sowmiya.et all. [6] Developed to connect any door with internet. In this system user also implemented PIR sensor and camera. PIR sensor used for detecting person and camera used for capturing the video of the person who comes at the door. The video was sent through 3g dongle to authorized person. They had also discussed some advantages of this system. They had concluded use of this system in banks, hospitals etc. But their proposed model didn't provide the facility of sending messages to the authorized people.

OBJECTIVES

The proposed system focuses on the following objectives:

- To design and implement face authenticated real time security system.
- To design and implement face authentication of captured image using camera by OpenCV/ Python platform on Raspberry Pi.
- Interfacing of camera to capture live face images.
- Create a database of authorized person if they exist.
- Controlling Home Appliance through Mobile Application using IOTTechnology.
- Face Detection and Face Recognition using Haar cascade Algorithm.
- Automation of door locking using by comparing face with database.
- The captured image is compared and verified with the database, if foundmatching then the access to locking device is allowed.
- In case of failure of face authentication an alerting SMS can be sent to thepredefined mobile number.
- Detection of Human being using PIR/IR Sensor.
- Detection of Gas Leakage using MQ3 Sensor.
- Controlled by any device capable of Wi-Fi.
- Extensible Platform for Future Enhancement

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SYSTEM BLOCK DIAGRAM

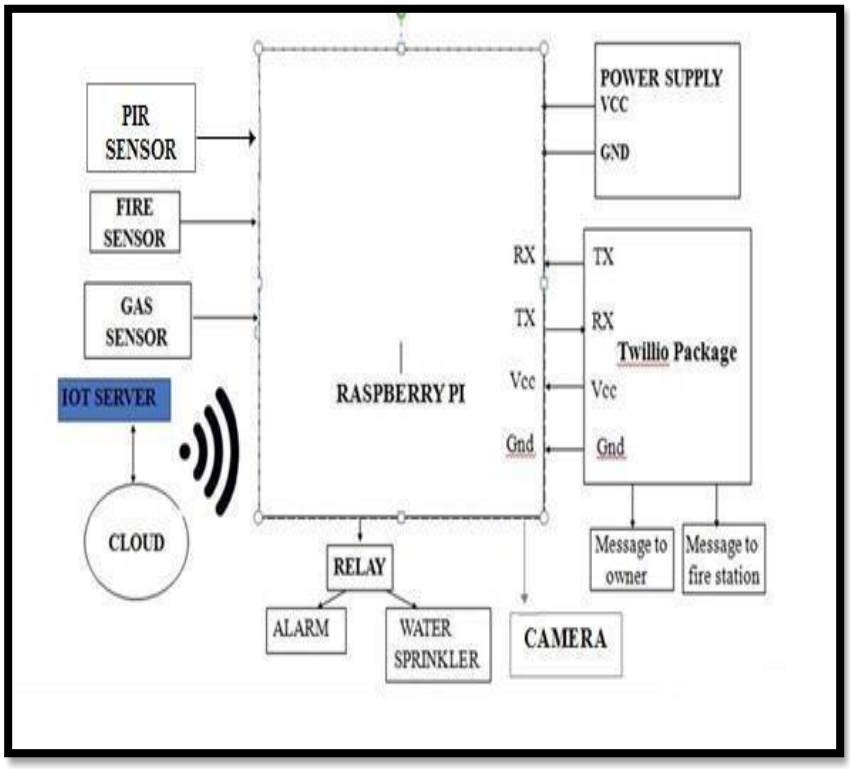

Fig 5.1 : Block diagram

The figure 5.1 represents the block diagram of the prototype. A brief description of the main modules in the block diagram is mentioned below

METHDOLOGY

System design is the process of defining the architecture, components, modules, interfaces and data for a system to satisfy specified requirements. System design could see it as the application of systems theory to product development. Theory is some overlap with the disciplines of system analysis, systems architecture and systemsengineering.

If the broader topic development “blends the perspective of marketing, design, and manufacturing into a single approach to product development,” then design the act of talking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user.

Until the 1990s systems design had crucial and respected role in the data processing industry. In the 1990s standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering.

Object-oriented analysis and design methods are becoming the most widely used methods for computer systems design. The UML has become the standard language in object-oriented analysis and design. It is widely used for modelling software systems and is increasingly used for high designing non-software systems and organizations.

System design is one of the most important phases of software development process. The purpose of the design is to plan the solution of a problem specified by therequirement documentation. In other words, the first step in solution is the design of theproject.

The design of the system is perhaps the most critical factor affecting the quality of the software. The objective of the design phase is to produce overall design of the software. It aims to figure out the modules that should be in the system to fulfil all the system requirements in efficient manner.

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The design will contain the specification of all the modules, their interaction with othermodules and the desired output from each module. The output of the design process isa description of the software architecture.

HARDWARE AND SOFTWARE REQUIREMENTS

The design of the system mainly consists of two parts, the systemrequirements for developing this project are listed below:

HARDWARE REQUIREMENTS:

Hardware requirements are those requirements that specify the hardware platform that is required to implement a system. Hardware requirements for the proposed system are given as follows:

1. ARM11 Raspberry Pi 3 board
2. Web Camera
3. SD card
4. DC Motor
5. Motor Driver
6. IR sensor
7. MQ3 sensor Relay

SOFTWARE REQUIREMENTS:

Software requirements are those requirements that specify the software platform that isrequired to implement a system. Software requirements for the proposed system are given as follows:

1. Raspbian OS
2. Open CV
3. Embedded C

APPLICATIONS

This project can be used for various applications as listed below:

1. Lighting control.
2. HVAC.
3. Lawn/Gardening management.
4. Smart Home Appliances.
5. Improved Home safety and security.
6. Home air quality and water quality monitoring.
7. Natural Language-based voice assistants.
8. Better Infotainment delivery

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