


Advances Image-Based Automated Security System

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ABSTRACT

As security is a serious concern nowadays, it becomes important to develop a product that deals with security issues without any human intervention. Hence, an automatic security system is a proposed device that ensures the security of the premises. Using both emerging technologies and specialized hardware, we can achieve safety goals and be able to develop the proposed device. It is an IoT-based approach that includes cloud computing, OpenCV, and web application for developing a security-based automatic system. Using raspberry pi and software, the authors design an automated security system where all the used electrical items are controlled. This system deals with the protection of possessions, minimizing break-ins, and avoiding any dangerous situations. The additional salient feature is that it also deals with the COVID-19 alerts, which are generated from the temperature sensor. Therefore, it protects the premises not only from any unauthorized access but also protects the premises from any infected person.

KEYWORDS

Cloud Computing, IoT, KNN, OpenCV, Raspberry Pi, Temperature Sensor

1. INTRODUCTION

As security is crucial nowadays, every organization needs a path to keep unwanted or unauthorized person outside the premises to make their organization fully secured. It is feasible to develop a secure system that can be accessed remotely by humans. The efficient way of dealing with security is by using low powered embedded devices and software because the efficiency of the system should be increased and the energy consumption for the entire process should be decreased.

IoT is a powerful technology with which every single thing can connect with the internet and can perform the dedicated task assigned by the human without any human involvement. IoT devices like Raspberry Pi (Patil et al., 2017), pi camera, sensors such as motion sensor and temperature sensor are low powered and hence consumes less energy and perform the desired task. Moreover, combining this

DOI: 10.4018/IJDST.339685

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technology with OpenCV (Akbas & Ahuja, 2020) results in the production of the two-dimensional output from the three-dimensional article. This helps us to determine the vehicle's and the person's identity. Identification of this information generates the data from the devices.

Now it becomes difficult to handle the large amount of data that is generated from IoT devices through sensors or pi camera from an external environment. In order to store the entire data and analyze the data, cloud computing comes into the role. Cloud computing is the delivery of the resources required by the user and provides the space to store a large amount of data. Hence, combining IoT, OpenCV and cloud computing provides the path to ensure the desired task to get completed.

The main aim of this research is to prevent the presence of any unauthorized person within the premises. The primary objective is to reduce human work and accomplish the task of security automatically (Penmatsa & Ganta, 2020). As automation becomes the prime factor for the security, this paper aimed to design and implement an automatic security system with the help of low powered devices and the system that provides overall control to the owner remotely.

Moreover, this research also deals with the problem of the pandemic situation by deploying the temperature sensor that automatically allows only those people into the premises whose body temperature is normal. Hence, it is an efficient security system (Indumathi & Gitanjali, 2020) that ensures security, provides convenience to the user, being energy efficient and provide remote connectivity. When the device automatically alerts the status of what is going on at your place ensures security. Moreover, the devices interact with each other and decide without any human involvement. All the activity gets automatically completed that provides convenience to the user.

2. RELATED WORK

Some of the methods are discovered over the last couple of years on the image processing technique using OpenCV for object detection. There are several ways for extraction and identification of the number from the number plate. Moreover, there are also several algorithms designed in order to recognize the face. Additionally, IoT draws attention to the security of possession remotely. So, we can see (Table 1) the different ways that are carried out in previous years (Reddy, Marla, Favorskaya, Satapathy, Singh, Bansal, Kamal, & Kumar, 2022).

In the last four years, there has been a drastic change in the development of smart and intelligent security system. Over the year, various systems are developed which enhances their previous shortcomings. But some of the challenges persist which needs to be eradicated. These challenges include accuracy, proper orientation, high resolution and limitations of hardware components used (Reddy, Marla, Favorskaya, Satapathy, Singh, Bansal, Kamal, & Kumar, 2022).

As the main aim of any algorithm is to ensure accuracy, consistency, efficiency and reliability. Hence it becomes more important to cover all the possible cases and deals with them in such a way that the algorithm provides the best result along with accuracy, efficiency, and consistency. In the case of image processing techniques, there are so many such cases that are not deal which reduces the accuracy rate. Such cases are orientation, resolution, and any hardware challenge. So these all cases need to consider which brings out accuracy and consistency (Sharma et al., 2020; Singh, Bansal, & Kumar, 2020).

3. PROPOSED METHOD

There are several modules in our proposed system that combines to ensure the security of the premises. In this system, we use microcontroller i.e., raspberry pi in order to control the function of all modules and provide the required output according to the way it is programmed. Here, raspberry pi connects to the face detection and recognition module and number plate detection and recognition module. The pi camera is the main component which is responsible for taking all the inputs in form of images iff there is any motion detected from the motion sensor (Fig. 1). From the image, it is determined

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