Rover Control using Optimized Frontal Face Detection Algorithm Based on Opencv

Gowri Shankar R H

Abstract: Real-time surveillance is a vital component in any situation or environment where there is a high need of security for both personal and commercial property and assets. Technology today is used in many different ways in order to provide us such surveillance. An ideal solution for surveillance involves not only the assortment of necessary sensors and devices using appropriate tools, but also should be provided in the most optimized way for obtaining feed and data while keeping the expenditure minimized. In our project, we aimed at developing a low-cost, real-time land mining mini-rover which will be capable of providing real-time face detection using OpenCV and roam around in the area which we want to observe. Our target was to use hardware which is very low of cost and easily available. Since the time of industrial revolution, there's an ever-growing call for the growth within the power and assets. There are several techniques and methods to extract resources from earth, one such approach is mining. There had been a variety of incidents when you consider that the appearance of mining. Explosions, temperature variations, suffocation due to inhalation of dangerous gases have taken the lives of many. Henceforth, the safety of mine employees ought to be the primary precedence. There are several precautions taken such the use of personal safety gadget consisting of helmets, protection goggles, torches and many others. Mines are required to have adequate lighting and ventilation structures, however in most mines, use of such systems are not possible. But those precautions do now not ensure the complete protection of the employees. Working in an unexplored, unpredictable surroundings in spite of many precautions is fraught with risks. An approach for measuring temperature and detecting dangerous gases at those websites via the use of an unmanned rover is proposed. The facts is continuously transmitted to the base station computer the use of the ZigBee transmitter. Using the records received, the mine is mapped and the mine situations are constantly monitored.IOT is used here to monitor the current temperature status of the rover which is deep inside the mine. By using a wifi module named ESP8266 12E the IOT connection is established to the rover and cloud. The temperature is calculated and uploaded in the cloud.
Keywords: openCV, IOT Frontal face algorithm,mining.

I. INTRODUCTION

Face detection is a computer vision technology that helps to visualize human faces in the digital images. This technique is specifically used in case of object detection and recognition in a digital images and videos. With the advancement of technology, the face detection has gained a lots of importance especially in fields like photography, security and marketing. In order to detect any other object we need the difference in color and gradients which is captured in the camera. But more than that the appearance of the object is very important. There are several techniques and methods are there to detect the face. In this project frontal face algorithm is used to detect the face of the human.

Gowri Shankar R H, Senior Software Developer,Department of ETW,Robert Bosch Engineering and Business Solutions Private Limited (RBEI),Coimbatore-641035, Tamil Nadu, India.

Processing software is used which is a graphic and drawing tool. The face is continuously transmitted to the base station computer with the use of the zigbeetransmitter. Using the record received, the rover is controlled and monitored. The system is divided into two parts: transmitter and the receiver section. The transmitter section will transmit the face which is recorded in the camera through zigbee transmitter and the second section is the receiver section the output from the transmitter is given as a input to the receiver section which is used to control and monitor the rover.

II. RELATED WORKS

This paper deals with a real time face detection on mobile phones for the criminal detection.This is very efficient for security purposes. This paper focuses on the development of the client-side of frame work face detection and tracking using a android mobile phones[1]. In this research,the face recognition method is integrated in robot. This will apply the human face recognition using a eigen face approach.PCA involves for the mathematical procedure to derive the face recognition[2]. In this paper it is the extension of the opencv library. Here they used GPU architecture[3]. This paper focuses on the advancement of the face recognition and the challenges in recognize the face under the different set of lighting's[4]. This paper deals with a hardware architecture of the face detection system using a re-configurable devices. The Ada boost algorithm with Haar-classifier is applied to a re-configurable device[5]. This paper evaluates two methods of the face detection and the local binary pattern based on the detection of the hit rate and the speed of the detection[6]. This research in based on ada boost algorithm and the face detection based on a skin color. This method is has high accuracy of robustness[7]. This paper describes the face detection and tracking algorithm used in computer vision.To improve the accuracy of detection kalman filter and Cam-shift is used[8]. This paper explores a human robot for mutual communication system by used can communicate with an information terminal. This system is based on the facial expression system[9]. In this paper the facial detection is done by using a image processing based on opencv for face detection, tracking and recognition for automotive applications[10]. This paper presents the developments of tracking the visitors. This system provides object detection by used and the retrieves of the visitors data[11].

III. EXISTING SYSTEM

In the existing model,The real-time face is detected using opencv and simplecv libraries by using the face detection algorithm. The face is detected by using Haar-classifier and ada boost algorithm is used to detect the face. Here

processing software is used to implement the algorithm.The face is detected which is visible in the frame.The drawback of this model is when there is when there no face is present it shows a false detection like a face is detected in the frame this is the major drawback of this model.

IV. PROPOSED SYSTEM

By detecting the face the rover is controlled and monitored accordingly. This paper can be extended by adding the temperature and gas sensor which is used for commercial and industrial applications. This application can also be used for industrial and commercial applications. Which is also used for the physically challenged people by controlling the wheel chair.It is also used for mining purposes and industrial applications.The rover is the prototype of this idea. The main objective of my paper is the rover is controlled and monitored by Face Detection using opencv with Frontal Face detection Algorithm. The Movement of a Rover is controlled by Face Detection. By extending the application of this paper to industrial and commercial applications. The temperature sensor and gas sensor is used to find the temperature and gas leakage of the place where the rover moves is calculated and updated in a Cloud. Which can also be used in the industrial and commercial applications.

A. Block Diagram

The block diagram consists of two sections that is transmitter and the receiver sections which is shown in the below figure 1 and figure 2.
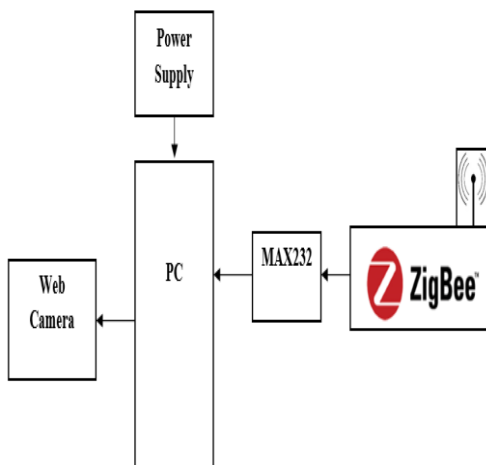

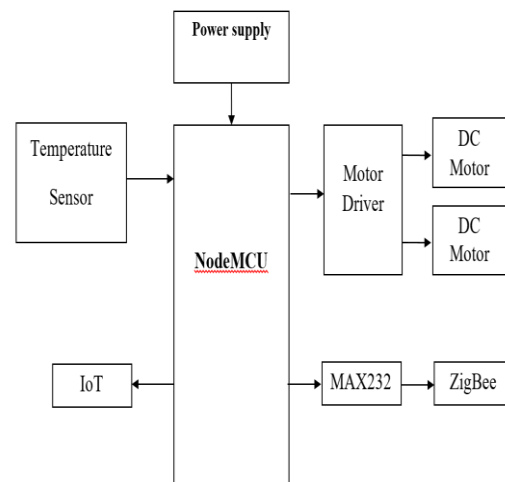**Figure 1.** Block diagram of the transmitter section

Figure 2. Block diagram of the receiver section

B. Implementation

The block diagram figure 1 and 2 which explains the sections that is transmitter and the receiver section. In Figure 1 the transmitter section it contains camera, zigbee and the Personal Computer. The algorithm which is used here is Frontal face algorithm to detect the face using Processing software. The Processing software is a graphics and drawing tool, Which will produce the output in a graphical form.The output of the camera is given as input to the receiver through zigbee . The processor is used to implement the algorithm which is used to detect the face. The processor is used to store 'n' number of programs. zigbee is used for Wi-Fi streaming.In Figure 2 the Node MCU is used as a controller to control the rover. In this section the ZigBee is used to get the input from the transmitter. The rover model issued as a prototype here. The rover is controlled by the face detection which is given as a input to the receiver section. By moving the face the rover is controlled in all five mandatory actions such as four direction and stop. The temperature of the particular area where the rover travels is uploaded in the cloud.

V. METHODOLOGY

The face detection is the important step is the face recognition system. There are many techniques to detect the face. This paper deals with the face detection using a frontal face detection algorithm. The prototype has two sections that is transmitter and the receiver section. The rover is controlled by the facial detection .The direction of the rover is controlled by the movement of the face. The output of the transmitter is given as a input to the receiver through zigbee module. The algorithm which is used to detect the face is frontal face algorithm.The temperature and gas sensor can also be used to detect the temperature and gas leakage detecting purposes. Which can be further used for industrial and commercial applications. By using internet of things technology the output is updated in the cloud. This application can also be used for physically challenged people by interfacing it with the wheel chair. By using the temperature sensor the

temperature pf the particular area where the rover travels is calculated and the temperature is uploaded in the cloud.
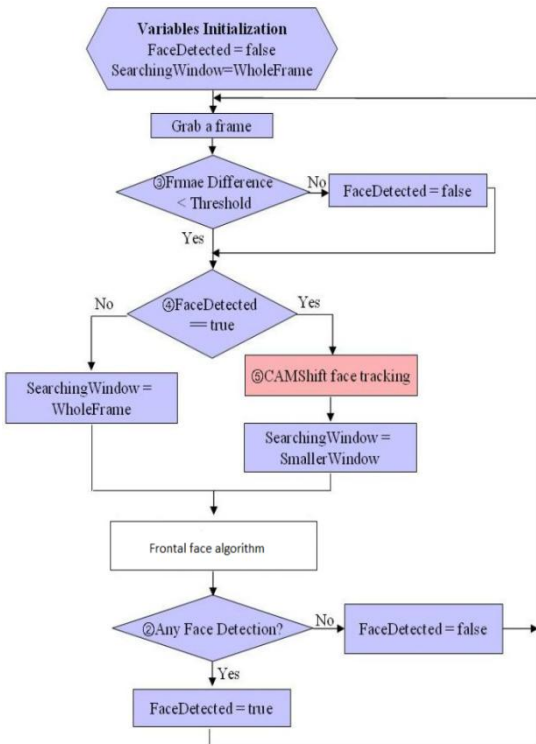
VI. FLOW CHART

Figure 4. Flow chart of frontal face algorithm

The above flow chart Figure 4 shows the flows of a face detection method and shows how the frontal face algorithm works. Until the face is detected in the frame this flow will be continued.

VII. RESULTS

The below figure 4 shows the hardware connections and the prototype of a rover model. The controller and other components are connected to the rover. The figure 5 shows the output of the face detection which is controlled by all the directions that is forward, backward, left and right. The frame is partitioned for four directions to control the rover and the temperature of the particular area where the rover travels is calculated and it is uploaded in the cloud.
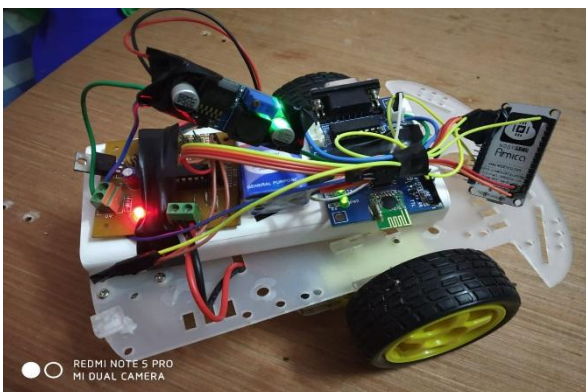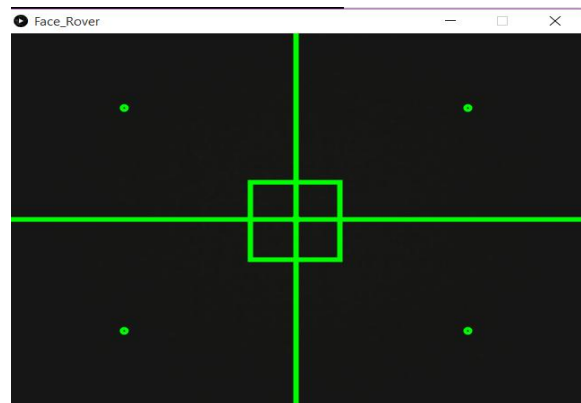

Figure 5 Rover with IOT Connected

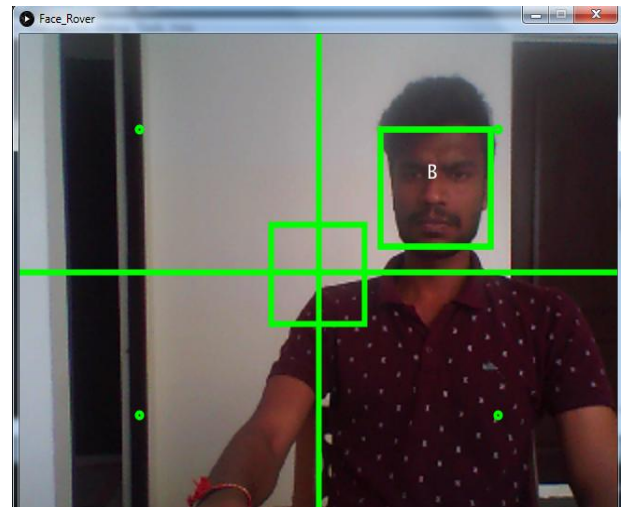**Figure 6 facial detection Screen (Blank)**

Figure 7 facial detection Screen (With Face)

VIII. CONCLUSION

As a result, the face is detected and the rover is controlled by all the four direction that is forward, backward, left and right according to the input of the facial movement. This application can be used for industrial and commercial used by adding the sensors. The temperature and gas sensor can also be used to detect the temperature and gas leakage detecting purposes. Which can be further used for industrial and commercial applications. By using internet of things technology the output is updated in the cloud.The future technology will be very easily used by all the people in a efficient way.

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