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HOME AUTOMATION: SMART FAN

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ABSTRACT:
Today's generation is looking forward to easing everything in the best possible way. Human-Computer Interaction goal is to the make system highly usable. In this project, we've come with an idea of Smart Fans. Objective is to use Smart Fans without any remote control. To achieve this, we have used gesture recognition. Using the least of resource (i.e., Camera Sensor), we can control the smart fan. Proposed system enables users to have interactions with Smart fans by recognizing user's gestures. Gestures will allow users to control speed of the fan and turn it on and off. Interacting with physical world using expressive body movements is much more comfortable and practical than just speaking. Main aim of project is to make system highly usable by all kind of people (including differently-abled people). Otsu thresholding is applied to separate the foreground and background.
Finally, template-based matching technique is developed using Principal Component Analysis (PCA) for recognition.

INTRODUCTION

Today's generation is looking forward to easing everything in the best possible way. Human- Computer Interaction goal is to make system highly usable. Objective is to use Smart Fans without any remote control. To achieve this,we have used gesture recognition. Using the least of resource (i.e., Camera Sensor), we can controlthe fan. Proposed system enables users to have interactions with Smart fans by recognizing user'sgestures. Gestures will allow users to control speed of the fan and turn it on and off.

LITERATURE REVIEW

1. Mandeep Kaur Ahuja & Amardeep SinghResearch Scholar and Professor Computer Engineering Department Punjabi University Main Campus, Patiala, INDIA mandeep.ahuja03 @gmail.com, Year-2015, Publishe-IEEE, Static Vision Based Hand Gesture Recognition Using Principal Component Analysis (In this paper the hand gesture recognition system is developed using skin color model, Otsu Thresholding and PCA. the proposed model isn't capable of the working with the images containing hands of other than skin color. The proposed model does not evaluate the images clicked in other light colors where the hand gestures has been clicked and the model work only with static gesture. In future the system can be upgraded to support dynamic gestures and an application for controlling medical operations can be developed using the system).

2. Hiroaki Yabe,Takuichi Nishimura,Ryuuic hi Oka Tsukuba Research Center Tsukuba, 305 Japan yabe{nishi,oka} @tic.rucp.or.jp ToshiroMukai Multimodal Functions Sharp

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Lab 1-9-2,
Nakase, Mihama-ku, Chiba, Japan mukaiQiml.mkhar. sharp.co.jp, Year-2015, Publishe-IEEE, Recognition of gestures using morphological features of networks made of gesture motion images and word sequences (This paper proposes a method to recognize human gestures using both motion images and texts. The method uses two kinds of network models to obtained from two kinds of sequences in a style of selforganization. They extract common and singular parts of gesture by analyzing the topology of the network of gesture motion images. The proposed method for recognizing gestures and uses morphological features between two networks that make of gesture motion images and word sequences. We showed the usefulness of the method through an experiment using database composed of pairs of gesture motion image and text).

3. Sunila Gollapudi S. Gollapudi, Learned Computer Vision Using OpenCV, https://doi.org/10. 1007/978-1-4842- 4261-2_2, Year-2019, Publishe- S. Gollapudi, OpenCV with Python (This is a lesson manual about OpenCV using python. The manual will cover setting up your system with OpenCV and the Python libraries, understanding key modules and out-of-box functions for computer vision implementations, and learning the syntax for scaling up).
4. Ola Younis, Waleed Al-uaimy, Fiona Rowe andMohammad H. Alomari, Year-2015, Publishe-IEEE, Real-time Detection of Wearable Camera
Motion Using Optical Flow (The proposed approach has been tested on the real first-person perspective video captured by the wearable camera.
The experimental results demonstrate that the proposed method classifies the type of motion is successfull in real-time and can be used as part of low-cost wearable solutions for various forms of vision loss assistive technologies. Promising performance results of 84% correct states for camera motion detection were obtained.).

OBJECTIVE

To recognize fingers in the environment.
Applying segmentation to dividethe fingers and background.
Applying Otsu thresholding toobtain the fingers' outlines in image.
Applying high boost filter tosharpen the image.
Counting the fingers so as to change thespeed of the fan from 0 to 4
Cosine Angle Between the figures
Contours Counting

TECHNOLOGY USE

- Segmentation of Fingers and extraction ofoutline of finger.
- Motion detection using absdiff() functionfrom CV2 library.
- Otu's Thresholding to convert colorfulimage into binary image.
- Gaussian Blur.

WORKING

With growth of technology in various fields, there has been a lot of digital improvements in various sectors. Now we are exploring various options to combine technology to improvise the equipment's. Our proposed system is product based focusing on equity. Differently-abled people or Senior Citizens in using the equipment's faces problems. But with our Proposed model we can overcome this problem.
Smart fans and ordinary fans: Normally with ordinary fans, user have to look for remote or manually rotate the switch for operating it. The technology of switch is not mobile.

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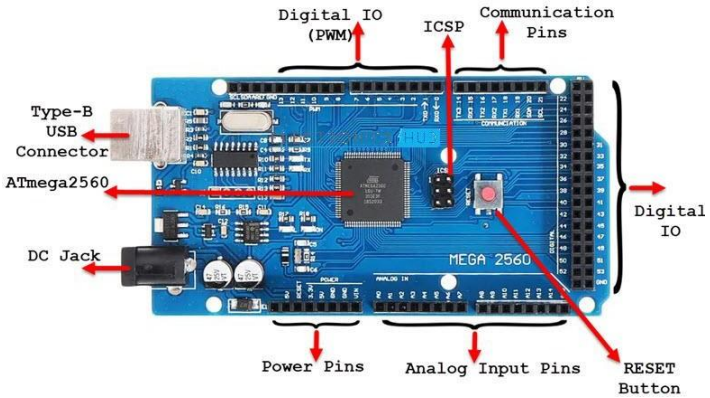
However,remotes are mobile. But Remotes are liabilities, which needs to be taken care of. Our proposed model is about using the gesture pointed at camera. The camera could be attached to fan if the fans are wall fans, but for ceiling fans CCTV cameras can be used. With motion detection technology used, the Smart fans technology could be further expanded into secret surveillance system.

- Gesture Recognition: It is a staple method of interaction especially for the deaf, differently abled and the blind people.

Segmentation: The image captured by the camera is divided into multiple segment.
Otsu thresholding: It helps to returna single intensity threshold that separate pixels into two classes, foreground and background.
High-boost filter: It is used for amplifying high frequency components of signals and image which results in image sharpening.
Cosine angle:
Contours counting: contours represent the shape of the object found in a image that is captured by camera.

- Motion Detection: It detects the motion of the user and read it to give thecorresponding response what the user wants.

Capture Frame: frame capture usingOpenCV
Gaussian Blur: As sometimes the capture motions of the user can be blurred deu to the incorrect focus of the camera so to reduce the image noise and reduce detail Gaussian blur is used so that themotions is clearly visible. o Finding contours: weused OpenCV tool to extract contours.



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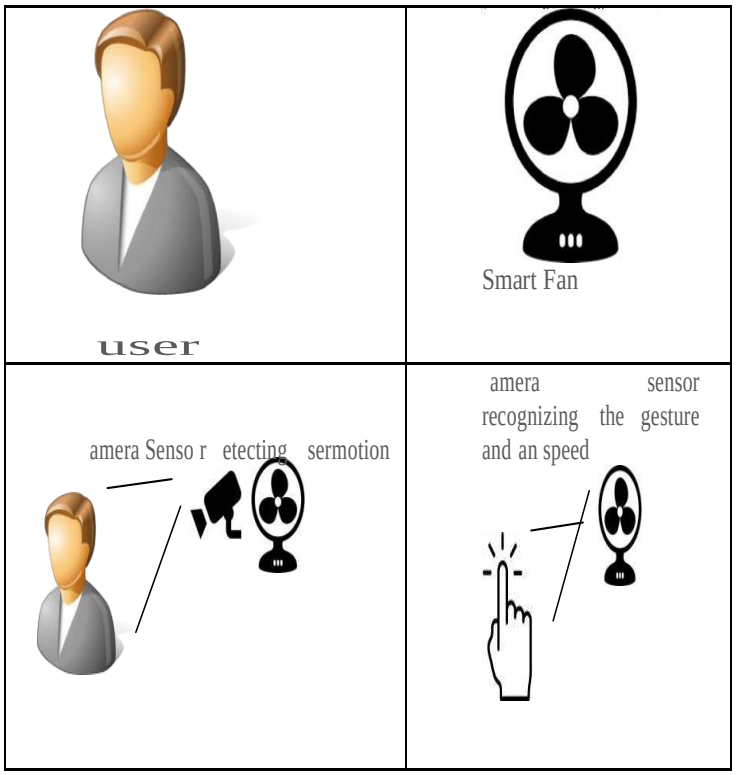
FINAL OUTCOME

Our proposed system will have the outcome of product-based. The user will be able to work on the technology affiliated with the concept of smart fans. They will trigger the events from gesture recognition, which will give the response. Their Motion will be detected from the camera and conclude if there is anyone present in the room.



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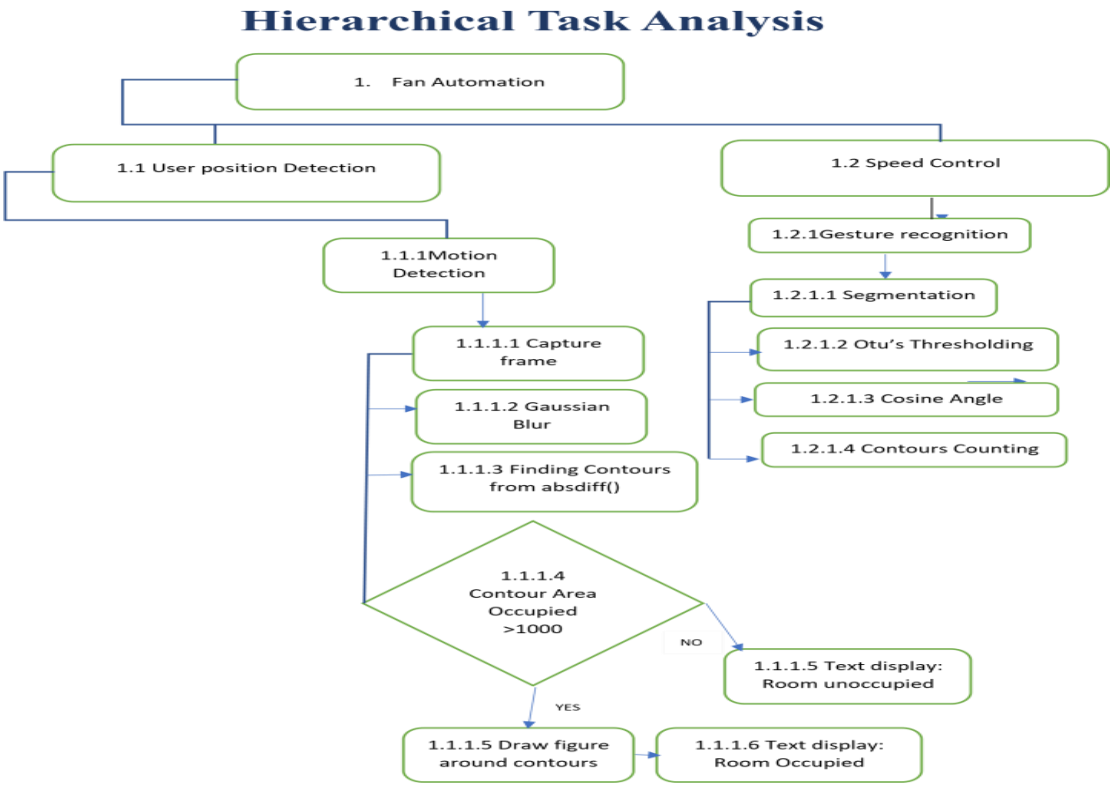
TASK ANALYSIS



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Perez-Pinal F. J., Nunez C. and Alvarez R. 2005 A Novel Speed Control Approach In Parallel-Connected Induction Motor By Using A Single Inverter And Electronic Virtual Line-Shafting IEEE 36th Power Electronics SpecialistsConference (PESC '05) 1339-1345

Nicolae D.V. and Jimoh A.A. 2007 A Three- Phase Induction Motor with Power Electronic Controlled Single-Phase Auxiliary Stator Winding IEEE Power Electronics Specialists Conferences (PESC 2007) 98-103

CONCLUSION

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