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Design and Implementation of Keyboard and Mouse Control based on OpenCV using DLIB Algorithm

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ABSTRACT: The system recommends computer vision to detect defects in images, which sometimes include fabric. Examining sewing defects is an important step in the quality assurance of garment production. Although automated drug detection has been shown to be effective, these systems are often configured with manual features created by the operator. Recently, deep learning methods including artificial neural networks (ANN) have shown success in many computer vision applications. To use the representation of ANNs, we directly investigated the use of maps of layers based on global annotation. In this project, we propose an error detection method to use ANN feature maps extracted from the first set of a pre-training model to detect bursts from captured images of sewing work. Experiments were conducted on a set of stitching images, including original images, synthetic images, and rotated images, to evaluate the effectiveness of the proposed method. As a result, the plan found defects with 97.3% accuracy. Additionally, additional cases were explored for computing tools and deep learning libraries to reduce the call time required for on-the-fly calculations. The results confirm the feasibility of the scheme as a suitable production method for clothing production. This work specifically investigates the hardware integration with the communication interface of the Nano controller. This setting sends a signal to the relay, allowing the system to stop the sewing machine when a defect is detected. The system has the feature that if any defect is detected, the image is captured and sent to authorized personnel using the IMAP protocol, thus improving (not good) the entire management process.

I.INTRODUCTION

Nowadays computers have become the most usable devices. They are used for communication, education, entertainment and scientific research. Unfortunately, paralyzed, elderly, and those with restricted upper limb movement find difficulty to use them. This project focuses on hands free computing and an eye-controlled home automation for the disabled. This project is a real time eye tracking system that will control the cursor movement by tracking the eye movements of the user and mapping it to the computer screen. Realtime execution is obtained by running a web cam (video streaming) and capturing continuous frames of images. Haar cascade algorithm is applied in each frame to detect all the faces in the image. Next, facial landmark detector is applied in each face detected to obtain facial features like eyes, eyebrows, nose, mouth etc. Specific region of interest, eyes in this case, is considered and some image processing techniques are applied for better performance in eye tracking. Eye tracking is done by tracking the position of limbus whenever the users gaze changes. Cursor can be controlled by specific functions in the Python library. A delayed eye blink performs the click action on the device. The using web cam frame by frame images of the patient is captured continuously (Image capturing). Face and eyes of the patient is detected from the image using Facial Landmark Detection. Using Facial Landmark Detection eye coordinates are obtained and by using those coordinates we are able to track the eye movements. Then by mapping those coordinates with the computer cursor coordinates, cursor control can be achieved. A small delay is established such, that if the blink time is equal to the delay time click action is performed.

II.OBJECTIVE

- This developed system helps the people especially the handicapped to use the computer easily using their face movements and the webcam of the system.
- By keeping the track of their face movements this model helps the people to left click and right click the mouse pointer.

- Easy interaction with computer without using mouse.
- In addition to this we are implementing the writing technique for blind people using 40 capacitive touch sensors on hand gloves for making customized information to convey the peoples.
- The 40 TTP223 Sensor used for alphabetic (A to Z) 26 sensors, 10 sensors used for numbers (0 to 9) 4 sensor used for enter key and cancel key and miscellaneous.

III.LITERATURE SURVEY

Microsoft Kinect is integrated to obtain mathematical information such as the location of different joints in the user's body and the distance or angle between different joints. Thus, 14 features can be defined that will lead to a decision tree to determine whether the user is in an emergency situation: medical, life-threatening, or damage. [1] It systematically prioritizes native interactive input over mouse input and performs better on parameters such as speed and accuracy. It seems that artificial intelligence technology has achieved great results in gesture recognition. It is important to understand the advancement in skills in gesture recognition to provide stronger and more reliable recognition with shorter response time [2]. Inertial measurement units (IMUs) and magnetometer sensors are used in many studies in the field of audio data collection for virtual keyboards. These sensors are being integrated into wearable devices such as smart rings to capture complex information about typing. Keystroke recognition methods continue to evolve and focus more on data analysis. This work involves combining acceleration data, gyroscope data, and magnetometer data to see the nuances of motion. Previous studies have investigated the importance of these different types of information in improving the robustness and accuracy of keystroke recognition systems. [3]. Finally, this work is motivated by our desire to create a way to control computer systems based on natural interactions, because it is a better and faster way to interact with users and has additional functions. People can also benefit from this [4].

IV. EXISTING & PROPOSED SYSTEM

1.EXISTING SYSTEM

- On this existing system may additionally warfare with accomplishing high precision and accuracy, main to ability errors in decoding user gestures.
- Gesture popularity systems are frequently influenced through environmental conditions which include lighting and history complexity.
- Variations in those elements can effect the system's performance and cause misinterpretation of gestures, affecting the general user enjoy.
- Customers may additionally face a learning curve when adapting to gesture-based totally interactions.
- Mastering the specific gestures required for one-of-a-kind commands can be hard, and the systems effectiveness can be compromised if customers struggle to perform gestures continually.

1.1 DISADVANTAGES

- Gesture recognition systems are often touchy to environmental conditions consisting of lighting, history, and interference, affecting their overall performance.
- Accomplishing high levels of accuracy and precision in deciphering user gestures remains a persistent mission.

2. PROPOSED SYSTEM

- In this proposed method to enforce the mouse cursor manage based on eye gaze moves the use of deep gaining knowledge of approach. The video of the person is captured by webcam within the machine the usage of Open CV and processed using python. Then, the captured video can be transformed into picture. Then the algorithm starts to detect a face of a person the use of a sixty eight-factor dlib facial landmark algorithm. Facial Landmark Detector encompass pre-trained models. To estimate the area of 68 coordinates (x, y) that map the facial factors on someone's face, the dlib library includes pre-skilled facial landmark detector.
- The following step became to come across most effective the eyes from this body. Then the gaze movement changed into tracked. since the shade of the iris is black, its image has a significantly decrease depth compared to the rest of the eye. This facilitates us in easy detection of the iris vicinity the usage of EAR (Eye issue ratio). Taking the left and proper corners of the eye as reference points, the shift of the iris because the character modified his eyes awareness turned into determined. After detecting the location of eyes gaze by using the use of dlib set of rules and controlling the mouse capabilities which include left-click on, proper-click on, and cursor movement

based on the attention gaze function. And also, the blind man or woman can easily ship the message to authorized people by the usage of capacitive touch sensors, that is connected with terminal software in computer.

2.1 ADVANTAGES

- Arms-unfastened computing, Facilitating the handicapped using the pc.
- Eye based human pc interaction offer actual time eye monitoring and eye gaze estimation.

V. BLOCK DIAGRAM

1. SOFTWARE BLOCK DIAGRAM

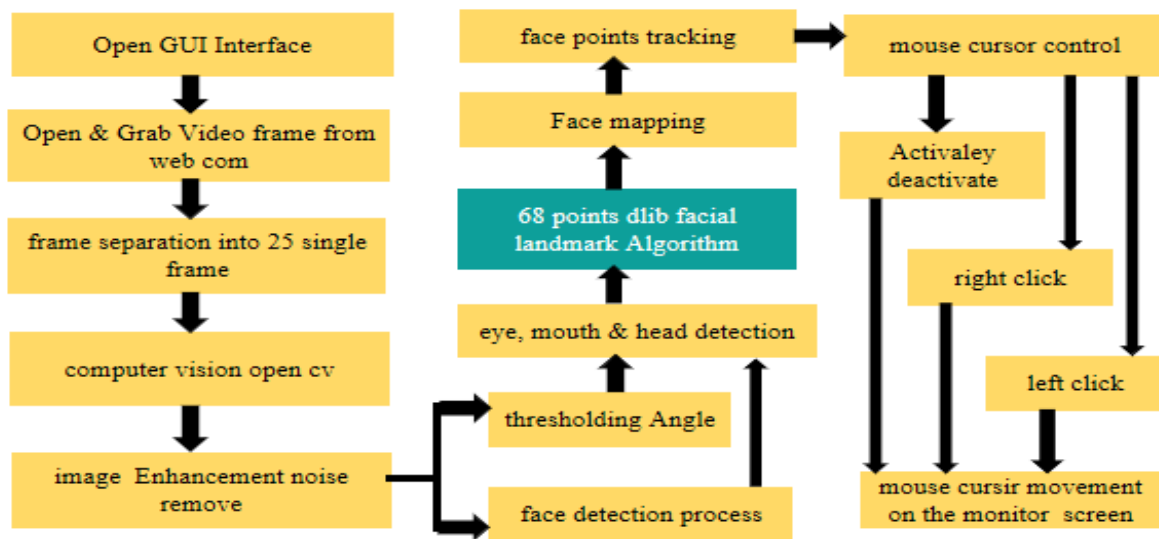


Fig no:1 Software block diagram

2. HARDWARE BLOCK DIAGRAM

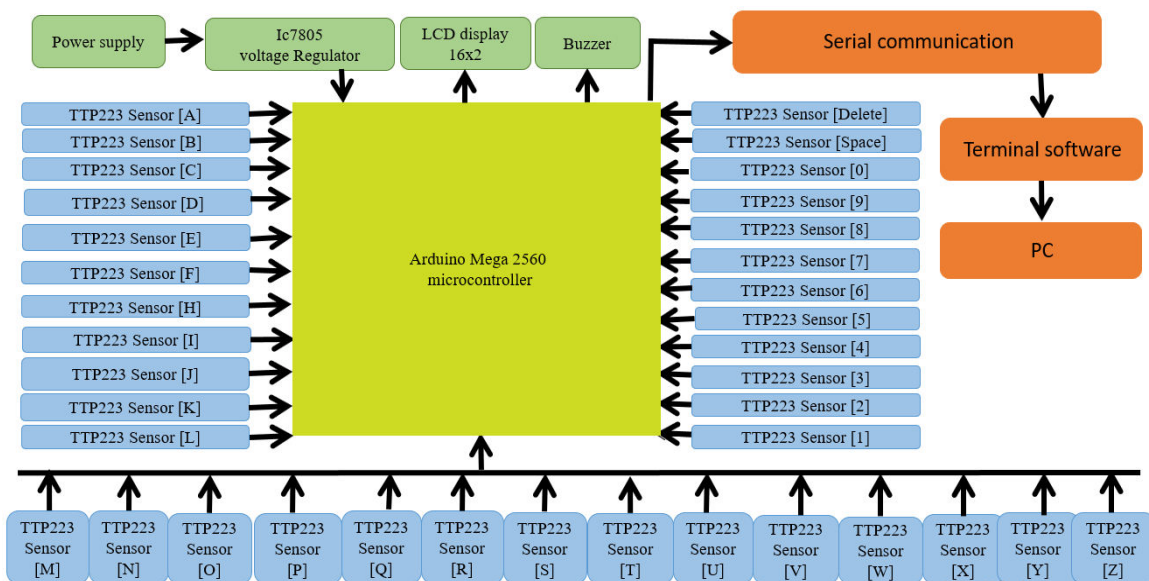


Fig no: 2 Hardware block diagram

VI. HARDWARE REQRIMENTS

1. Arduino Mega 2560

Arduino Mega 2560 is an open supply unique microcontroller board Successor to the Arduino Mega 2560 based totally on the ATmega2560 SMD chip. The Mega 2560 R3 additionally adds SDA and SCL pins subsequent to the AREF. in addition, there are two new pins positioned close to the RESET pin. One is the IOREF that allow the shields to conform to the voltage supplied from the board. the opposite is a no longer related and is reserved for destiny functions. The Arduino Mega 2560 R3 works with all current shields however can adapt to new shields which use those additional pins. The board has 54 input/output pins (15 of which can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), 16 MHz crystal oscillator, USB connection, power supply, ICSP header and reset button.



Fig no: 3 Arduino Mega 2560

2. TTP223 Touch sensor

The TTP223 is a hint pad detector IC replicating a single tactile button. This contact detection IC is designed for changing traditional direct button key with numerous pad size. TTP223 touch Sensor red Module – TTP223 Capacitive contact transfer is made in India and it's far based on a touch-sensing IC (TTP223). It permits you to get rid of the worry of conventional push-type keys. typically, it outputs low and continues at low strength state. while a touch is sensed at the circular marked location, it outputs excessive and switches to the quick reaction nation. whilst no longer being touched for 12 seconds, it switches to low energy nation again.



Fig no: 4 TTP223 touch sensor

VII. SOFTWARE REQRIMENTS

1. FACIAL LANDMARK ALGORITHM

It is the same face mask as the training model; dlib is used to estimate the position of 68 points (x, y) matching the face to the human face as in the image. Dlib is a contemporary C++ toolkit containing system learning algorithms and equipment for creating complex software in C++ to remedy real world problems. it's far used in each enterprise and academia in a huge variety of domains including robotics, embedded gadgets, cellular telephones, and large excessive-performance computing environments. Dlib's sixty eight-factor facial landmark detector has a tendency to be the most famous facial landmark detector inside the laptop imaginative and prescient area because of the velocity and reliability of the dlib library. Face alignment is a laptop vision era for identifying the geometric structure of human faces in digital pix. Given the vicinity and size of a face, it routinely determines the shape of the face additives consisting of eyes and nostril.

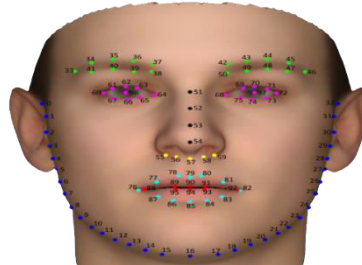


Fig no: 5facial landmark algorithm

2. IMAGE ENHANCEMENT

Image enhancement is the process of changing digital pixels to achieve better results for a photo or image. For instance, you may put off noise, sharpen, or brighten a photograph, making it easier to pick out key functions. The goal of picture enhancement is to enhance the usefulness of an image for a given challenge which includes offering a more subjectively beautiful image for human viewing. In image enhancement, very little try is made to estimate the actual photo degradation technique, and the strategies are regularly ad hoc. In the international of laptop portraits, image enhancement is taking an photograph this is been digitally stored and enhancing its satisfactory with software program. even as no longer truly growing the quantity of unique records, picture enhancement refers to polishing obstacles or adjusting contrast.

3. EDGE DETECTION

Aspect detection is a technique of picture processing used to pick out points in a digital picture with discontinuities, absolutely to say, sharp modifications within the image brightness. those factors in which the photograph brightness varies sharply are referred to as the edges (or obstacles) of the picture.

4. FACE DETECTION PROCESS

Face detection is a essential laptop imaginative and prescient project that includes finding and figuring out faces within an photograph or video circulation. within the context of the proposed challenge, the face detection procedure is critical for beginning the following stages of eye tracking and cursor manage based totally on eye gaze actions. The process starts off-evolved with shooting video frames from a webcam using the OpenCV library in Python. every frame is then converted into an image for efficient processing. The heart of the face detection manner lies inside the usage of the 68-factor dlib facial landmark set of rules. This set of rules employs pre-educated fashions to pick out and map 68 key points on someone's face, such as the eyes, nose, and mouth.

VIII. RESULT

The layout and implementation of keyboard and mouse manage based totally on OpenCV the use of Dlib algorithm efficaciously developed a human-laptop interplay machine that makes use of face movements to control the laptop cursor, putting off the need for a conventional mouse. via employing computer imaginative and prescient and picture processing algorithms, the system tracks the user's face and eye regions in actual-time the use of a webcam. The Arduino Mega 2560 micro controller processes these inputs to writing words the usage of contact sensor. This innovative technique provides an on hand and intuitive way for customers to engage with computer systems, improving usability, mainly for individuals with restrained mobility. The device is value-powerful and gives a realistic alternative to business solutions.

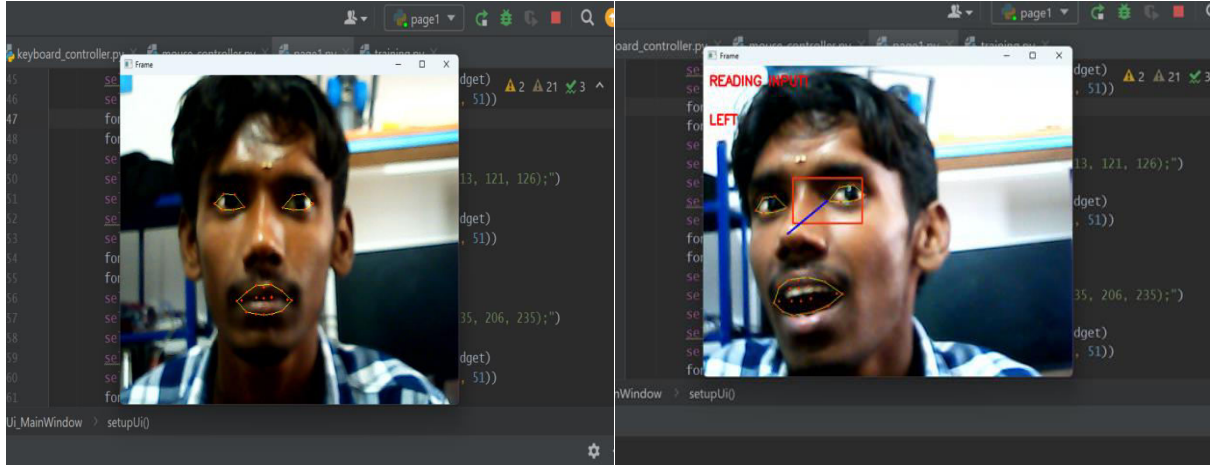


Fig no: 6 Facial landmark detection

Fig no: 7 Cursor movement in left

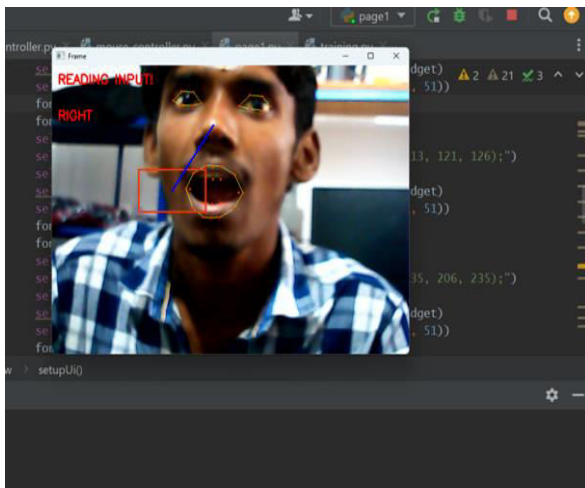


Fig no: 8 Cursor movement in right

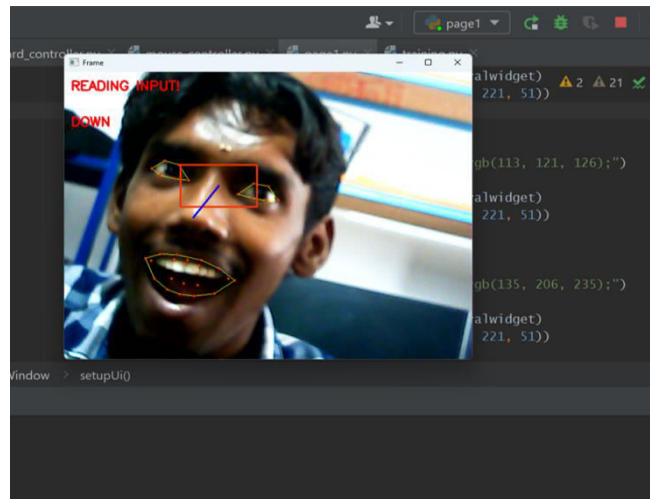


Fig no: 9 Cursor movement in up



Fig no: 10 Gloves sensor connect

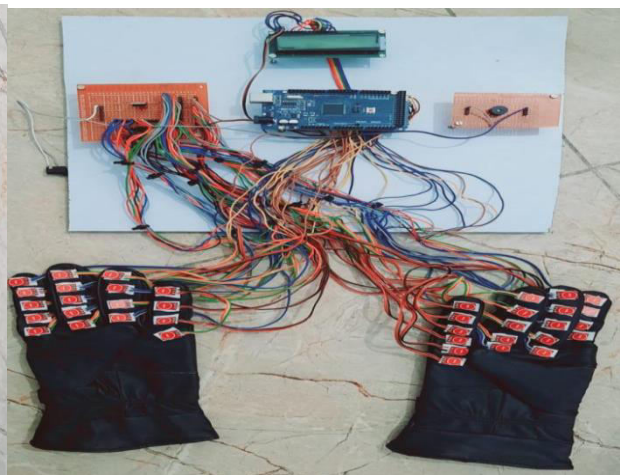


Fig no:11 Hardware Kit over all setup

IX. CONCLUSION

The Human-laptop interaction (HCI) system presented on this project makes use of face motion monitoring as an alternative to conventional mouse input. The system simulates face movements to manipulate the mouse cursor and detects the consumer's gaze for click operations, imparting a arms-loose and intuitive interface. in contrast to current commercial answers, this system gives a price-effective method with greater usability, overcoming barriers in present day technologies. by incorporating face mapping, the machine no longer only interprets facial expressions into cursor moves however also permits gaze tracking, revealing a user's point of hobby and cognitive focus. Implementation entails laptop vision and picture processing algorithms, ensuring actual-time tracking of eye areas thru a webcam, growing a extra inclusive and responsive computing experience. The task is an Arduino Mega 2560 microcontroller for processing written phrases through touch sensors, facilitating revolutionary communicate methods linked with computer.

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