
# Mini-Project on Virtual Air Keyboard

# Introduction

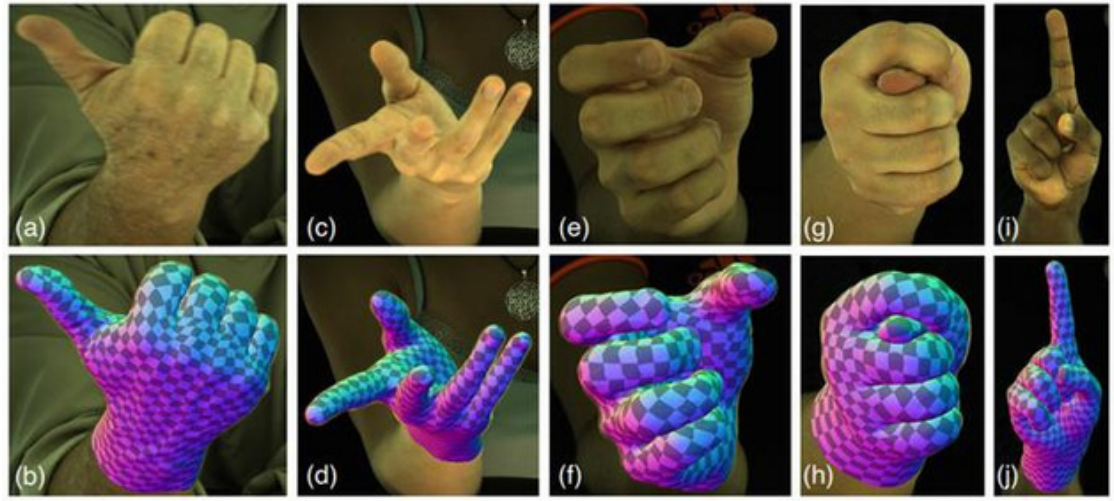
**Introduction**

In today's digital world, we are constantly interacting with screens and devices. One of the most common ways we interact with these devices is through typing. However, typing on a physical keyboard can be difficult and uncomfortable, especially for people with disabilities.

Virtual keyboards offer a more accessible and inclusive way to type. They can be used on a variety of devices, including computers, tablets, and smartphones. Virtual keyboards can also be customized to meet the needs of individual users.

One of the most promising ways to create virtual keyboards is to use computer vision. Computer vision can be used to track the movements of the user's hand and fingers, and to identify the keys that the user is trying to press. This type of virtual keyboard is known as a hand-tracked keyboard.

Hand-tracked keyboards have several advantages over traditional virtual keyboards. First, they are more accessible to people with disabilities. Second, they are more accurate and efficient, as the user does not have to worry about accidentally pressing the wrong key. Third, they can be used on a variety of devices, without the need for any special hardware.



**Motivation****

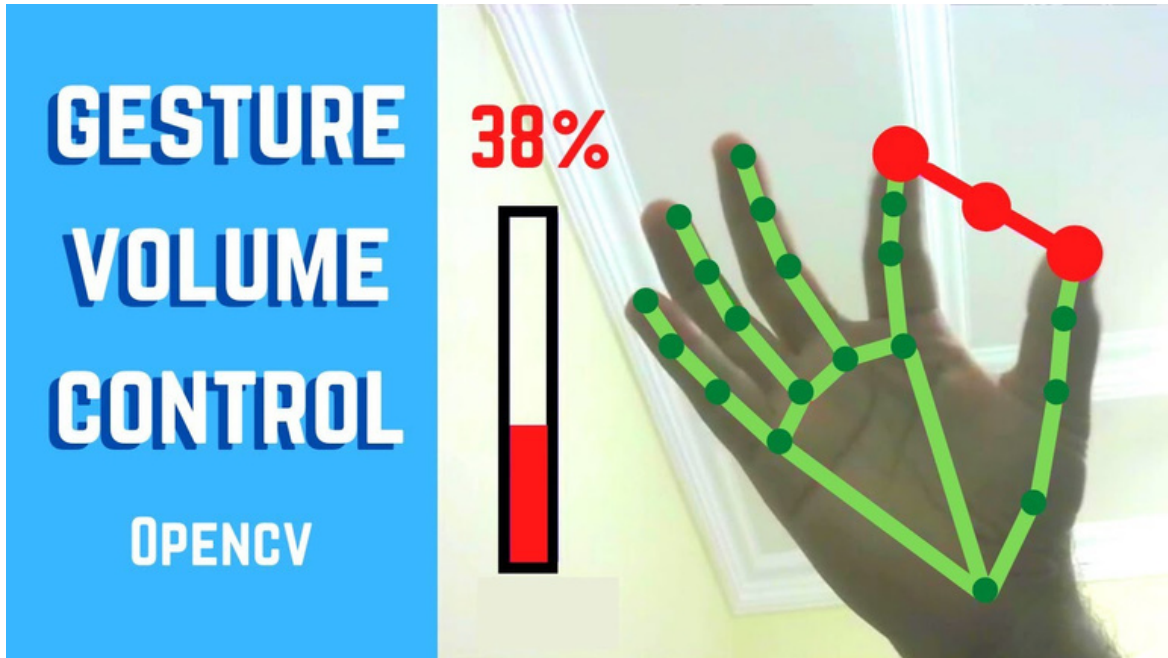
**I was motivated to work on this project by my own experiences with hand-tracked keyboards. I have a friend who has cerebral palsy, and he finds it very difficult to use a traditional keyboard. He told me that a hand-tracked keyboard would be a life-changer for him.**

**I also believe that hand-tracked keyboards have the potential to revolutionize the way we interact with computers. With hand-tracked keyboards, we could type on any surface, without the need for a physical keyboard. This would make computing more accessible and inclusive for everyone.**

****Objectives****

**The objectives of this project are to develop a hand-tracked keyboard that is:**

*** Accurate and efficient**
*** Accessible to people with disabilities**
*** Easy to use on a variety of devices**



# Literature Survey of the existing systems

# ⬤ Limitations of the existing systems

**Literature Survey on Virtual Keyboards**

**Real-world solutions: There are a number of real-world solutions for virtual keyboards. Some of the most popular ones include:**

**On-screen keyboards: These keyboards are typically displayed on a touchscreen device, such as a smartphone or tablet. Users can interact with the keyboard by tapping on the keys with their fingers**
**Laser keyboards: These keyboards project a laser image of a keyboard onto a flat surface. Users can type by typing on the projected keyboard.**
**.Air keyboards: These keyboards track the movement of the user's fingers in the air and detect when the user makes a typing gesture.**
**Issues with existing solutions: Some of the issues with existing virtual keyboards include:**

**On-screen keyboards: On-screen keyboards can be small and cramped, making them difficult to type on accurately. Additionally, on-screen keyboards can obscure the underlying content on the screen.**
**Laser keyboards: Laser keyboards can be expensive and require a flat surface to work on. Additionally, laser keyboards can be difficult to use in bright environments.**
**Air keyboards: Air keyboards can be inaccurate and tiring to use. Additionally, air keyboards can be difficult to use in public places, as they can be seen by others.**
**User requirements and improvements expected: Users of virtual keyboards typically want a keyboard that is easy to use, accurate, and portable. Additionally, users want a keyboard that is affordable and does not obscure the underlying content on the screen.**

- **Leap Motion: Leap Motion is a hand tracking technology that uses cameras to track the movements of hands and fingers in three dimensions. It is used in a variety of applications, including virtual reality, gaming, and user interfaces.**
- **Microsoft Kinect: Microsoft Kinect is a sensor that can track the movements of the entire body, including hands. It is used in a variety of applications, including gaming, fitness, and home**

# About our project

| Technology/ Methodology | Limitations | Advantages | Results Achieved |
|---|---|---|---|
| GUI | Can be small and cramped, making it difficult to type on accurately.<br>Can obscure the underlying content on the screen | Easy to use and understand.<br>Portable | On-screen keyboards are commonly used in smartphones and tablets. |
| Laser projector | Expensive. Requires a flat surface to work on. Difficult to use in bright environments | Portable. Does not obscure the underlying content on the screen. | Laser keyboards are commonly used in virtual reality headsets |
| Camera and computer vision algorithm | Can be inaccurate and tiring to use. Difficult to use in public places, as they can be seen by others. | Portable. Does not obscure the underlying content on the screen. | Air keyboards are still under development, but they have the potential to be the most portable and user-friendly type of virtual keyboard |

# System Design● Technologies and methodologies

**Explanation of each part of the diagram:****

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* **Camera:** The camera is used to capture images of the user's hands.
* **CVZone Pynput:** CVZone Pynput is a library that is used to track hand movements in images.
* **Virtual keyboard:** The virtual keyboard is a graphical user interface that displays the keys that the user can press.
* **Keyboard controller:** The keyboard controller is a software component that is used to send keystrokes to the operating system.
The following technologies and methodologies will be used to develop the virtual keyboard:

* **CVZone Pynput:** CVZone Pynput is a library that is used to track hand movements in images. It is a free and open-source library that is written in Python.
* **Python:** Python is a general-purpose programming language that is used to develop the virtual keyboard. Python is a free and open-source language that is easy to learn and use.
* **PyQt5:** PyQt5 is a graphical user interface toolkit that is used to develop the virtual keyboard interface. PyQt5 is a free and open-source toolkit that is written in Python.

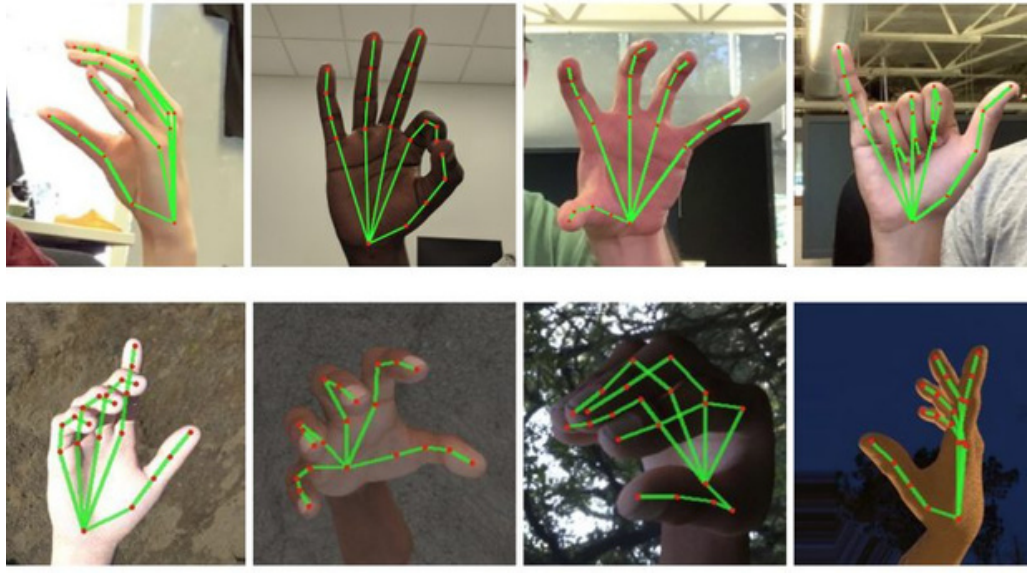
# □Conclusion

**Conclusion and Future Scope**

**The proposed virtual keyboard has the potential to be a viable alternative to existing hand tracking solutions. It is a cost-effective, accurate, compatible, and accessible solution that can be used in a variety of applications.**

****Future scope:****

*** The virtual keyboard could be extended to support multiple languages.**
*** The virtual keyboard could be integrated with other applications, such as word processors and games.**
*** The virtual keyboard could be used to develop new types of user interfaces, such as gesture-based interfaces.**

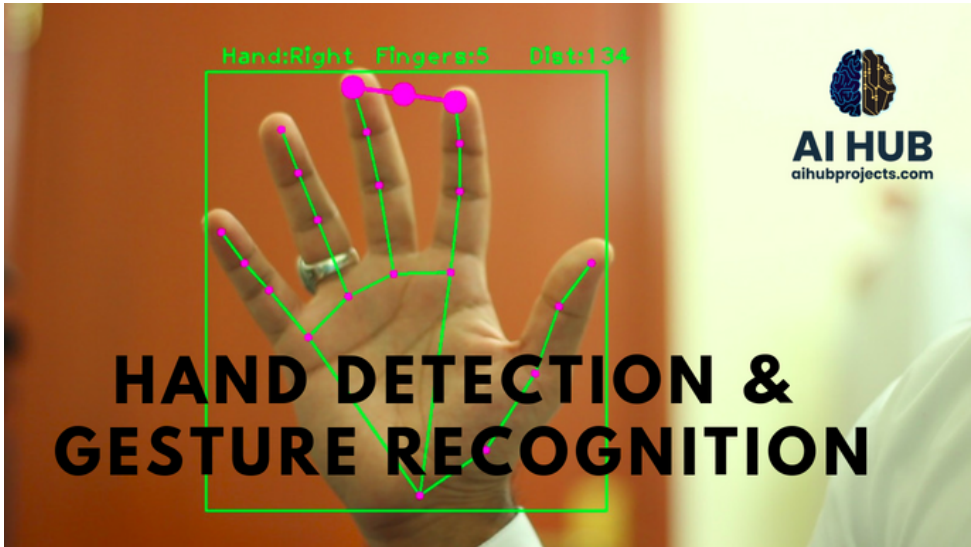


## Additional thoughts:

One of the key advantages of the proposed virtual keyboard is that it is based on open-source technologies. This means that anyone can contribute to the development of the keyboard and make it even better.

Another advantage of the proposed virtual keyboard is that it is highly customizable. The user can change the size, position, and appearance of the keyboard to suit their individual needs.

The proposed virtual keyboard has the potential to be a valuable tool for people with disabilities. It can allow people with disabilities to type and interact with computers in a way that is comfortable and convenient for them.



# References

GitHub
youtube
pycharm official website
handtracking module site