

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY,
BELAGAVI-590018**



**Mini Project Report On
“GESTURE CONTROLLED VIRTUAL MOUSE”**

A report submitted in partial fulfillment of the requirements for

MINI PROJECT

In

**Computer Science and Engineering (IOT , Cyber Security including Blockchain
Technology)**

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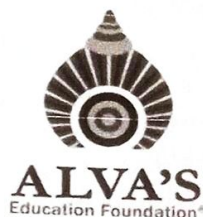
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(IOT , CYBER SECURITY INCLUDING BLOCKCHAIN
TECHNOLOGY)**

ALVA'S INSTITUTE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(IOT , CYBER SECURITY INCLUDING BLOCKCHAIN
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CERTIFICATE

This is to certify that the Project entitled “**GESTURE CONTROLLED VIRTUAL**
MOUSE” has been successfully completed by

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the bonafide students of Department of Computer Science & Engineering (IOT , Cyber Security including Blockchain Technology), Alva's Institute of Engineering and Technology in DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING (IOT , CYBER SECURITY INCLUDING BLOCKCHAIN TECHNOLOGY) of the VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI during the year 2023–2024. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor of Engineering Degree.


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Project Guide


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ABSTRACT

The Gesture Controlled Virtual Mouse makes it simple to communicate with a computer using voice commands and hand gestures. The computer requires almost little direct physical contact. All input and output processes might potentially be managed digitally by combining voice instructions with both static and dynamic hand gestures. This study employs state-of-the-art Machine Learning (ML) and Computer Vision (CV) algorithms to recognize hand gestures and verbal commands, and it works without the usage of any additional hardware. It takes use of CNN-like models by utilizing MediaPipe, which is based on pybind11. It has two modules: one that operates directly on hands using MediaPipe Hand detection, and the other that makes use of gloves of any consistent colour.

- Gesture-controlled virtual mice represent an innovative advancement in human computer interaction, allowing users to control digital devices through natural hand or body movements rather than traditional input devices like a mouse or keyboard.
- This technology is gaining prominence due to its potential in improving accessibility, enhancing user experience in virtual environments, and providing more intuitive interaction methods for gaming and smart home applications. By using sensors such as cameras, infrared (IR) sensors, and motion detectors, gesture based systems interpret a user's gestures—such as swipes, pinches, or pointing—as commands to control a computer's cursor, perform clicks, scroll, or navigate menus. However, the technology faces several challenges that need to be addressed for widespread adoption.
- Key issues include accuracy, particularly in varied environmental conditions, latency (delay between gesture input and on-screen action), complex gesture recognition, and hardware limitations such as sensor sensitivity and range. These challenges can disrupt the seamless experience that gesture control promises.
- To overcome these problems, several solutions are proposed, including the use of advanced sensors and machine learning algorithms to improve accuracy and adapt to different user behaviours. Edge computing can reduce latency by processing data locally, while simplified gesture sets can make the system more intuitive for users.
- Additionally, multi-sensor systems and feedback mechanisms (visual and haptic) can enhance user interaction by providing real time confirmation of actions. Despite these challenges, as technology evolves, gesture-controlled virtual mice are poised to offer a more natural, inclusive, and efficient way to interact with digital environments.
- The continued development of these systems will likely lead to their widespread use in areas such as accessibility, entertainment, and smart technology, making them a mainstream alternative to traditional input methods.