# VISVESVARAYA TECHNOLOGICAL

# UNIVERSITY

**Jnana Sangama, Belagavi-590018**



## COMPUTER GRAPHICS AND IMAGE PROCESSING LAB WITH MINI PROJECT

## A MINI PROJECT SYNOPSIS ON

**‘‘Volume Controller Using OpenCV’’**

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## BACHELOR OF ENGINEERING IN

**COMPUTER SCIENCE AND ENGINEERING**

### For the Academic Year 2024-2025

Submitted by

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PROJECT GUIDE

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**[Affiliated to VTU,Belgavi,Approved by AICTE,New Delhi]**

**ABSTRACT**

In the realm of human-computer interaction, the development of intuitive and efficient control mechanisms is paramount. This mini-project focuses on designing a volume controller using OpenCV, a widely-used open-source computer vision and machine learning software library. The project aims to leverage hand gesture recognition to manipulate the volume levels of a multimedia system, providing a contactless and user-friendly interface.

The core of the system involves capturing real-time video input through a webcam, processing the frames to detect and track hand gestures. Using OpenCV's advanced image processing techniques, such as background subtraction, contour detection, and convex hull analysis, the system identifies specific gestures that correspond to volume up, volume down..

A machine learning model, trained to recognize these gestures, further enhances the accuracy and robustness of the gesture recognition process. The detected gestures are then mapped to corresponding volume control commands, which are executed to adjust the system's audio output.

This project demonstrates the integration of computer vision techniques with everyday applications, showcasing how OpenCV can be utilized to create practical, non-invasive control systems. The developed volume controller not only highlights the capabilities of OpenCV in real-time image processing but also opens avenues for further exploration in gesture-based user interfaces.

**HARDWARE AND SOFTWARE REQUIREMENTS**

**Hardware requirements:**

* **Processor**: A multi-core processor (Intel i5/i7 or AMD equivalent) is recommended to handle image processing tasks efficiently.
* **RAM**: At least 8 GB of RAM to ensure smooth operation and quick processing of images.
* **Storage**: A minimum of 256 GB SSD for faster read/write operations, which is beneficial when handling large datasets and installing necessary software.
* **Frame Rate**: A camera with a frame rate of 30 frames per second (fps) is ideal for real-time video processing.

**Software Requirements:**

* **Operating System**

The system can be developed on any major operating system, including Windows, macOS, or Linux. Ensure that your operating system is up to date to avoid compatibility issues with libraries and tools.

* **Programming Language**

Python: Python is the preferred programming language for this project due to its simplicity and the extensive range of libraries available for image processing and computer vision.

* **Development Platform**

IDE/Text Editor: An Integrated Development Environment (IDE) such as PyCharm, VSCode, or Jupyter Notebook is recommended for writing and debugging code.

* **Libraries and Framework**

OpenCV: OpenCV (Open Source Computer Vision Library) is essential for image processing and computer vision tasks.