**Abstract**

**Hand Gesture-Based Screen Brightness Control**

**Synopsis:** This project implements a real-time hand gesture-based system to control screen brightness using **OpenCV, MediaPipe, and Screen Brightness Control (SBC)**. By tracking the distance between the **thumb and index finger**, the system dynamically adjusts brightness, providing a **touchless and intuitive user experience**.

**Objective:** To design an efficient and **AI-powered hand tracking system** that enables users to adjust screen brightness **without physical contact**. The project aims to enhance **accessibility and usability**, particularly for users with mobility limitations.

**Methodology:**

* **Utilized** MediaPipe Hands for **real-time hand landmark detection**.
* **Processed** video frames using **OpenCV** for gesture recognition.
* **Computed** thumb-index finger distance using **Euclidean distance formula**.
* **Mapped** distance to brightness levels using **NumPy interpolation**.
* **Integrated** the SBC library to **dynamically adjust screen brightness**.

**Expected Outcome:** A functional **gesture-controlled brightness adjustment system** that responds **smoothly and accurately** to hand gestures. The system ensures **seamless brightness control**, reducing the need for manual adjustments.

**Impact:** This project introduces a **contactless interface** for brightness control, enhancing **user convenience and accessibility**. Future improvements may include **multi-hand gesture recognition, AI-based gesture prediction, and voice control integration**, further expanding its usability across devices.

**Name:** Ronak Kumar Bhambu  
**B.Tech AI and Data Science**