

Mirror, Mirror

Project Overview

Mirror, Mirror is a real-time emotion detection system that integrates computer vision with interactive hardware components. Utilizing Python's OpenCV library and a pre-trained machine learning model, this system identifies human emotions through facial expressions captured via a live video feed. The identified emotions trigger corresponding color-coded LED responses in an infinity mirror setup, creating a visual representation of the user's emotional state.

Implementation

Emotion Detection

The core functionality revolves around the emotion recognition software, which operates on the following steps:

1. *Face Detection*: Utilizes a Haar Cascade Classifier from OpenCV to detect faces in the real-time video feed.
2. *Emotion Recognition*: The detected faces are analyzed using a deep learning model, pre-trained to classify five distinct emotions: anger, happiness, sadness, fear, and neutral.
3. *Color Mapping*: Each emotion is associated with a specific color:
 - Anger: Red
 - Happiness: Green
 - Sadness: Blue
 - Fear: Purple
 - Neutral: Yellow

Hardware Integration

Upon detection and classification of an emotion, a signal is sent to an Arduino controller, which manages the operation of LED lights embedded in an infinity mirror. The mirror setup comprises a standard mirror, a two-way mirror, and an LED strip placed between them, creating the illusion of endless light reflections.

Aesthetic Enhancements

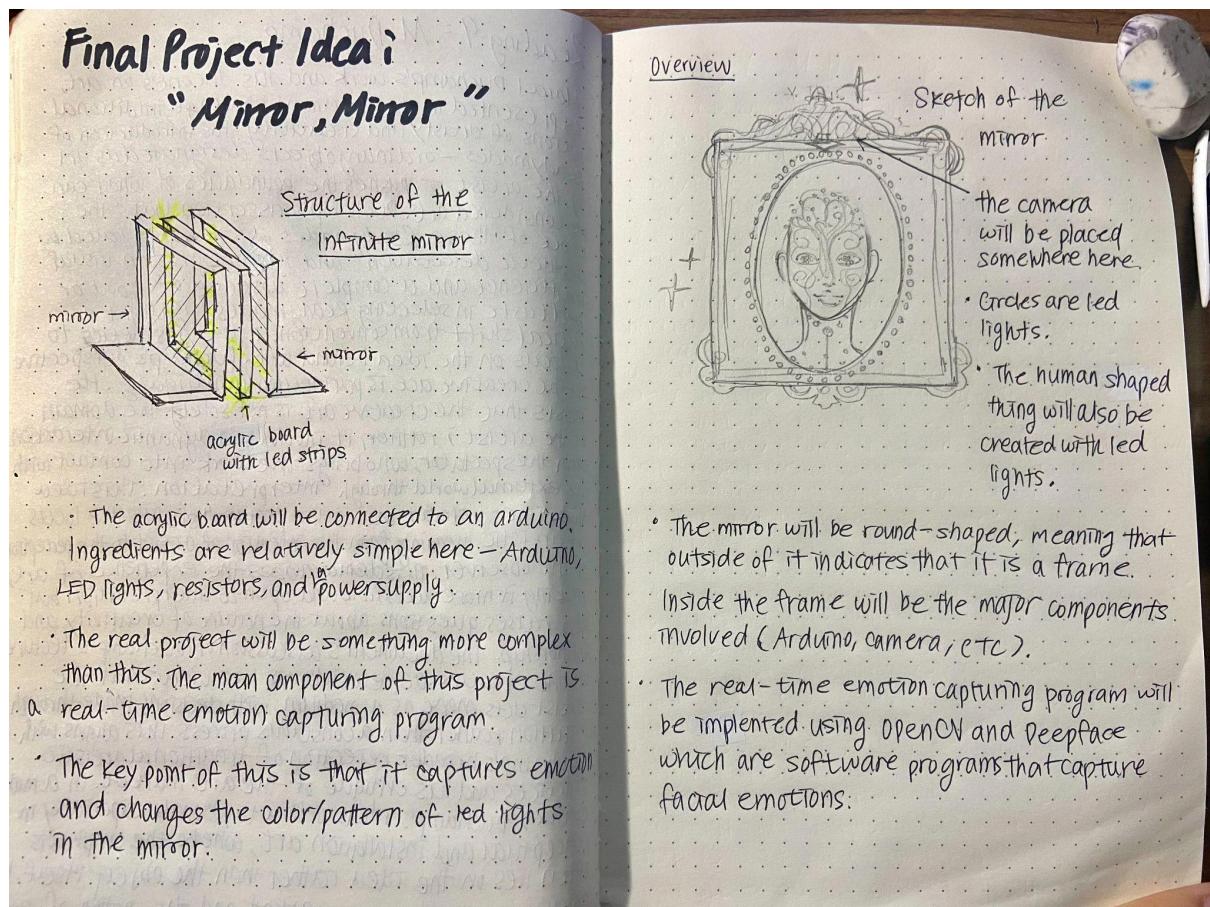
To enhance thematic relevance and aesthetic appeal:

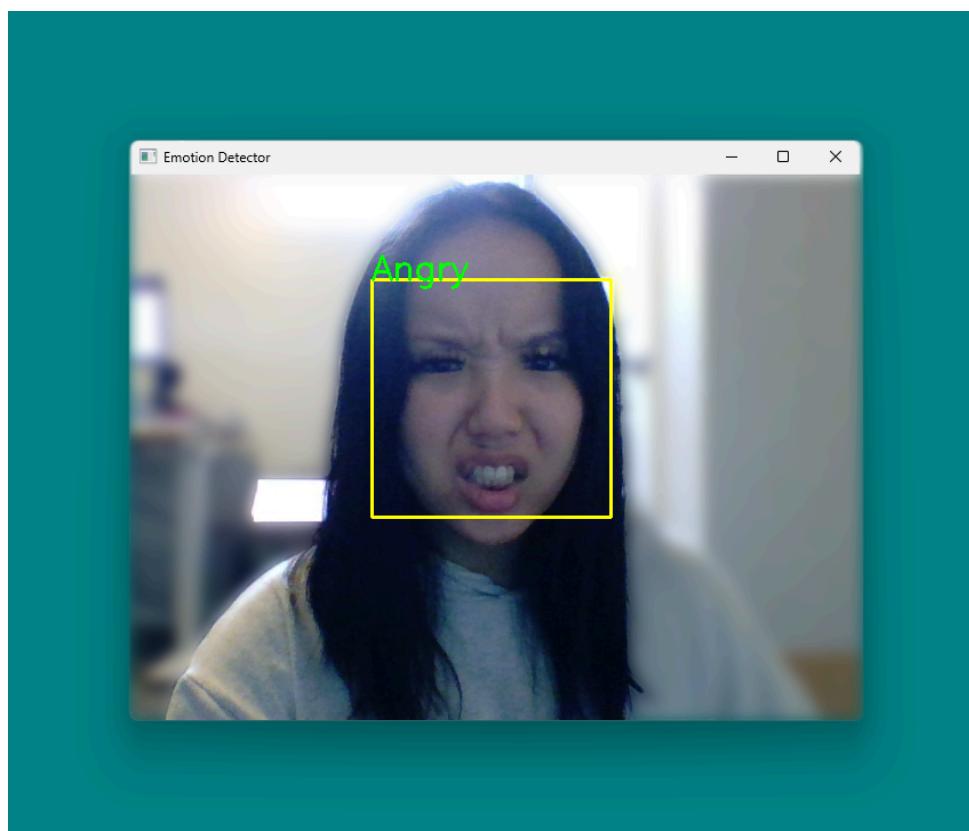
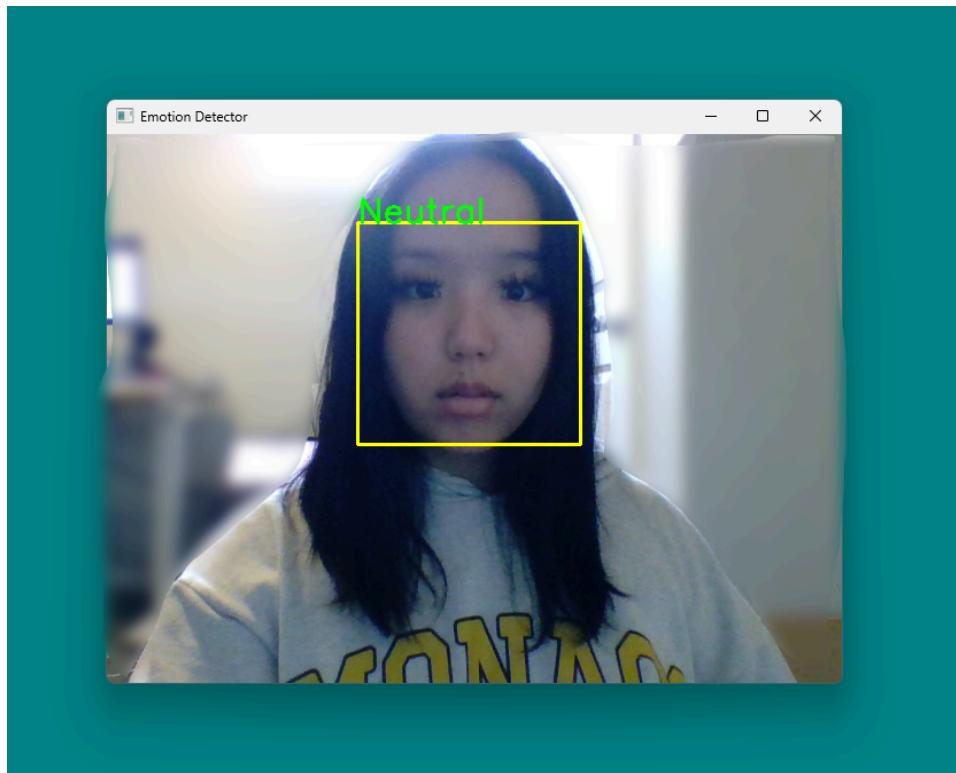
1. The front panel of the mirror features a hand-engraved depiction of the Evil Queen from Disney's Snow White, symbolizing the mirror's ability to reveal deeper truths.
2. The rear of the mirror is illustrated with a hand-painted image of Snow White, enriching the fairy-tale motif.
3. The frame of the mirror, unable to find a suitable pre-made option, was custom-designed and 3D printed, followed by hand painting to match the overall theme.

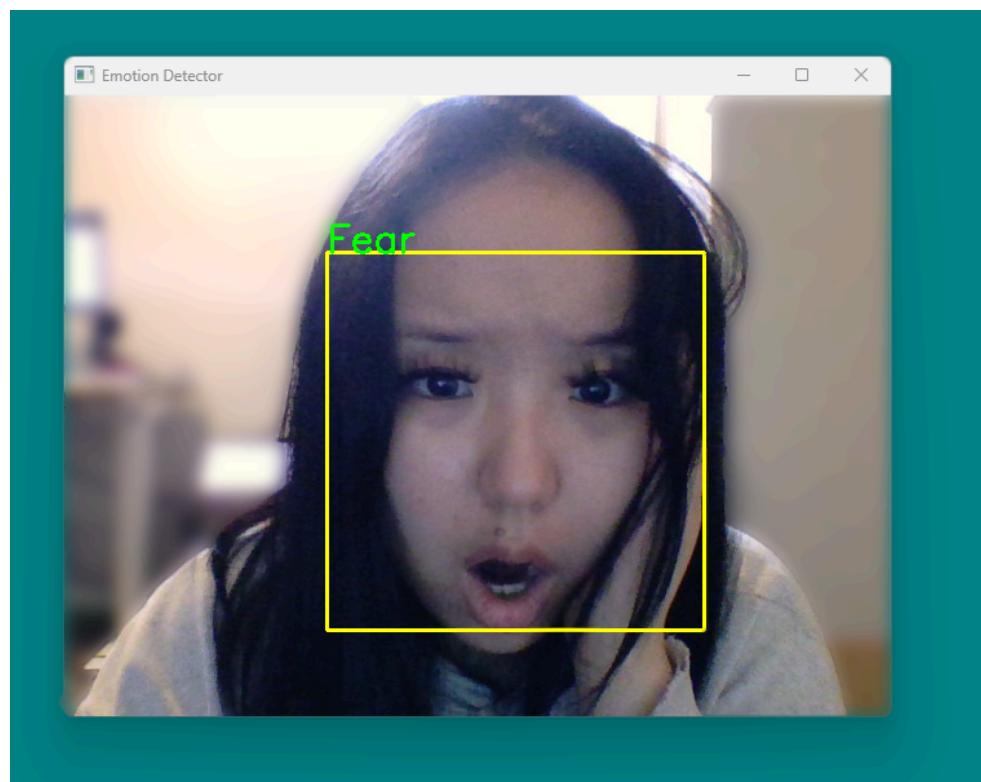
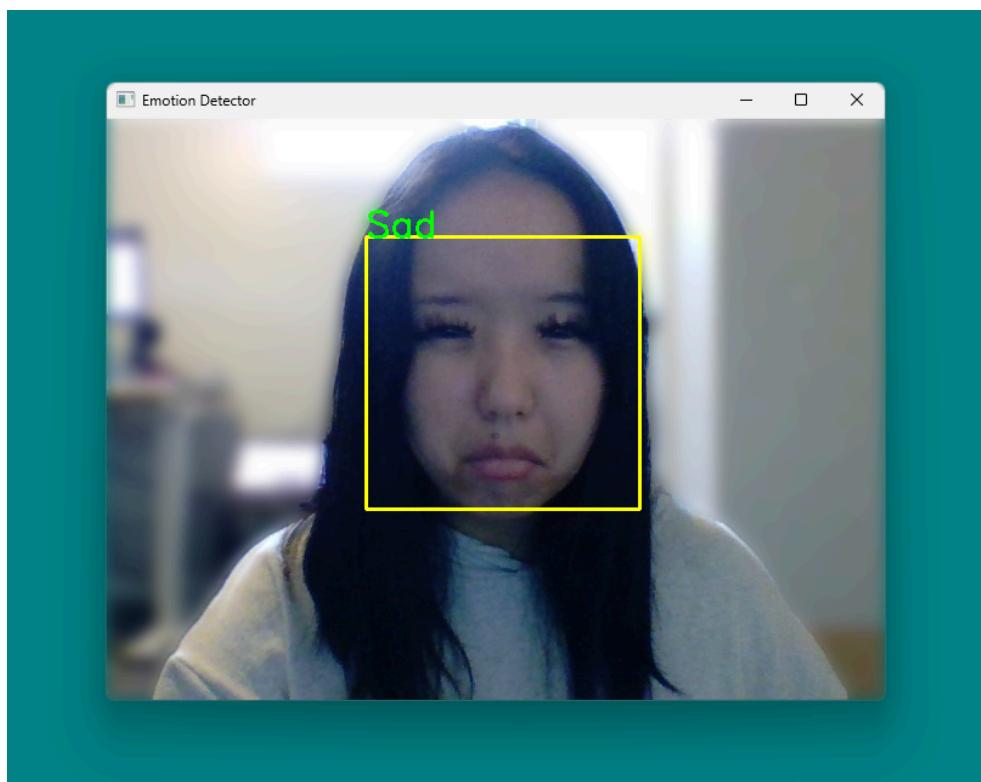
Project Significance

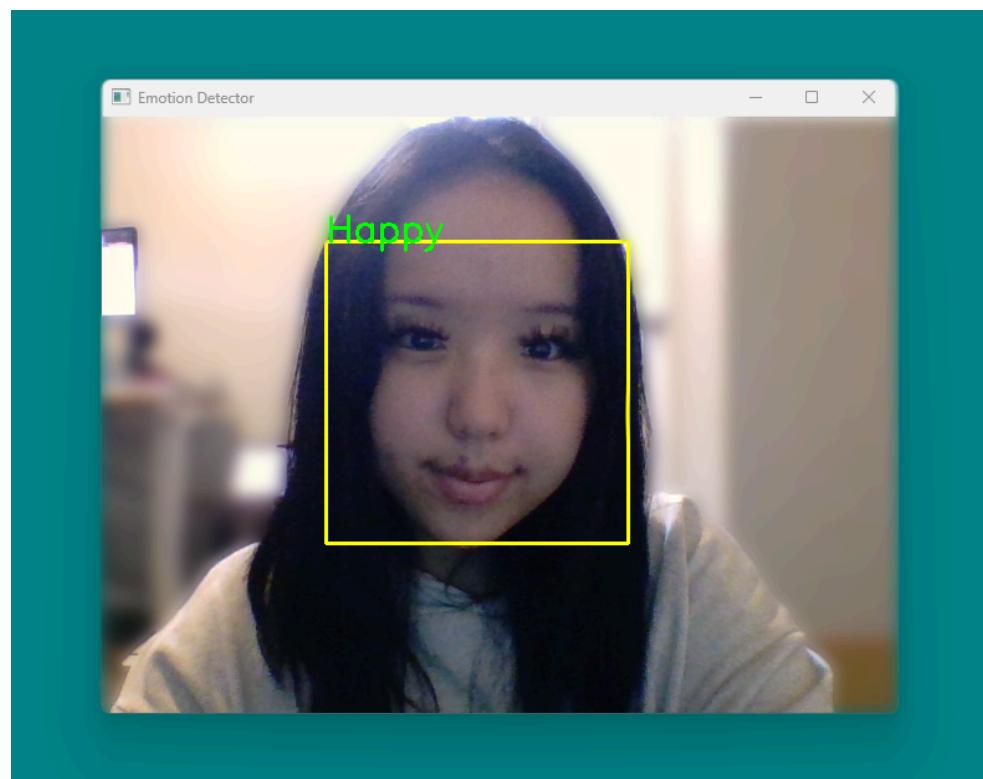
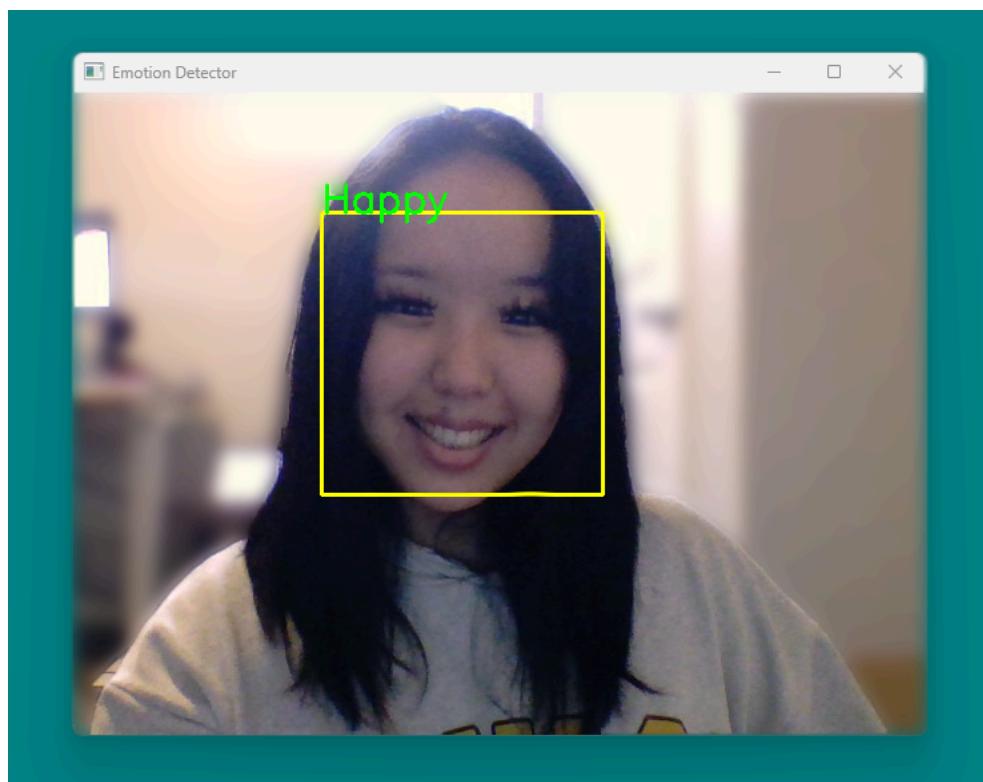
The inspiration for *Mirror, Mirror* draws heavily from the iconic magic mirror in Snow White, which metaphorically reflects one's deepest truths through the mirror's feedback. This project not only demonstrates the technical capabilities of integrating software with hardware in creative ways but also explores the intersection of technology and art, making emotional states visually communicable uniquely and interactively.

Initial Design



Real-time Emotion Detection Program Output Photos





Project Photos



