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CAR-SMART COCKPIT

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Abstract: This paper presents the development and implementation of a car cockpit automation system utilizing face recognition technology. The primary goal of this project is to enhance user comfort and convenience by automating the adjustment of car settings, including rearview mirrors, steering wheel position, and seat height, based on the identified user. The system integrates a face recognition algorithm implemented in Python using the OpenCV library, with adjustments controlled by an Arduino through serial communication.

Keywords: Car Cockpit, Automation Face Recognition, User Personalization, Automated Adjustments Comfort and Convenience Serial Communication, Vehicle Settings Image Processing System Integration.

I. INTRODUCTION

Manual adjustments of car cockpit components are a common inconvenience, especially when multiple users share a vehicle. This project aims to automate these adjustments using face recognition technology, ensuring that the cockpit components are personalized for each user, enhancing overall user comfort and driving experience.

Car cockpit automation is an emerging technology aimed at enhancing driver comfort and safety by automating the adjustment of various in-car settings. Traditionally, drivers must manually adjust their seats, steering wheels, and mirrors to their preferred positions each time they enter a vehicle. This manual process can be time-consuming and inconvenient, particularly in shared or rental vehicles. Face recognition technology has gained significant traction in various fields due to its ability to provide personalized experiences based on the identification of individual users. In the context of car cockpit automation, face recognition can be utilized to identify the driver and automatically adjust the cockpit settings to their preferred configurations, thereby enhancing the driving experience and ensuring optimal comfort and ergonomics.

The purpose of this project is to develop a system that automates the adjustment of rearview mirrors, steering wheel, and seat positions based on face recognition. By using Python and the OpenCV library for image processing, the system will identify the driver and make the necessary adjustments to the cockpit components, providing a seamless and personalized driving experience. The project aims to demonstrate the feasibility and effectiveness of integrating face recognition technology into car cockpit automation.

II. LITERATURE PAPER

[1]Viola, P., & Jones, M. proposed Rapid Object Detection Using a Boosted Cascade. This seminal paper introduces a framework for object detection using a boosted cascade of simple features. The method improves the speed and accuracy of detecting objects in images, including faces. The approach involves training a classifier on positive and negative examples of objects to achieve real-time detection.

[2] Matthew P Reed proposed on the topic Survey of auto seat design for improved comfort. Analysis of width length and Hight of the seat. Limited scope to specific car models. Driver friendly mechanism. This paper presents a comprehensive survey of automotive seat design with a focus on improving driver comfort. It analyses how various dimensions—width, length, and height—of car seats impact driver comfort. The study is limited to specific car models, examining how different seat designs and adjustments cater to ergonomic needs and driver preferences. The paper proposes mech an for enhancing seat adjustability and comfort to accommodate a wide range of driver sizes and preferences.

[3] The paper by Vivek J. Belapurkar and Vinay G. Jadhav titled "Design and Control of Servo Motor" explores the design and control mechanisms of servo motors, emphasizing their high torque, precise control, and compact, lightweight design. Servo motors are noted for their affordability and wide availability, making them suitable for various applications. However, the paper also highlights the need for precise tuning and calibration to achieve optimal performance, which

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can be time-consuming. Additionally, while standard models are affordable, high-performance servo motors can be expensive due to the increased demand for precision, torque, and speed. Overall, the paper underscores the benefits and considerations of using servo motors in diverse applications.

III. METHODOLOGY

A. BLOCK DIAGRAM

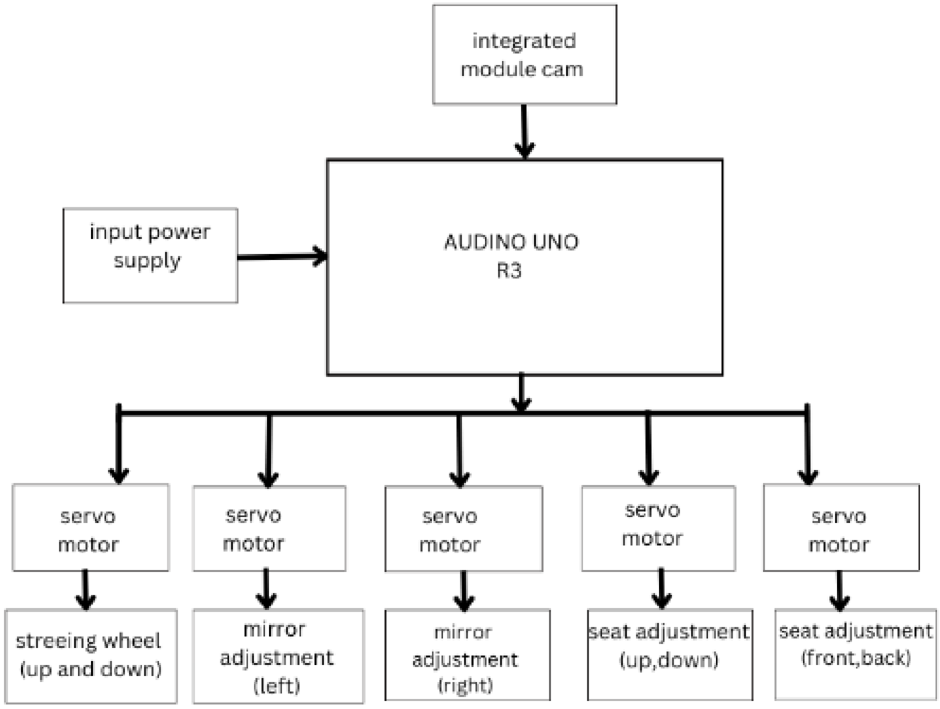

figure 1 block diagram

Figure 1 The block diagram shows an automated car cockpit adjustment system using an Arduino Uno R3 microcontroller and servo motors. The input power supply powers the system, while the integrated module cam provides data to the Arduino.

The Arduino controls various servo motors to adjust the steering wheel (up and down), left and right mirrors, and seat (up, down, front, and back) positions. This setup allows for automated and personalized adjustments of the car's cockpit features.

B. WORKING

In this automated car cockpit adjustment system, the input power supply provides electricity to the Arduino Uno R3 microcontroller and the integrated module cam. The module cam captures data, such as the driver's presence or preferences, and sends this information to the Arduino. The Arduino processes these inputs and sends control signals to the connected servo motors. Each servo motor is responsible for adjusting specific cockpit components: one for the steering wheel's vertical position, two for the left and right mirror adjustments, and two for the seat's vertical and horizontal positions. The system allows for seamless and personalized adjustments, enhancing driver comfort and convenience. The Arduino processes this data and sends control signals to the servo motors to adjust various cockpit features. These features include the vertical position of the steering wheel, left and right mirror angles, and the seat's vertical and horizontal positions. This setup provides personalized and seamless adjustments to enhance driver comfort and convenience.

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C. FLOWCHART

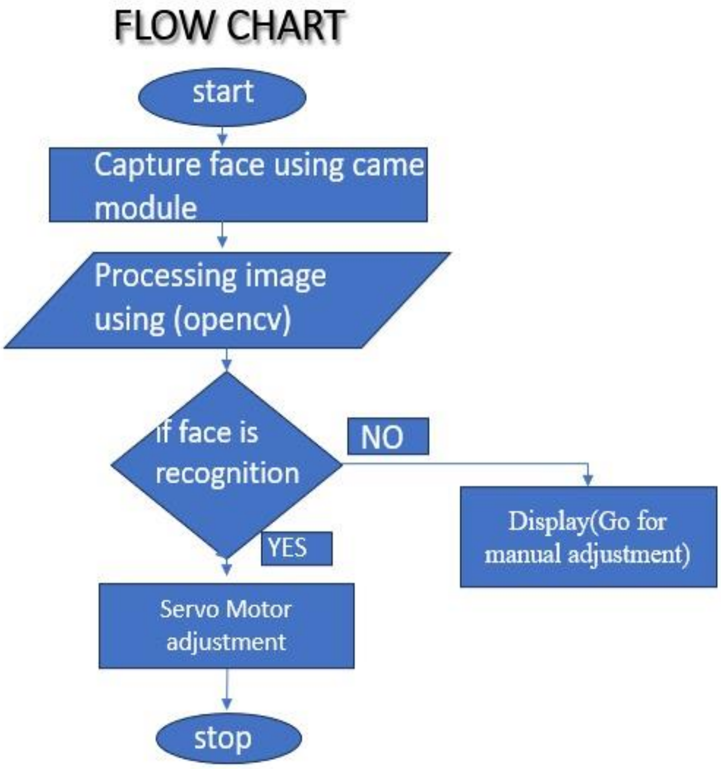

Figure 2 This flowchart outlines the process of an automated car cockpit adjustment system. It begins with capturing the driver's face using a camera module. The captured image is then processed using OpenCV, an open-source computer vision library. If the system recognizes the face, it proceeds to the Arduino, which sends signals to adjust the motors for the steering wheel, mirrors, and seat according to the driver's saved preferences. If the face is not recognized, a display prompts the user to manually adjust the settings. This ensures personalized and efficient cockpit adjustments for the driver. This ensures personalized and efficient cockpit adjustments for the driver.

IV. RESULTS

The prototype of the proposed system is shown in Figure 3.

Case 1: In this case the person has to sit in the car if the person is identified then the settings will be changed according to that person.

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Case 2: when the second person comes and sits in the car the face is detected using the integrated cam and the settings will be changed according to the details fed to the program. On the LCD display the it will displayed the face is detected and the settings will according to the predefined angle sand settings of that person. The person can drive with his own settings easily and safety.

Case 3: when the unknown person sits in the car who is pre-defined in the program and then on the display it will displayed that unknown identity please go for manual adjustment and the person has to for manual adjustments of his own setting.

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V. APPLICATIONS

1. Driver Personalization: Automatically adjusts the car's cockpit settings for different family members or frequent drivers, enhancing comfort and convenience.
2. Safety and Comfort: Ensures that each driver has their optimal seat position, mirror angles, and steering wheel position, reducing the risk of discomfort and improving driving safety.
3. Prototype Testing: Utilized in automotive R&D to test and refine automated adjustment systems and improve the overall ergonomics and user experience of vehicle interiors.
4. Improved Efficiency: Reduces the time needed for drivers to manually adjust settings, improving overall efficiency and user satisfaction.
5. Company Cars: Provides personalized settings for employees using company vehicles, increasing comfort and potentially reducing fatigue.
6. Customization: Allows drivers of ride-sharing vehicles to quickly and easily adjust settings to their preferences, improving their driving experience.

REFERENCES

[1]. Face Recognition Algorithms Viola, P. & Jones, M (2001). Rapid Object Detection Using a Boosted Cascade of Simple Features 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition.
[2]. Huang, G. B Ramesh, M Berg, T., & Learned-Miller, E. (2007). Labelled Faces in the Wild: A Database for Studying Face Recognition in Unconstrained Environments. in University of Massachusetts, Amherst Technical Report 07-49
[3]. Shen, L., & Wang, Y. (2016). Camera Calibration and 3D Reconstruction Using a Low-Cost Camera in IEEE Transactions on Image Processing.