NATIONAL INSTITUTE OF TECHNOLOGY ANDHRA PRADESH

CREATING AN AURDINO-BASED FACE DETECTION AND RECOGNITION SYSTEM

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ABSTRACT

• The aim of this project is to develop a face recognition bot using Arduino. The system will use a camera module to capture an image of a person's face and then use image processing algorithms to detect and recognize the face. The recognition process will be based on machine learning algorithms that will be trained on a dataset of known faces. Once the system has identified a face, it will communicate with the Arduino board to trigger a specific action, such as unlocking a door or turning on a light. The system will also have the ability to store new faces in its database and update the recognition model accordingly. The project will involve designing and implementing the hardware and software components necessary for the system to function properly. The face recognition bot will be a useful tool for home automation, security, and other applications

PROBLEM FORMULATION

• A common problem with traditional door lock systems is that they can be easily bypassed by someone with a key or by picking the lock. One solution to this problem is to use a face recognition bot to control access to the door . A face recognition bot uses advanced computer algorithms to analyze and identify human faces. The bot can be integrated with a door lock system to allow access only to authorized individuals. By comparing images of missing persons to a database of known individuals, police could potentially find missing persons faster and bring them home safely

• One of the significant challenges for blind people is recognizing individuals, especially in social situations. Blind people have to rely on others to identify people around them, which can be inconvenient and often uncomfortable.A face recognition bot can help blind people identify individuals by analyzing their faces. The bot can use machine learning algorithms to recognize facial features and match them with previously stored profiles in its database. When a blind person comes in contact with someone, the bot can identify that person by analyzing their facial features and then provide information about them to the blind user.

INTRODUCTION

A face recognition bot is a computer program that uses artificial intelligence (AI) to identify and authenticate people based on their facial features. The bot can capture an image of a face and match it against a database of known faces to determine the person's identity. The technology behind face recognition bots involves complex algorithms that analyze facial features such as the distance between the eyes, nose, and mouth, as well as the shape of the jawline and cheekbones. The bot can also account for changes in lighting, facial expression, and even facial hair to ensure accurate identification

WHY WE CHOOSE FACE RECOGNITION OVER OTHER BIOMETRIC ?

• There are number reasons to choose face recognition. This includes the following:

• a. It requires no physical interaction on behalf of the user.

• b. It is accurate and allows for high enrolment and verification rates.

• c. It does not require an expert to interpret the comparison result.

• d. It can use your existing hardware infrastructure, existing cameras and image capture Devices will work with no problems

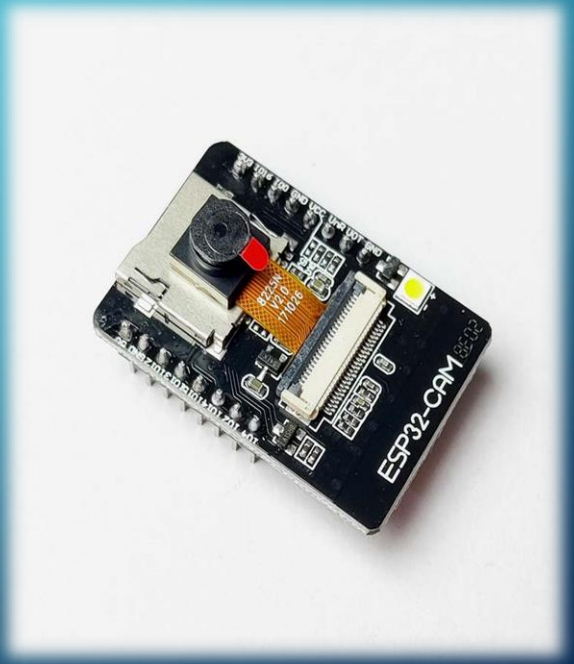
• e. It is the only biometric that allow you to perform passive identification in a one to. Many environments (e.g.: identifying a terrorist in a busy Airport terminal)

PARTS USED

- 1 ESP32-CAM Board AI-Thinker(444)
- 2 FTDI Module(130)
- 3 Micro-USB Cable
- 4 Jumper Wires(15)

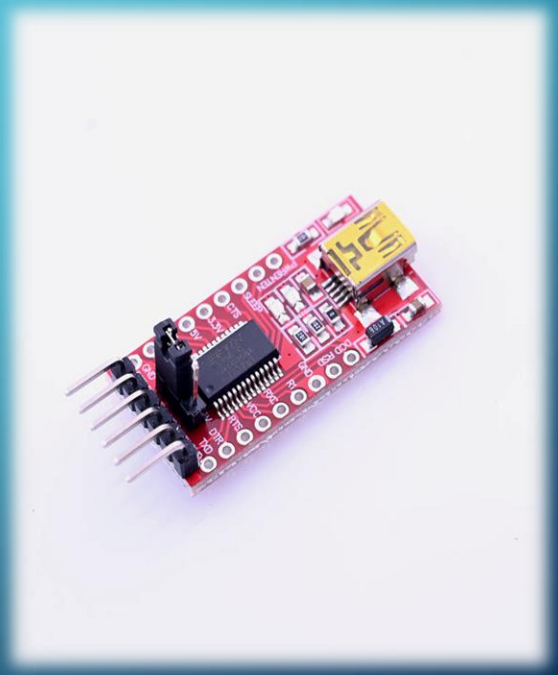
ESP32-CAMBOARD AI-THINKER

• The ESP32-CAM AI-Thinker development board can be programmed using Arduino IDE.The ESP32-CAM AI-Thinker module is an ESP32 development board with an OV2640 camera, microSD card support, on-board flash lamp and several GPIOs to connect peripherals. However, it doesn't have a built-in programmer. You need an FTDI programmer to connect it to your computer and upload code.To program the ESP32-CAM board with Arduino IDE, you need to have Arduino IDE installed as well as the ESP32 add-on



FTDI-MODULE

Future Technology Devices International Limited, commonly known by its acronym FTDI, is a Scottish privately held semiconductor device company, specialising in Universal Serial Bus (USB) technology.It develops, manufactures, and supports devices and their related cables and software drivers for converting RS-232 or TTL serial transmissions to and from USB signals, in order to provide support for legacy devices with modern computers

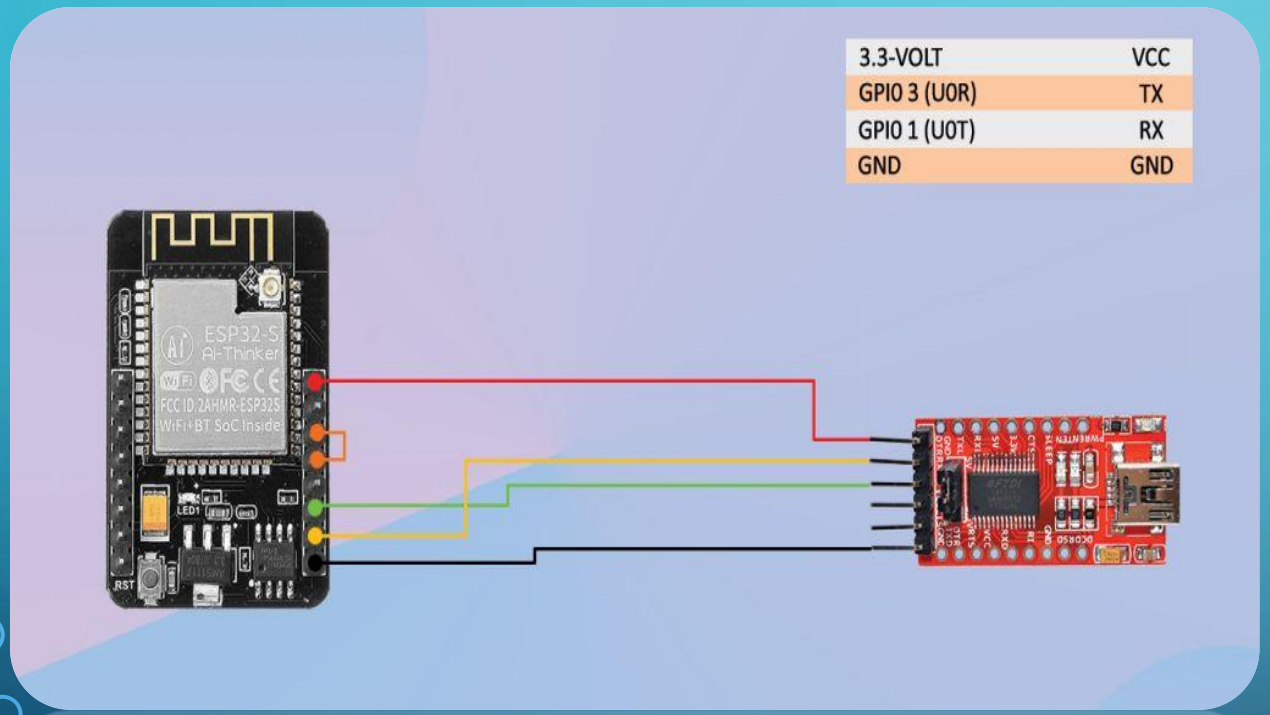


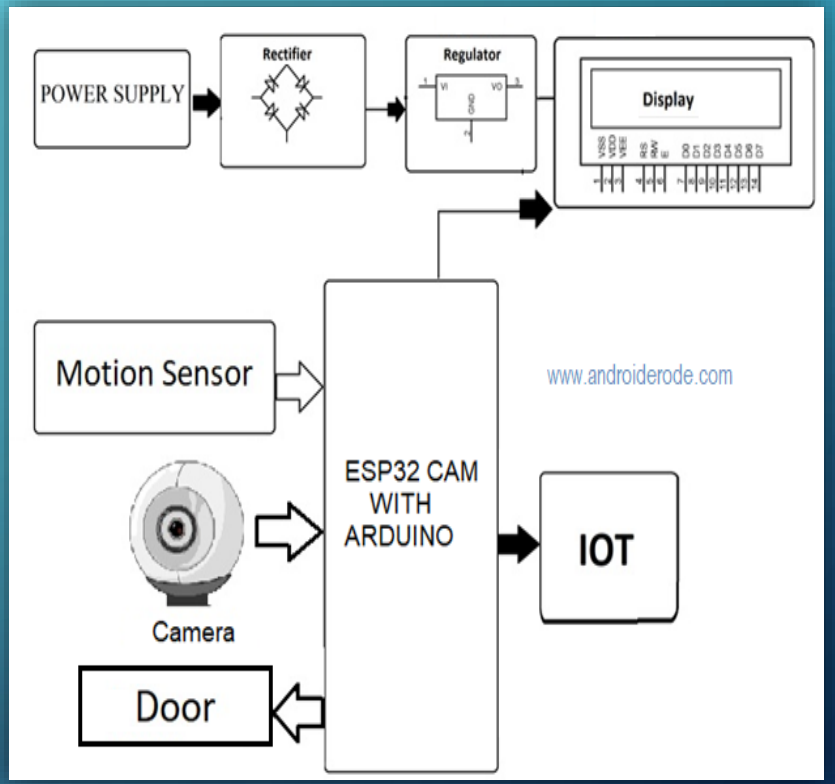
Working

• Face recognition bots use artificial intelligence algorithms to identify and verify the identity of a person based on their facial features. The basic working principle of a face recognition bot involves the following steps: • Face detection: The bot first locates and detects the face in an image or video frame. This is done using various image processing techniques such as Haar cascades, convolutional neural networks, etc. • Face alignment: Once the face is detected, the bot aligns the face to a standardized position and size for better accuracy. • Feature extraction: The bot extracts unique features from the face such as the distance between eyes, nose shape, cheekbones, etc. These features are then used to create a mathematical representation of the face known as a face print or face template.

• Face matching: The face template is then compared to a database of known faces to identify a match. The database can contain images of people that are authorized to access a particular system or location, or it can be a larger database containing images of people for identification purposes. • Verification: Once a match is found, the bot verifies the identity of the person by comparing the face print with the stored identity information. • Face recognition bots can be used for various applications such as access control systems, attendance tracking, security surveillance, etc. However, it's important to note that the accuracy of face recognition technology depends on various factors such as lighting conditions, angle of the face, quality of the image, etc.

CIRCUIT DIAGRAM





CONCLUSION

Face recognition is a technology that uses advanced algorithms to identify and verify a person's face. It is used in a variety of applications, such as security, authentication, and identification. Arduino is an open-source electronics platform that can be used to create face recognition systems. Arduino provides the necessary hardware and software to create a face recognition system. The bots can provide secure access to areas or devices. Beyond that, facial recognition technology adds convenience and safety to everyday experiences, like using banking services, receiving healthcare, or shopping. It can enable a more secure entry to places of business, help prevent all types of fraud, and make using online services a safer experience.

REFERENCES

https://www.arduino.cc/en/Guide/Introduction
https://www.allaboutcircuits.com/projects/face-recognition-usingArduino/