FACULTY OF ENGINEERING AND TECHNOLOGY
SCHOOL OF COMPUTING

DEPARTMENT OF COMPUTING TECHNOLOGIES

18CSE357T BIOMETRICS
MINI PROJECT REPORT

PROJECT TITLE:
EAR RECOGNITION

SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
Deemed to be **University** *u/s 3 of UGC Act, 1956*

TEAM MEMBER

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Objective:

- The objective of ear recognition is to accurately recognize and identify individuals based on the unique characteristics and patterns of their ears. Ear recognition algorithms aim to analyze and match ear images or ear-related biometric features to establish the identity of a person. This technology is commonly employed in biometrics, security systems, forensics, and access control.
- The specific objectives of ear recognition include:
- Biometric Identification: Ear recognition serves as a reliable biometric modality, allowing for individual identification by analyzing the distinctive shape, structure, and contours of the ear. The objective is to develop robust algorithms that can accurately match ear images or ear-related features to enrolled templates in a biometric database.
- Forensics and Criminal Investigations: Ear recognition can assist in forensic investigations by analyzing earprints, ear-related evidence, or surveillance footage to identify suspects or link individuals to a crime scene. The objective is to establish associations between ears captured in different contexts to aid law enforcement agencies in their investigations.
- Surveillance and Security: Ear recognition can be deployed in surveillance systems to track and identify individuals across different locations or camera feeds. The objective is to develop efficient algorithms that can recognize ears in real-time or from large-scale databases, enhancing security measures and facilitating proactive monitoring.
- In summary, the objective of ear recognition is to accurately recognize and identify individuals by analyzing the unique characteristics and patterns of their ears. It serves as a biometric modality for identification, access control, forensic investigations, surveillance, human-computer interaction, and medical applications.

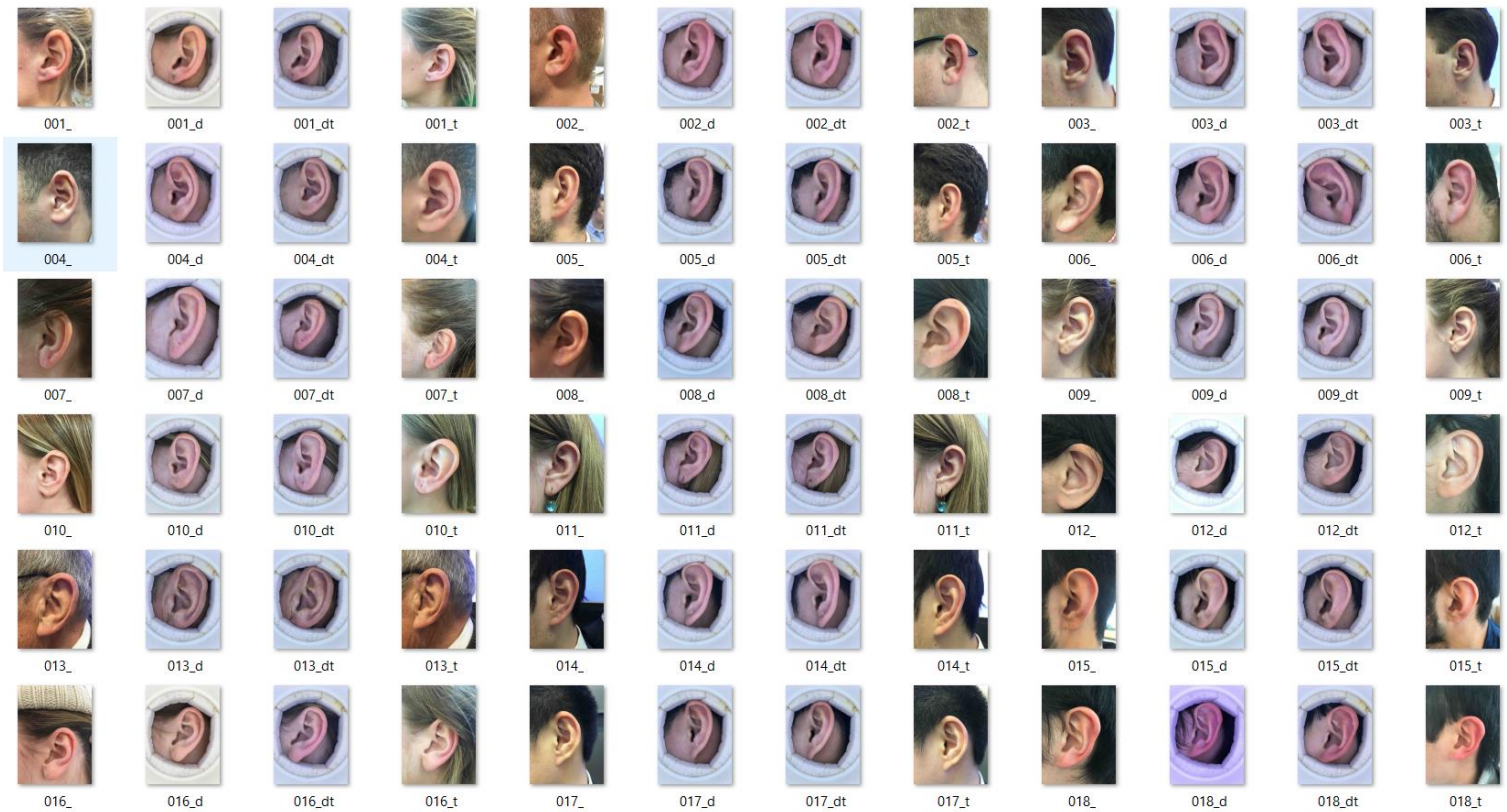
Scope:

- Research and Development: The scope of ear recognition also extends to research and development, involving the advancement of algorithms, methodologies, and technologies related to ear recognition. This includes improving the accuracy, efficiency, and robustness of ear recognition systems, as well as exploring new applications and techniques
- Human-Computer Interaction: Ear recognition can enhance human-computer interaction by enabling personalized experiences and user identification. The scope includes applications in adaptive user interfaces, customized settings, and user profiling in areas such as entertainment, gaming, healthcare, and smart home technologies.
- It is important to note that the scope of ear recognition may vary depending on specific legal, ethical, and privacy considerations within different jurisdictions. Adhering to regulations and ensuring the protection of individuals' privacy rights is an essential aspect of implementing ear recognition technologies.

Software Used:

- VS Code, Jupyter Notebook,TensorFlow,Keras,OpenCV.

Dataset used:



Algorithm/Design Pattern used:

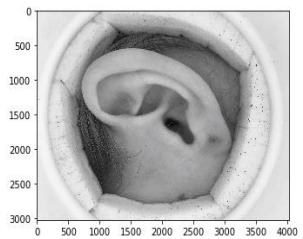
- Local Binary Patterns (LBP): LBP encodes texture information by comparing the intensity values of pixels in a neighborhood, providing a compact representation of ear texture patterns.
- Euclidean Distance: The Euclidean distance is a simple distance metric used to measure the similarity between feature vectors extracted from ear images. A lower distance indicates a higher degree of similarity.
- Artificial Neural Networks (ANN): ANN models, such as convolutional neural networks (CNN), can be trained on large datasets of ear images to learn discriminative features and perform classification or matching tasks.
- Principal Component Analysis (PCA): PCA is a statistical technique used for dimensionality reduction. It can be applied to ear feature vectors to transform them into a lower-dimensional space while preserving the most relevant information for recognition

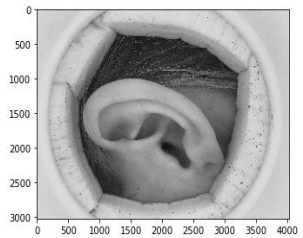
Design Pattern Used:

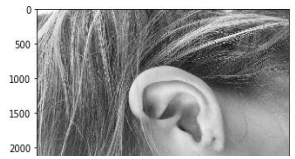
- Model-View-Controller (MVC): MVC separates the ear recognition system into three components: the model (data and algorithms), the view (user interface), and the controller (logic and interaction). This pattern allows for modularity and flexibility in the system design.

ScreenShots:

```
Epoch 12/15
780/780 [==============================] - 3s 4ms/step - loss: 0.0016 - acc: 1.0000
Epoch 13/15
780/780 [==============================] - 3s 4ms/step - loss: 7.7093e-04 - acc: 1.0000
Epoch 14/15
780/780 [==============================] - 3s 4ms/step - loss: 4.9167e-04 - acc: 1.0000
Epoch 15/15
780/780 [==============================] - 3s 4ms/step - loss: 3.2491e-04 - acc: 1.0000
This is person No.0
These are all other picture of that person
```







Contribution of the author:

- Sabaresh and Fidin- Research and Development of the code.
- Piyush and Pradhyumna-Report and finding the dataset for the model.