TEAM - 2

BLOOD GROUP IDENTIFICATION

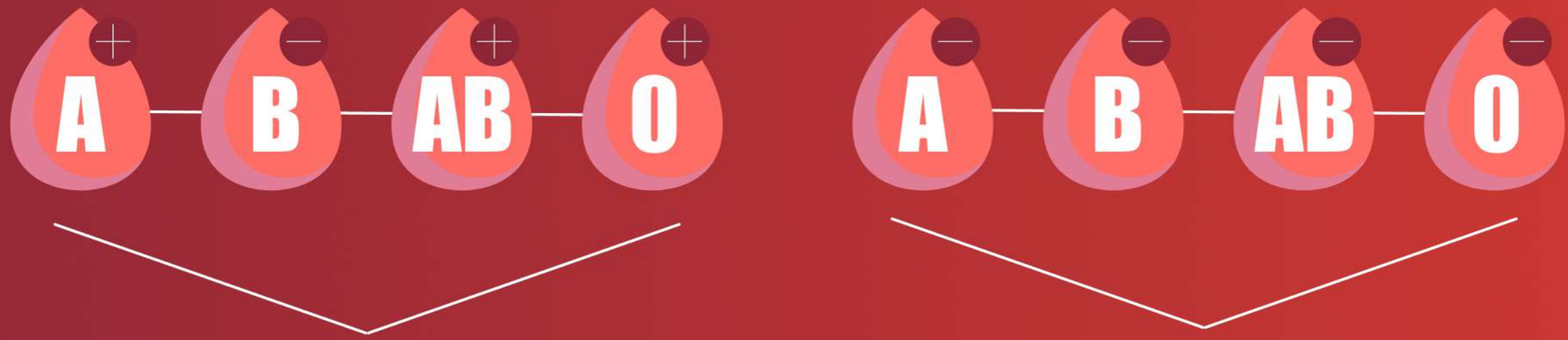
INTRODUCTION

- The Blood Group Identification System is a web application developed in Django, enabling users to identify their blood group by simply uploading images of blood cells.
- The system utilizes OpenCV to perform various image processing tasks, such as converting the image to grayscale, applying blurring and thresholding techniques, and performing morphological operations, all aimed at improving the image quality for accurate blood group analysis.
- Once the image is processed, the system automatically identifies the ABO blood type and Rh factor, offering a quick, efficient, and fully automated method for blood typing, eliminating the need for manual procedures.

Problem Statement

Traditional blood group identification methods are prone to errors and time-consuming. In medical emergencies, delays in accurate blood typing can lead to serious risks. There is a need for an automated, quick, and reliable solution to ensure accurate and efficient blood group identification.

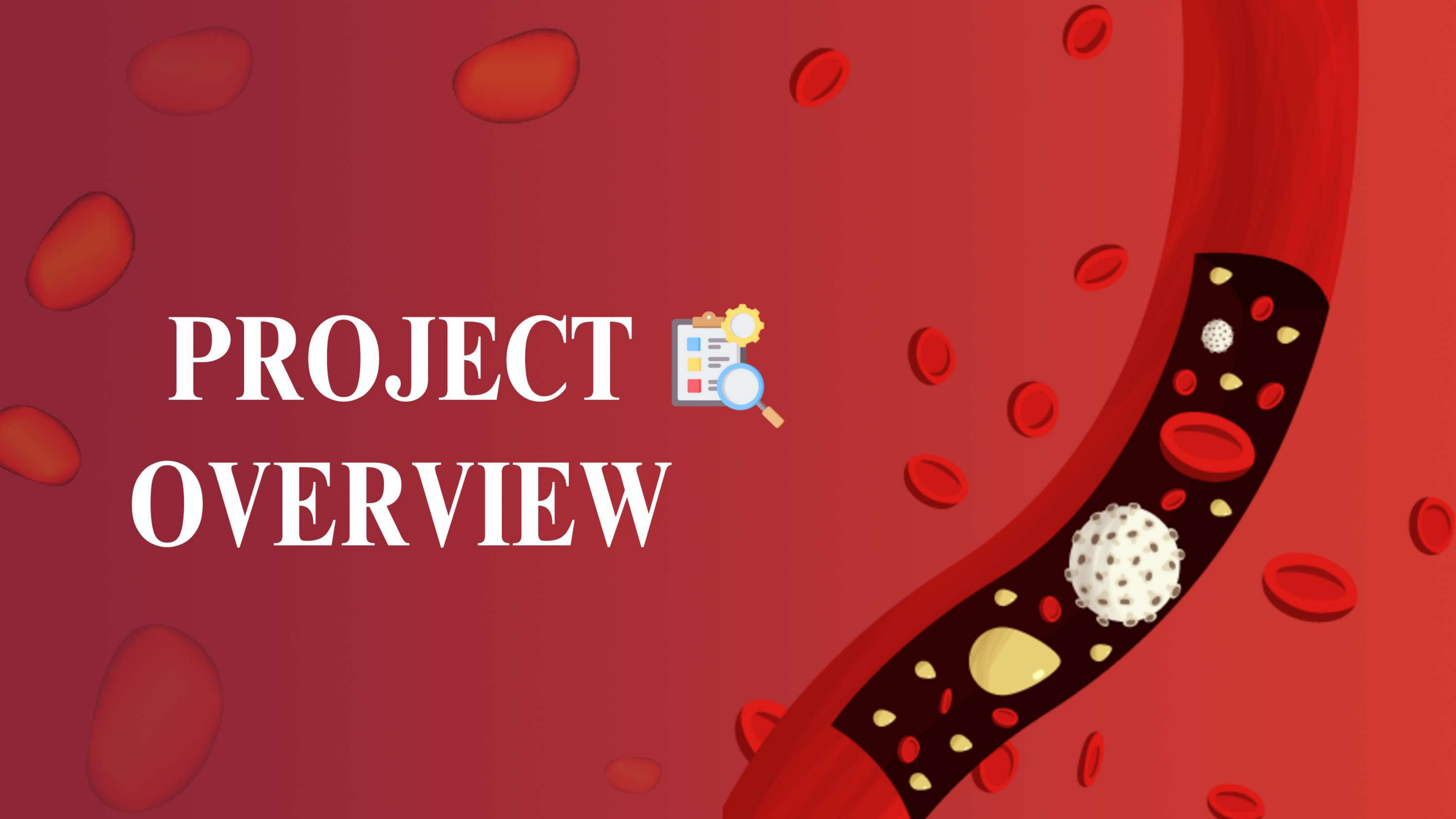
Blood Groups



The ABO blood group system classifies blood into four types (A, B, AB, O) based on specific antigens on red blood cells, while the Rh factor (positive or negative) further classifies blood depending on the presence of the Rh antigen.

- **Blood group A** – has A antigens on the red blood cells with anti-B antibodies in the plasma
- **Blood group B –** has B antigens on the red blood cells with anti-A antibodies in the plasma
- **Blood group O – has no antigens, but both anti-A and anti-B antibodies in the plasma**
- **Blood group AB – has both A and B antigens, but no antibodies**

PROJECT OVERVIEW

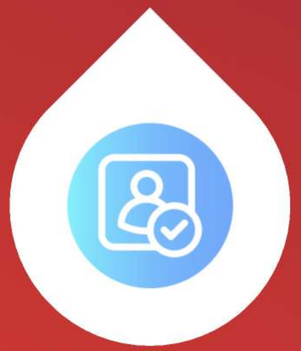


CUSTOMER FEATURES

- Allows new users to create an account by providing basic information for secure access to the application.

- Enables users to securely log in with their credentials to access blood group identification features.

- Serves as the main dashboard, offering a simple interface to navigate blood identification tools and user options.



- Displays user information and blood group details.
- Allows users to upload images of ABO blood cells to check the blood group.

MILESTONES

01

The system allows secure user registration, login, and image uploads for blood group identification. It also stores and manages user credentials in a structured database.

02

The system uses OpenCV to preprocess blood slide images with grayscale conversion, Gaussian blur, and thresholding to enhance features. It then detects contours to analyze key elements for blood group identification.

03

The extracted contour count is displayed on the profile page, integrated into the blood group identification process. This provides users with accessible and relevant information for their results.

04

The system preprocesses blood slide images with OpenCV and applies morphological operations to identify the ABO blood type and Rh factor. The processed image and results are displayed on the profile page for the user.

Blood Type Detection Process

- **Reading and Decoding:**
  The uploaded image is encoded into a Base64 format, which allows it to be efficiently processed and transmitted as a string within the system.

- **Image Preprocessing:**
  Grayscale Conversion :The image is converted to grayscale, removing color information and simplifying the image to focus on intensity levels for better analysis.
  Gaussian Blur: Gaussian blur is applied to smooth out the image, reducing noise and ensuring small variations in the image don't affect the processing.
  Contrast Enhancement: The contrast of the image is enhanced to make the key features of the blood cells more visible, improving detection accuracy.

- **Thresholding:**
  Thresholding is applied to create a binary image where the blood cells are clearly distinguished from the background, making them easier to detect and analyze.

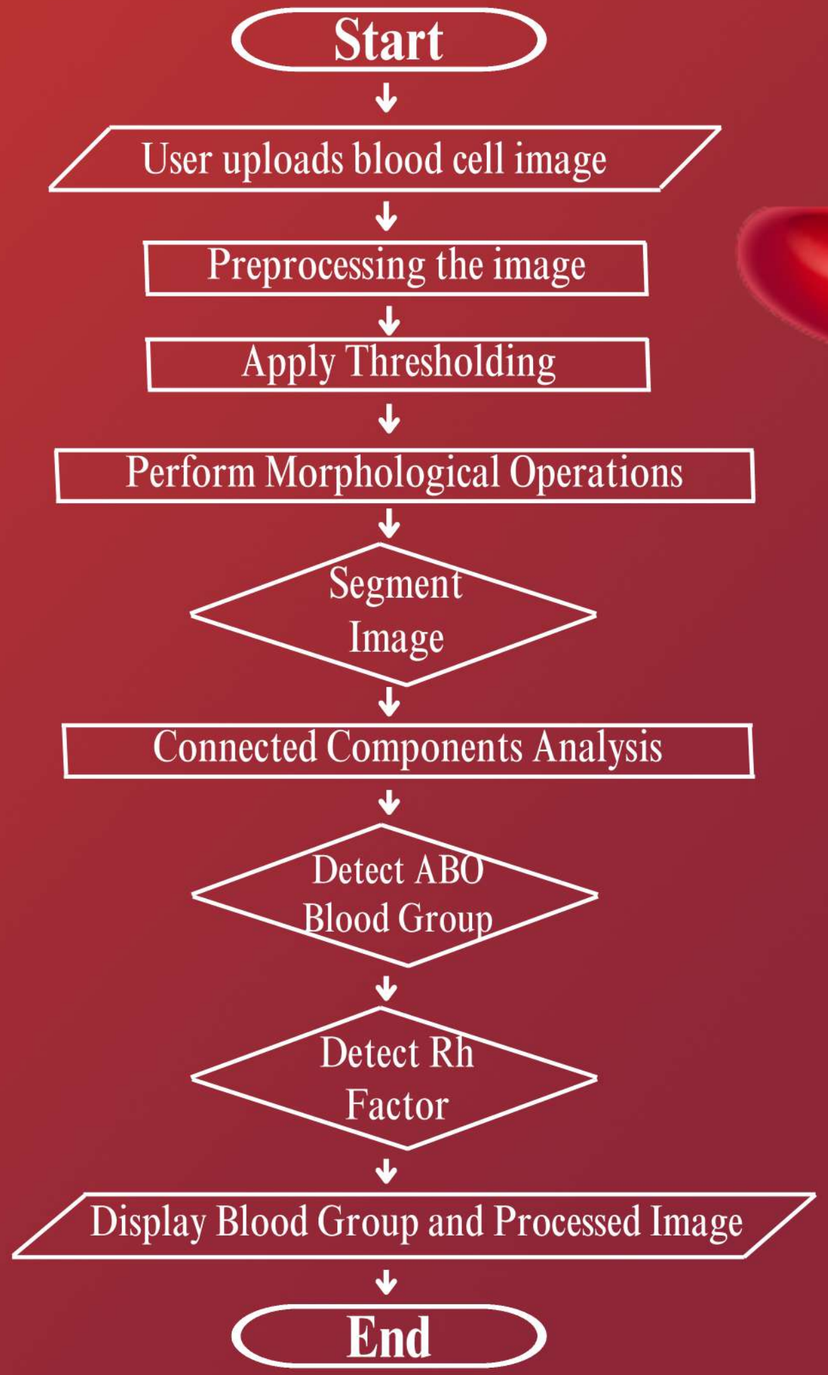
- **Morphological Operations**

  Opening : This operation removes small noise from the binary image by eliminating small particles.

  Closing Closing fills any small gaps in the detected regions, helping in better identification of blood cells.

- **Region Segmentation and Analysis**: The binary image is divided into three regions for detailed analysis of blood group antigens.
- **Connected Components Analysis**: Significant regions are counted to detect and identify the presence of blood group antigens.
- **ABO Blood Group Detection**: The blood type (A, B, AB, or O) is identified based on the detected regions and antigens present
- **Rh Factor Detection**: The presence of the Rh antigen is checked to determine if the blood group is Rh-positive or Rh-negative.
- **Output Visualization**: The processed image, along with the identified blood type and Rh factor, is displayed to the user for confirmation.

Process Flow of Blood Group Identification

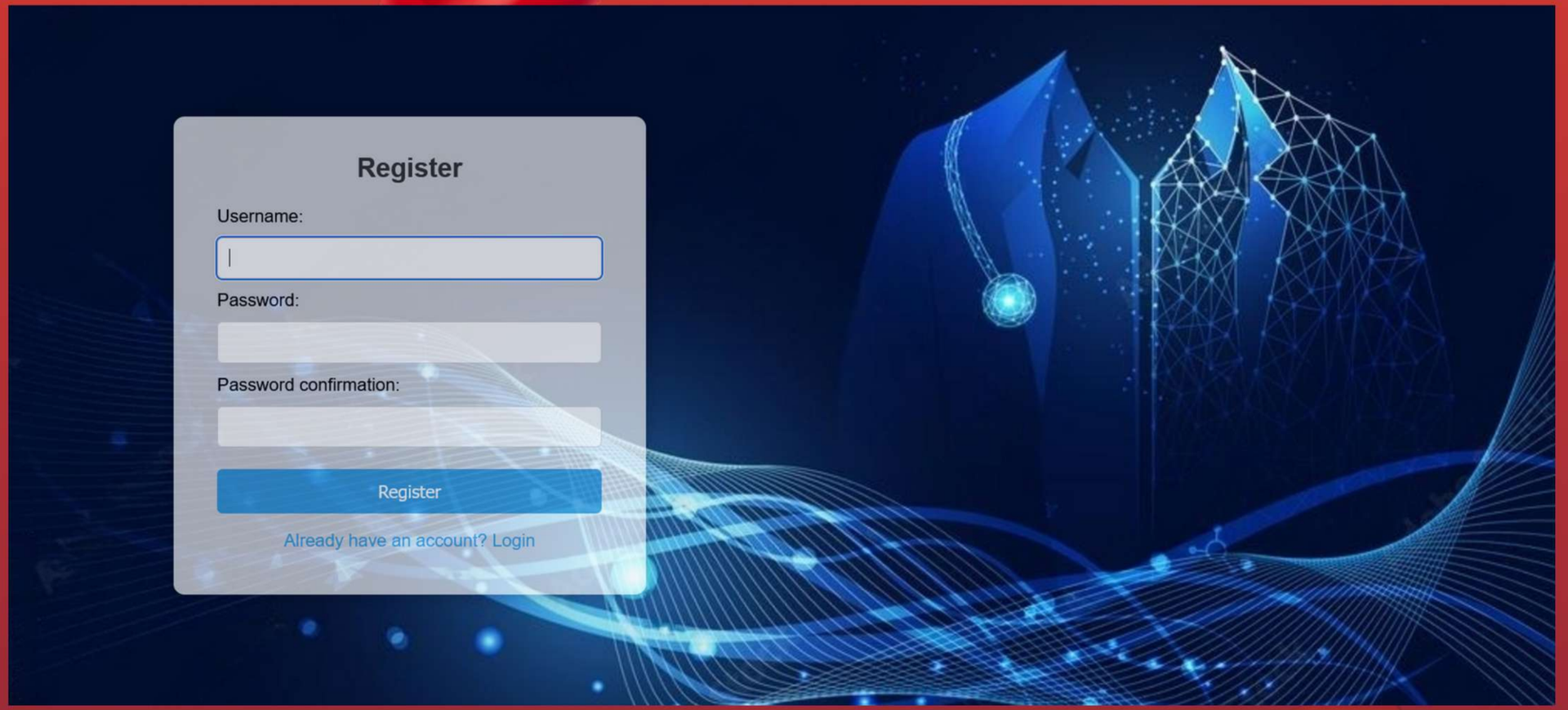


User Journey

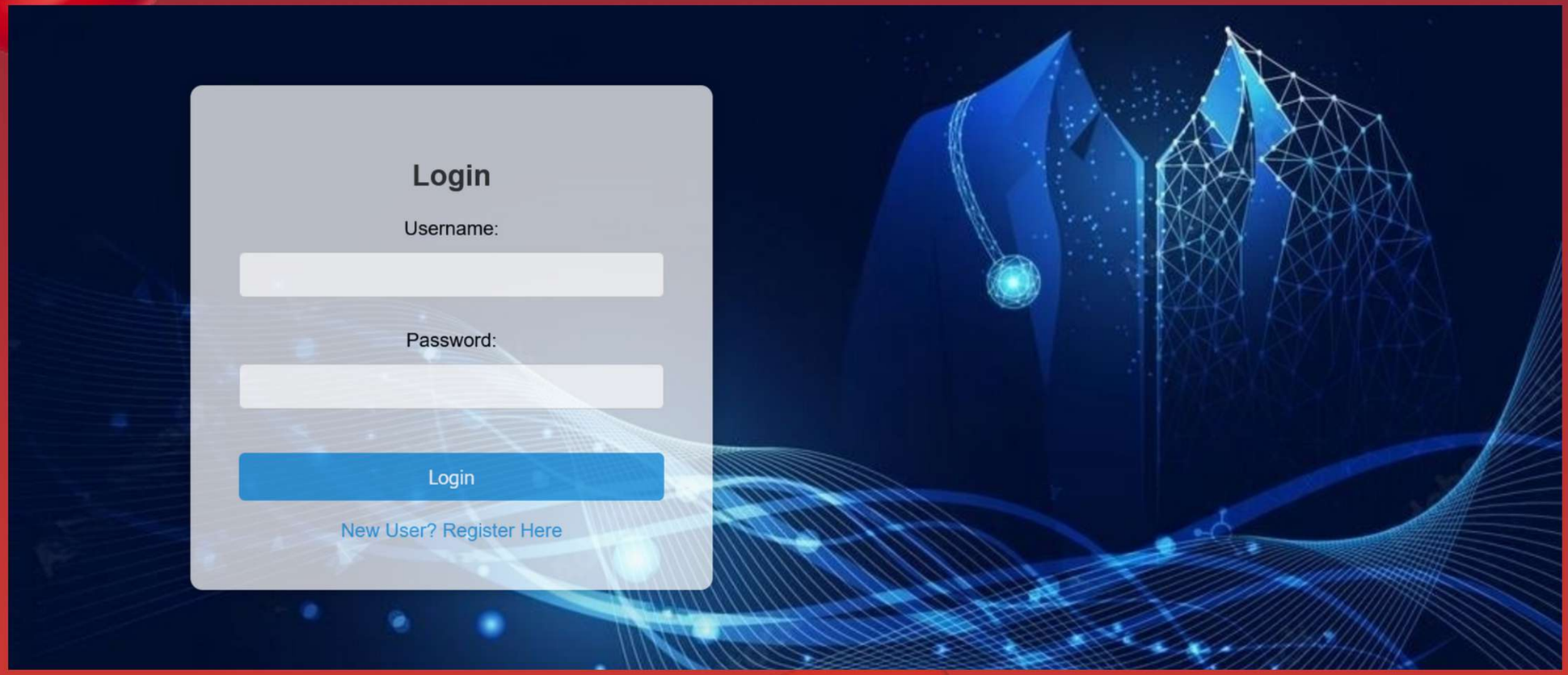
Home Page


LifePlus
Home
About
Services
Contact
Login
Register
Welcome to LifePlus
Your trusted partner in blood group identification. At LifePlus, we offer reliable and quick blood group identification services, helping you to know your blood type and contribute to life-saving blood donation initiatives.
Our platform connects blood donors and recipients, creating a seamless experience in emergency and routine blood transfusions. Whether you're here to find out your blood type or to register as a donor, LifePlus is committed to supporting community health and safety.
Explore Services
Get Started

Register Page



Login Page



Profile Page

Welcome to Blood Group Identification Web App!

ABO Blood Cell Image

Browse... No file selected.

Check for Blood Group

Morphological Output

Welcome to Blood Group Identification Web App!

ABO Blood Cell Image

Browse... No file selected.

Check for Blood Group

Uploaded Image:

Morphological Image:

Blood Group is:

AB Positive

Advantages

- Eliminates manual errors and provides faster, more accurate blood typing.
- Offers rapid results, ideal for both emergency and routine cases.
- Accessible to both medical professionals and regular users, requiring no specialized knowledge.
- Uses OpenCV for advanced image processing to identify blood type and Rh factor precisely.
- Cost-effective, scalable, secure, and web-based, ensuring remote access and data protection.

Conclusion

The Blood Group Identification System provides an efficient, automated solution for identifying blood groups through blood cell image uploads. Leveraging OpenCV with techniques like grayscale conversion, thresholding, and morphological operations, it ensures accurate ABO and Rh factor detection. The user-friendly web interface simplifies blood group identification, making it accessible to both medical professionals and individuals while reducing manual errors.

Team Members

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THANK YOU!