**BLOOD DONATION PREDICTION USING AI & ML FOR A CONNECTED DONOR–BLOOD BANK–HOSPITAL NETWORK**

Problem Statement:

Blood shortages persist due to fragmented information, unpredictable demand, and delays in identifying compatible, nearby donors. Existing systems largely depend on manual outreach and static registries, which are slow to update and often fail during time‑critical scenarios such as trauma cases, surgeries, and outbreaks. Donors who are willing to help are not proactively engaged at the right time, and blood banks struggle to forecast inventory needs across blood groups, components (WB, PRBC, FFP, platelets), and geographies. Hospitals, meanwhile, lack a unified interface to view cross‑bank inventory and trigger timely requests. As a result, units expire unused in one region while shortages occur in another, leading to avoidable morbidity and mortality.

This project proposes an AI‑ and ML‑driven application that connects willing donors, blood banks, and hospitals through a single, easy‑to‑use interface. Machine learning models will predict demand at the hospital/blood‑bank level (short‑term and medium‑term), estimate donor availability and likelihood to donate (based on recency, eligibility window, location, and past behavior), and optimize matching and prioritization for specific blood groups and components. The platform will automate outreach via notifications to eligible nearby donors, recommend optimal routing to the nearest donation center, and synchronize real‑time inventory across partnered blood banks and hospitals. By integrating secure user authentication, consent‑based data sharing, and privacy‑preserving analytics, the solution aims to deliver fast, equitable, and reliable access to blood components—reducing shortages, minimizing wastage, and improving patient outcomes.