Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	26/06/2025
Team ID	LTVIP2025TMID33042
Project Name	HematoVision-Blood Cell Classifier
Maximum Marks	4 Marks

Overview- Identifies the stack for UI, image processing, ML inference, reporting, packaging, and storage.

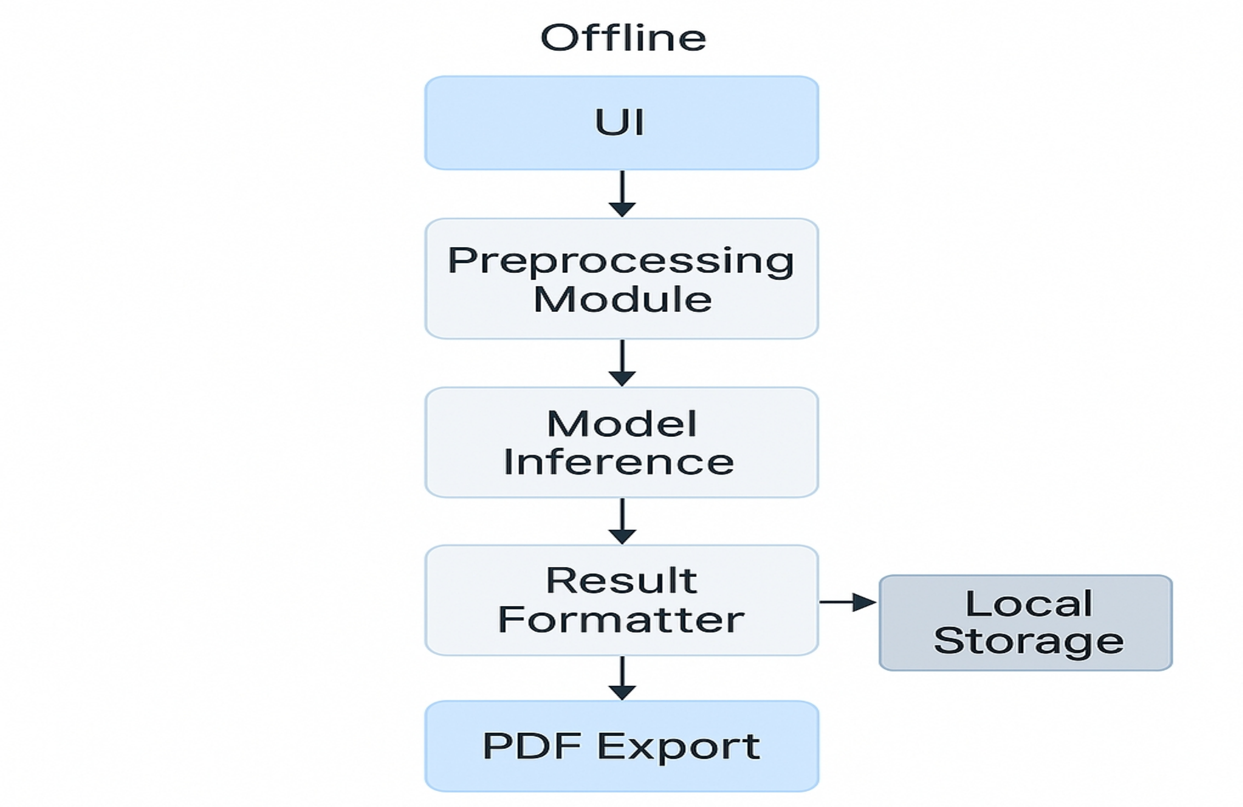
• Diagrams the component architecture so you can see how modules plug together in an offline bundle.

Table-1: Components & Technologies

S.No	Component	Description	Technology / Tool
1	User Interface	Local web UI for uploading images, viewing results & reports	Flask, HTML5, CSS3, Bootstrap, JavaScript
2	Application Logic-1	Image preprocessing (resizing, normalization, filtering)	Python, OpenCV, scikit-image
3	Application Logic-2	Model inference pipeline	Python, TensorFlow/Keras
4	Application Logic-3	Explanation module (heatmaps, confidence bars, textual rationale)	Python, Grad-CAM, Matplotlib
5	Database	Store user settings & session metadata	SQLite or JSON flat-files
6	Cloud Database	—	Not used (fully offline)
7	File Storage	Persist uploaded images & generated PDF reports	Local filesystem (OS directories)
8	External API-1	—	Not used
9	External API-2	—	Not used
10	Machine Learning Model	Convolutional Neural Network for blood cell classification	Custom CNN (TensorFlow), quantized ONNX
11	Infrastructure	Offline packaging & deployment	PyInstaller, custom .bat launcher

Table-2: Application Characteristics

S.No	Characteristic	Description	Technology / Approach
1	Open-Source Frameworks	All core components built on free, community-driven projects	Flask, TensorFlow, OpenCV, ReportLab, PyInstaller
2	Security	Ensures no data leaves the user’s machine; sandboxed file reads/writes	Offline-only operation; OS-level file perms
3	Scalable Architecture	Modular design lets you swap or extend preprocessing, inference, reporting	Python modules + REST endpoints
4	Availability	Runs without network; packaged dependencies guarantee “cold start” readiness	Local bundle via PyInstaller; splash screen
5	Performance	Inference under 5 s on 512×512 inputs; caches pre-processed intermediates	Model quantization; in-memory caching


Offline
UI
Preprocessing Module
Model Inference
Result Formatter
Local Storage
PDF Export