Guidelines

- Kindly use the given template for submitting your project (Make a copy of the template).
- One team is only required to submit one project.
- The ideal size of the presentation should not be more than 10-12 slides.
- You are welcome to add as many POCs and design concepts to support your project.
- It is mandatory to use Gemini APIs while building your prototype.
- In case of queries, kindly reach out to us at apacsolutionchallenge@hack2skill.com

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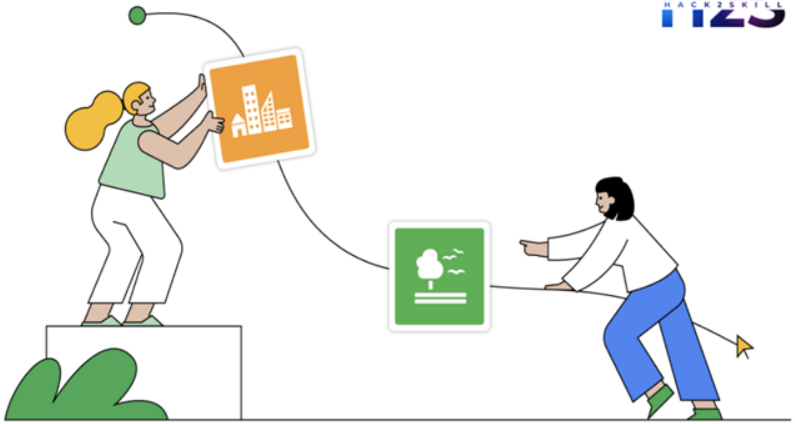
Solution Challenge

AI for a better tomorrow



Team Details

a. **Team name: Sanarex**
b. **Team leader name: Maria Munawwar**
c. **Problem Statement:** STEMI heart attacks demand rapid, accurate diagnosis, yet traditional ECG interpretation is often slow, error-prone, and dependent on specialist availability.

HeartLens addresses this by automating STEMI detection and infarction localization, enabling:

✓ Faster, AI-assisted ECG analysis
✓ Reduced diagnostic delays
✓ Improved accuracy and patient outcomes

Brief about your solution

HeartLens is an AI-powered ECG analysis tool that enables rapid STEMI detection and infarction localization, enhancing emergency cardiac care.

How It Works (3 Simple Steps):

1.ECG Data Input
Upload a 12-lead ECG image — HeartLens processes the waveforms automatically.
2.AI Analysis
Detects STEMI cases and localizes the infarction region using deep learning.
3.Report & Review
Generates an AI-assisted report with alerts for critical cases, ready for clinician validation.

Personalized Heart Health Assistant

Using Google's **Gemini AI**, HeartLens goes beyond diagnostics by offering:
✓ Tailored diet recommendations
✓ Exercise suggestions
✓ Lifestyle tips
All based on user inputs like **age, weight, cholesterol levels, and activity patterns**, empowering users to manage their heart health proactively.

Opportunities

a. How different is it from any of the other existing ideas?

•Pakistan's First AI-Powered STEMI Detection System

No other solution in the country currently offers real-time ECG analysis with STEMI detection and infarction localization.

•Dual-Mode Design

Tailored for both **medical professionals** (detailed reports) and **general users** (simplified insights).

•Personalized Recommendations

Integrates Gemini-based suggestions on **diet, exercise, and lifestyle** something not offered by current tools.

•Localization for Pakistan

Affordable, easy to adopt, and designed to fit into **local clinical workflows** and **rural healthcare settings**.

•We are collaborating with NICVD, and they have validated the significance of this problem statement and will be providing the ECG dataset to support our model development.

Opportunities

b. How will it be able to solve the problem?

- **AI-Driven Speed & Accuracy**
  Reduces diagnostic delays using deep learning to interpret ECGs instantly and precisely.
- **Bridges Accessibility Gaps**
  Enables remote STEMI detection in areas without on-site cardiologists.
- **User-Friendly Reports**
  Transforms technical ECG data into clear, understandable summaries for both doctors and patients.

Opportunities

c. USP of the proposed solution

Pakistan's First AI-Powered STEMI Detection System
The only system in Pakistan focused specifically on STEMI detection for early heart attack diagnosis.

AI-Driven Accuracy & Speed
Leverages deep learning for fast and precise ECG analysis, reducing diagnostic delays and saving lives.

ECG Lead-Based Region Identification
Pinpoints affected heart regions (inferior, lateral, septal, anterior) using 12-lead ECG data for localized infarction detection.

Designed for Both Medical Professionals & General Users
Generates detailed AI reports for doctors and easy-to-understand insights for everyday users.

Bridging the Accessibility Gap
Enables remote STEMI detection via mobile, especially in areas with limited or no access to cardiologists.

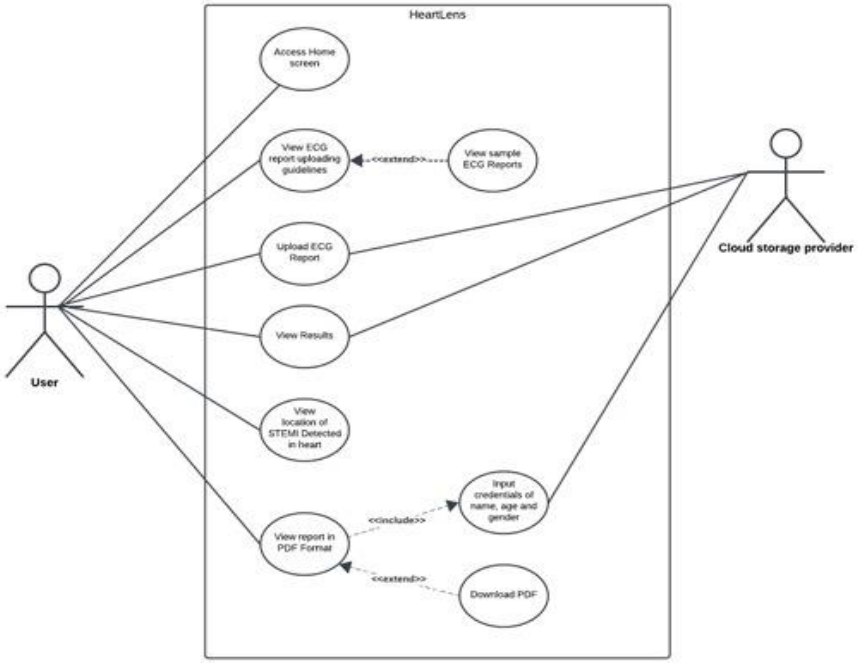
Localized for Pakistan's Healthcare System
Custom-built for local hospitals, clinics, and patients, ensuring affordability, accessibility, and seamless integration.

Personalized Heart Health Assistant
Powered by Gemini AI, offers tailored lifestyle guidance, diet plans, exercise tips, and health suggestions—based on user input like age, cholesterol, and activity level.

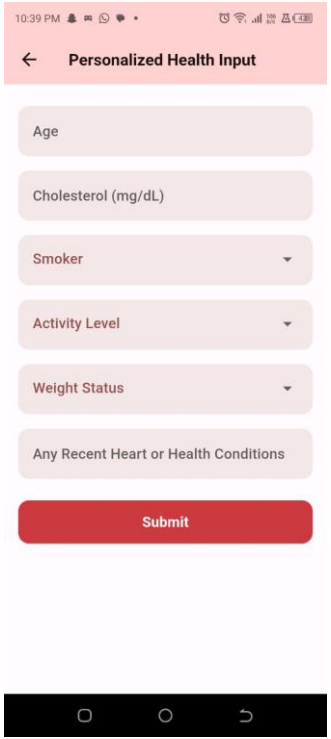
List of features offered by the solution

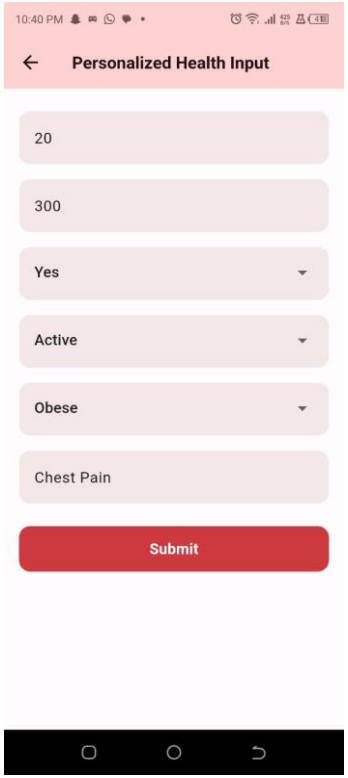
- ECG Upload and Scan
- STEMI Detection
- Infarction Localization
- Report Generation
- Personalized Heart Health Assistant

Use-case diagram

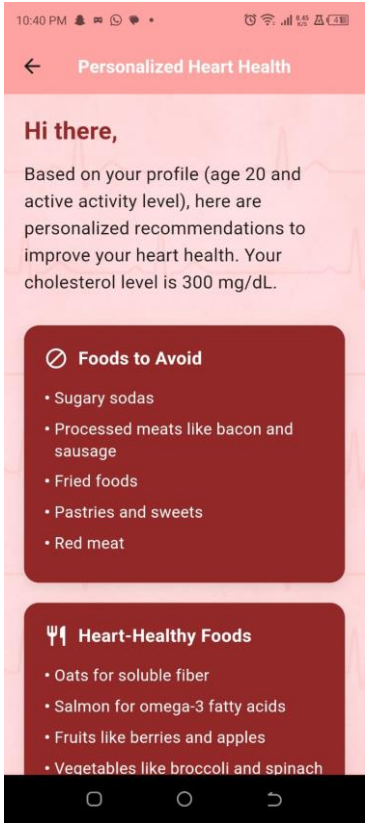


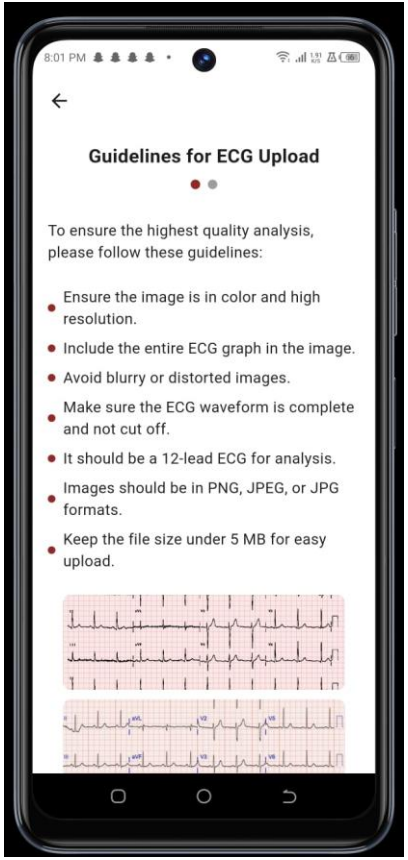
Snapshots of the prototype



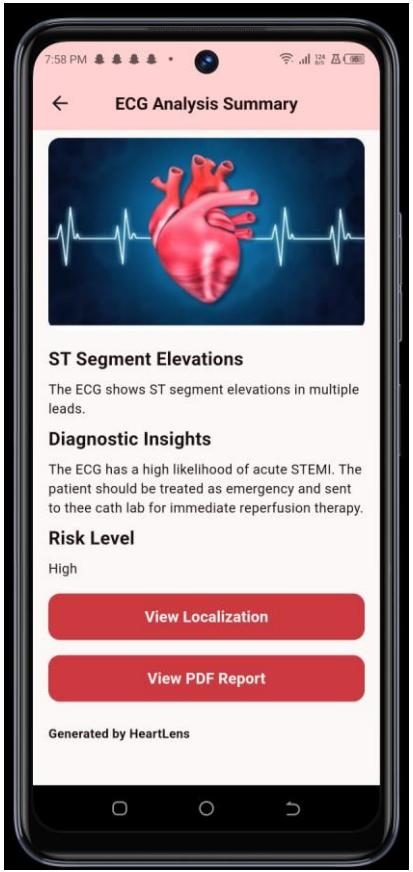


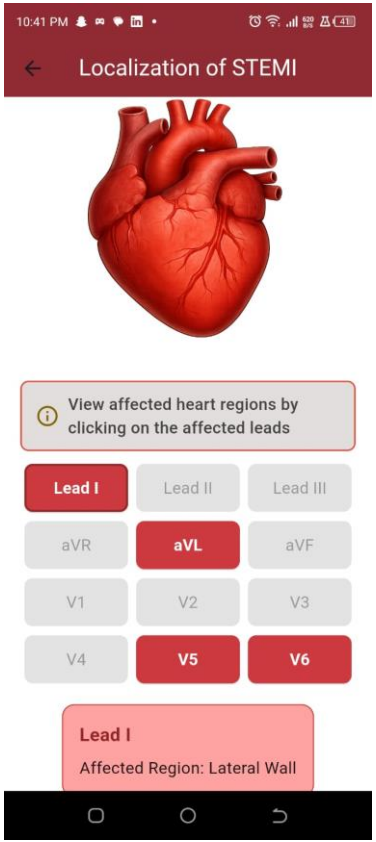
Snapshots of the prototype






7:58 PM
Upload ECG
Scan and Upload
Choose Photo
Take Photo
Proceed to Analysis


7:58 PM
ECG Analysis Summary
ST Segment Elevations
The ECG shows ST segment elevations in multiple leads.
Diagnostic Insights
The ECG has a high likelihood of acute STEMI. The patient should be treated as emergency and sent to thee cath lab for immediate reperfusion therapy.
Risk Level
High
View Localization
View PDF Report
Generated by HeartLens


10:41 PM
Localization of STEMI
View affected heart regions by clicking on the affected leads
Lead I
Lead II
Lead III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Lead I
Affected Region: Lateral Wall


7:59 PM
STEMI Detection.pdf
1/1
HEARTLENS
Automated ECG Interpretation for STEMI Detection
ECG Analysis Summary
Diagnostic Insights
Recommendations
Generated By:
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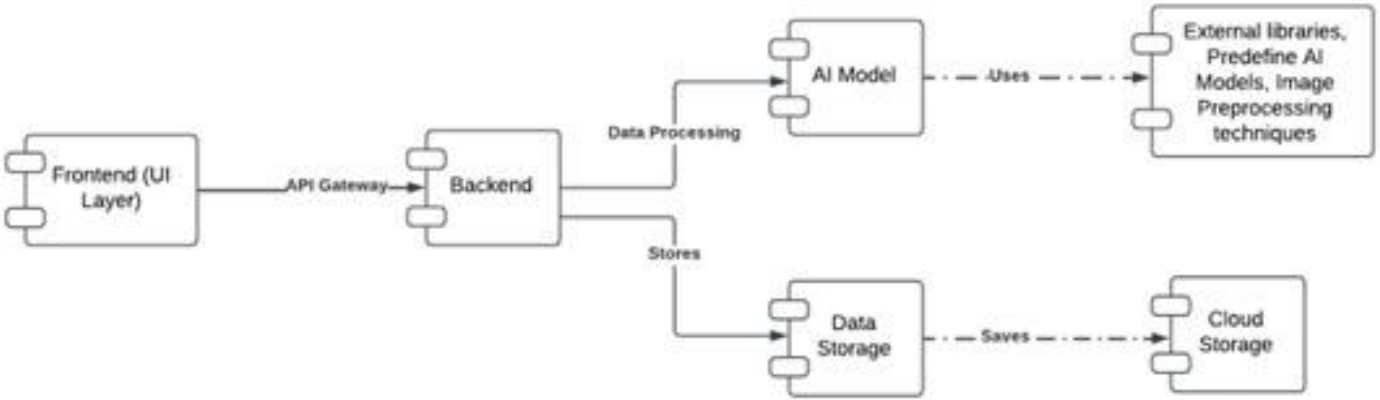
Architecture diagram of the proposed solution



Technologies to be used in the solution

(Mandatory to integrate Gemini APIs)

Tech Stack

- **Frontend:** Flutter (Dart) – Cross-platform mobile application
- **Backend:** Python (FastAPI) – API development and model inference
- **AI Model:** PyTorch – Deep learning-based STEMI detection
- **Database:** Firebase – Real-time data storage and cloud functions
- **Cloud Services:** Google Cloud – AI model hosting and processing
- **Conversational AI:** Gemini – Powers the Personalized Heart Health Assistant

Future Development

- Integration with wearable ECG devices for continuous monitoring
- Expansion to detect other cardiac conditions beyond STEMI
- Inclusion of some of the 39 other diseases detectable through ECG in future updates
- Multi-language support for wider accessibility

Cost structure: Pro forma income statement

HeartLens
Income Statement
July 1, 2025 – June 30, 2026

Description	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
Revenue:													
Subscription Revenue – Basic version ($20/user/year)	0	0	0	100	140	160	160	200	200	220	220	240	1,640
Subscription Revenue – Enterprise version ($150/hosp/year)	300	300	450	600	600	750	750	750	900	900	1200	1350	8,850
Advertising Revenue – Basic version ($50/ad/year)	150	200	200	250	350	400	450	500	600	700	700	750	5,350
Hospital Integration Revenue – Enterprise version ($800/hosp/year)	1600	1600	2400	3200	3200	4000	4000	4000	4800	4800	6400	7200	47,200
Total Net Revenue	2,050	2,100	3,050	4,050	4,150	5,150	5,200	5,250	6,300	6,400	8,300	9,300	62,250

Cost of Goods:													
Google Cloud Storage Services	5	5	5	7	7	8	8	9	9	9	10	10	92
Firebase Storage Services	4	4	4	5	7	7	8	9	9	9	10	10	86
Hosting & Domain Services	4	4	4	4	4	4	4	4	4	4	4	4	48
Total CoGS	13	13	13	16	18	19	20	22	22	22	24	24	226
Gross Profit	2,037	2,087	3,037	4,034	4,132	5,131	5,180	5,228	6,278	6,378	8,276	9,276	62,024
Gross Profit Margin	99.3%	99.3%	99.5%	99.6%	99.5%	99.6%	99.6%	99.5%	99.6%	99.6%	99.7%	99.7%	99.6%
Operating Expenses:													
Mobile App Developers (2 Dev @ $4/hr)	640	640	640	640	640	640	640	640	640	640	640	640	7,680
AI Engineer (1 Eng @ $4/hr)	320	320	320	320	320	320	320	320	320	320	320	320	3,840
SQA Engineer (1 Eng @ $7/hr)	420	420	420	420	420	420	420	420	420	420	420	420	5,040
Business Analyst	480	480	480	480	480	480	480	480	480	480	480	480	5,760

(1 Analyst @ $6/hr)													
Marketing & Outreach Cost	300	300	300	250	250	250	250	250	250	250	250	250	3,150
Customer Support & Maintenance	50	50	50	70	70	70	100	100	100	100	100	100	960
Legal & Regulatory Compliance	100	100	100	100	100	100	100	100	100	100	100	100	1,200
Total Operating Expenses	2,310	2,310	2,310	2,280	2,280	2,280	2,310	2,310	2,310	2,310	2,310	2,310	27,630
Net Profit	-273	-223	727	1,754	1,852	2,851	2,870	2,918	3,968	4,068	5,966	6,966	34,394
Net Profit Margin	-13.3%	-10.6%	23.8%	43.4%	44.6%	55.3%	55.1%	55.5%	62.9%	63.5%	71.8%	74.9%	55.2%

Note: All the amounts mentioned are in USD($)

Provide links to your:

1. Demo video link (3 minutes): https://youtu.be/S_k5AoCfbu0?si=sK_Wop_vYb-fLJL1
2. Working prototype link:https://drive.google.com/drive/folders/14mXGAhczUke6zLYJA9uOEfelB3SBa_Ob?usp=sharing

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Thank you