FYPD-Form1

FYP Proposal Form

Department of (Software Engineering) Batch (2022-2023)

FYP Title Skintelli: Intelligent Skin Disease Detection System with Explainable AI

Domain Artificial Intelligence / Healthcare / Medical Imaging

Nature of FYP New Project ☑ Industrial Collaboration ☐ Funded Project ☐

Extension of Existing Project ☐ Other Department / Academic Institution ☐

Problem Statement

Pakistan has only around 1,200 dermatologists for its entire population, with very limited access in rural areas. High consultation fees and lack of awareness result in delayed treatment of skin diseases. Many patients can't tell if a skin lesion is dangerous or harmless, leading to late diagnosis of serious conditions like melanoma. Current AI systems don't explain their decisions, making it hard for people to trust them

Proposed Solution

Skintelli is an AI system that detects skin diseases and explains its findings clearly. The system includes:

1. **YOLOv8** - Detects and classifies skin lesions quickly
2. **Grad-CAM** - Shows visual heatmaps highlighting which parts of the image the AI examined
3. **LLM** - Provides easy-to-understand explanations in natural language
4. **RAG** - Accesses updated medical information
5. **Agentic AI** - Automates the entire process from image input to final result
6. **GUI** - Simple interface showing the original image alongside the AI's heatmap

The key difference from other systems is transparency - users can see exactly what the AI looked at before making its decision.

Scope of the Project

What we will build:

- Desktop application for skin disease detection
- Visual explanations using colored heatmaps
- Natural language disease descriptions
- Works offline (no internet needed)
- Camera capture and image upload options

What we won't build:

- Medical diagnosis tool (this is a screening assistant only)
- Mobile app (future work)
- Patient records system
- Real-time video analysis

Development / Research Methodology

Phase 1: Data Preparation (Weeks 1-4)
- Collect HAM10000 and ISIC datasets
- Clean and organize images
- Split into training, validation, and test sets

Phase 2: YOLOv8 Model (Weeks 5-8)
- Train YOLOv8 model for skin lesion detection
- Fine-tune for better accuracy
- Target: over 90% accuracy in under 5 seconds

Phase 3: Grad-CAM (Weeks 9-10)
- Add visual explanation feature
- Generate heatmaps showing AI's focus areas
- Test that heatmaps highlight relevant features

Phase 4: LLM + RAG (Weeks 11-13)
- Connect language model for explanations
- Set up medical knowledge database
- Generate user-friendly descriptions

Phase 5: Agentic AI (Weeks 11-13)
- Build automated workflow
- Add error handling
- Ensure smooth operation

Phase 6: GUI & Testing (Weeks 14-15)
- Create user interface
- Add dual-panel display
- Test with users

Phase 7: Documentation (Week 16)
- Write final report and user manual

Resources Involved

Team:
- 4 students (Rana Mohsin, Muskan Zehra, Tabassum Abbas, Adnan Qadir)
- Supervisor: Miss Saira Khurram

Software:
- Python, YOLOv8, TensorFlow/PyTorch
- Grad-CAM libraries, OpenCV
- Tkinter/PyQt for interface

Hardware:
- Google Colab for training (free GPU)
- Regular PC for deployment (4GB RAM minimum)

Datasets:
- HAM10000 (10,000+ skin images)
- ISIC Archive

Budget: PKR 2,500 - 3,500

Final Outcome / Deliverables

1. **Working AI Model** - YOLOv8 trained for skin disease detection (90%+ accuracy)
2. **Desktop Application** - Complete software with user interface
3. **Explainable AI** - Heatmaps and natural language explanations for every prediction
4. **Documentation** - User manual, technical report, source code
5. **Performance Report** - Accuracy metrics and test results

FYP Team members:

S. No.	Name of the Student	IU Regn No	CGPA	Signature
1	Rana Mohsin	63924	3.81	
2	Muskan Zehra	62553	3.6	
3	Tabassum Abbas	63908	3.23	
4	Adnan Qadir	64876	2.99	

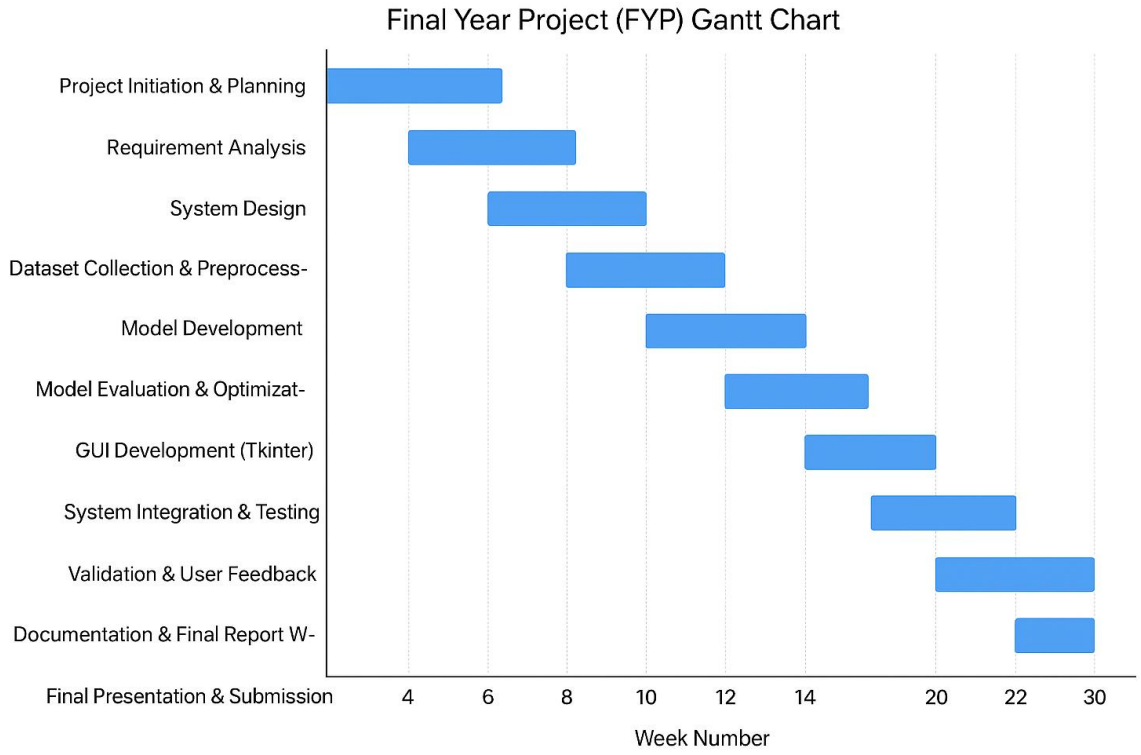
Details of Supervisor / Industrial Advisor:

	Name	Designation & Department	Contact No.	Signature
Supervisor	Ms. Saira khuram	Senior Lecturer (CS)	0300-9273665	
Co-Supervisor (if any)				
Industrial Advisor (if any)				

Project Schedule

S No.	Start of Project	Milestones	Deliverables/ Outcomes
1	Week 01 - Week 03	Project Planning	FYP Proposal Document
2	Week 04 - Week 05	Requirement Analysis	Requirements Report
3	Week 06 - Week 07	System Design	Design Document
4	Week 08 - Week 10	Dataset Preparation	Preprocessed Dataset
5	Week 11 - Week 14	YOLOv8 Training	Trained Model
6	Week 15 - Week 16	Grad-CAM Integration	Explainable AI Module
7	Week 17 - Week 19	LLM + RAG Setup	Explanation System
8	Week 20 - Week 22	GUI Development	Working Application
9	Week 23 - Week 24	Testing	Test Report
10	Week 25 - Week 26	User Validation	Evaluation Report
11	Week 27 – Week 28	Final Documentation	Complete Documentation
12	Week 29 – Week 30	Final Submission	FYP Submission

Gant Chart



FYP to **Sustainable Development Goals** (SGDs) Mapping:

SGDs	Mapping	Description
SDG 01. No poverty		
SDG 02. Zero hunger		
SDG 03. Good health and well-being	✓	Improves healthcare access through early skin disease detection
SDG 04. Quality Education		
SDG 05. Gender equality		
SDG 06. Clean water and sanitation		
SDG 07. Affordable and clean energy		
SDG 08. Decent work and economic growth		
SDG 09. Industry, innovation, and infrastructure	✓	Advances AI and computer vision for transparent medical diagnosis
SDG 10. Reduced inequalities		
SDG 11. Sustainable cities and communities		
SDG 12. Responsible consumption and production		
SDG 13. Climate action		
SDG 14. Life below water		
SDG 15. Life on land		
SDG 16. Peace, justice and strong Institutions		
SDG 17. Partnerships for the goals		

Note: *Marked those mapped*

FYP to **Complex Computing Problem** (CCP) Mapping:

CCP Attribute	WP1 and some or all of WP2 to WP7:	FYPD to CCP Mapping How it is addressed in FYPD
Depth of knowledge required	**WP1:** one or more of **ACM Knowledge Ara**	Uses advanced AI and image processing techniques
Range of conflicting requirements	**WP2:** wide-ranging or Conflicting technical, engineering/computing and other issues	Balances accuracy, speed, explainability, and privacy
Depth of analysis required	**WP3:** no obvious solution	Requires sophisticated model training and explainability features
Familiarity of issues	**WP4:** Involve infrequently encountered issues	
Extent of applicable codes	**WP5:** outside problems encompassed by standards and codes of practice	
Extent of stake-holder involvement and conflicting requirements	**WP6:** diverse groups of stakeholders with widely varying needs	
Interdependence	**WP7:** many component parts or sub-problems	

For office us only:

☐ Proposal Approved	☐ Not Approved	☐ Returned for Clarification / Modification	
Comments (if any):			
Project Serial No.		Date:	
Signature FYP Coordinator		Signature Chairperson	
Signature Associate Dean / Dean			

Annexure – A

Knowledge Areas in ACM

#	ACM Knowledge Area	Your Project Mapping to ACM Knowledge Area
1	AL-Algorithms and Complexity	
2	AR-Architecture and Organization	
3	CN-Computational Science	
4	DS-Discrete Structures	
5	GV-Graphics and Visualization	It uses Grad Cam for image processing and visualization techniques to analyze and display skin conditions clearly.
6	HCI-Human-Computer Interaction	Focuses on creating a user-friendly interface for easy interaction with non-technical users.
7	IAS-Information Assurance & Security	
8	IM-Information Management	
9	IS-Intelligent Systems	The system employs machine learning algorithms to intelligently detect and classify different skin types and issues (YOLOv8, Grad-CAM, LLM, and RAG).
10	NC-Networking and Communication	
11	OS-Operating Systems	
12	PBD-Platform-based Development	
13	PD-Parallel and Distributed Computing	
14	PL-Programming Languages	
15	SDF-Software Development Fundamentals	Involves structured software design, coding, and testing of the full system.
16	SE-Software Engineering	The project applies software design, testing, and deployment principles to build a reliable AI-based skin detection system.
17	SF-Systems Fundamentals	
18	SP-Social Issues and Professional Practice	