[Final Year Project Proposal]

Sr#	Student Name	Roll Number	Credit Completed	Signature
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2	Azhan Shoaib	22P-9053	93	
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Suggested Supervisor:
Faculty Member's Name: Dr. Muhammad Amin Signature: _____

Date (25 August 2025)

Project Details

Project Title	Fitness Intelligence Technology		
Project Area of Specialization	Artificial Intelligence / Machine Learning / Computer Vision / Natural Language Processing		
List Related Core Subjects	1) Database Systems 2) Artificial Intelligence 3) Data Structure 4) Object Oriented Programming 5) Operating Systems		
List Related Elective Subjects	1) Data Science 2) Computer Vision 3) Natural Language Processing		
Project Start Date	2022-02-15	**Project End Date**	2022-12-31

Project Summary (less than 2500 characters)	The project pertains to development of a mobile application that delivers personalized workouts, culturally/medically adaptable diet plans & biomechanics-aware form analysis. Unlike conventional fitness apps that provide generic templates, our app features a Virtual AI Trainer; an intelligent fitness companion that: ● Provides real-time form analysis based on user body attributes. ● Acts as a knowledge hub, answering user queries about gym machinery, exercise/workout modifications, recovery tips & healthy recipe adaptations. ● Generates personalized diet plans fulfilling cultural & medical needs (halal, vegan, keto) while balancing macros and calories. ● Continuously adapts/modifies workouts using reinforcement learning based on progress, fatigue, or available equipment. The project combines ML, CV, RL & NLP to create a cohesive solution that results in an intelligent fitness trainer that bridges the gap between human coaching and digital health technology.
Project Objectives (less than 2500 characters)	1. Develop a Virtual AI Fitness Trainer as a knowledge hub for all fitness related guidance & queries. 2. Personalize workouts & diet plans by ML-driven recommendations & Reinforcement learning for adaptive progression. 3. Implement realtime form analysis using biomechanics-aware rules & personalized user's body attributes (height, limb length, weight, etc.) 4. Implement comprehensive progress tracking. 5. Ensure inclusivity & accessibility through body-type personalization and culturally aware content.
Project Implementation Method (less than 2500 characters)	The project will be implemented in the following steps: 1) **Data Collection** ● Exercise library with machinery, dumbbells, and bodyweight variants. ● Datasets for correct vs. incorrect form (COCO, MPII, plus custom recordings.) ● Nutrition datasets. 2) **Model Development** ● Virtual Trainer: RAG + fine-tuned LLM for fitness queries. ● Form Analysis: Using MediaPipe/MoveNet for keypoints + biomechanics-based error detection, adjusted per body attributes. ● Diet & Workout Planner: Using contextual bandits + constraint based optimizer.

	3) **Integration** ● Frontend: React Native (cross-platform) ● Backend: FastAPI + PostgreSQL + FAISS (vector DB for AI Trainer) ● On-device inference (TensorFlow Lite) 4) **Testing** ● Evaluate form detection precision, trainer Q&A accuracy, and diet macro compliance. ● Beta-test on diverse body types.
Benefits of the Project (less than 2500 characters)	1) Provides a scalable alternative to personal trainers, accessible anytime, anywhere. 2) Offers personalized guidance tailored to cultural, physical, and lifestyle factors. 3) Improves exercise safety and efficiency through real-time form analysis. 4) Encourages sustainable fitness by adapting meals to cravings while staying within macros. 5) Bridges the gap between AI innovation and practical health-tech solutions.
Technical Details of Final Deliverable (less than 2500 characters)	We are going to develop a Virtual AI Fitness Trainer mobile app capable of: ● Adaptive workout planning and diet generation. ● Conversational AI trainer for Q&A, exercise substitutions, and recovery tips. ● Tracking user progress with gamified dashboards. ● Real-time form analysis personalized to user attributes.
Final Deliverable of the Project	A fully functional cross-platform mobile application with integrated AI modules that include; form analysis, diet planning, coaching assistant.
Type of Industry	Fitness & Digital Health Industry
Technologies	React Native, FastAPI, TensorFlow Lite, PyTorch, MediaPipe, Hugging Face Transformers, PostgreSQL, FAISS
Sustainable Development Goals	Following are the sustainable development goals: ● Good Health & Well-being. ● Industry, Innovation & Infrastructure. ● Reduced Inequalities (cultural inclusivity in diets)

Project Key Milestones

Elapsed time	Milestone	Deliverable
Month 1-2	Data Collection & Planning	Curated datasets, project schema
Month 3-6	Model Development	Form analysis, trainer, planners
Month 7–8	App Development	Working app with integrated models
Month 9–10	Testing & Refinement	User trials, evaluation reports
Month 11–12	Final Deployment	Production-ready mobile application.

Project Equipment Details

Item Name	Type	No. of Units	Per Unit Cost (in Rs)	Total (in Rs)
Local GPU Server (Lab / University Resource)	Equipment	1	-	-
Smartphone	Equipment	1	60,000	60,000
Cloud Compute	Service	1	30,000	30,000
AWS EC2 with GPU	Cloud Service	1	Pay-per-use (~25,000)	~25,000
Miscellaneous	Software/API	1	15,000	15,000
			Total in (Rs)	**130,000**