**[Final Year Project Proposal]**

| Sr# | Student Name | Roll Number | Credit Completed | Signature |
| --- | --- | --- | --- | --- |
| 1 | Subhan Tariq |  |  |  |
| 2 | Azhan Shoaib | 22P-9053 | 93 |  |
| 3 | Khawaja Abdullah Ishaq | 22P-9375 | 94 |  |

**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 Collecton & 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** |