FITEX

A PROJECT REPORT
BY – **LEETRANKERS**

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DECLARATION

I/We hereby declare that the work which is being presented in the report entitled **Fitex**, is an authentic record of my/our own work carried out during the period from Jan, 2025 to April, 2025 at School of Computer Science and Engineering and Technology, Bennett University Greater Noida.

The matters and the results presented in this report has not been submitted by me/us for the award of any other degree elsewhere.

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PROBLEM STATEMENT

The rising global awareness around health and fitness has led to a surge in demand for personalized fitness tracking solutions. However, most existing fitness apps provide generic workout plans and lack real-time adaptability based on individual user needs, body metrics, and lifestyle.
They also rarely integrate smart features like **food calorie detection from photos**, **muscle engagement visualization (heatmaps)**, or **dynamic workout generation** based on changing user profiles.

This project proposes **FiteX**, an AI-powered fitness platform that leverages a **fine-tuned Retrieval-Augmented Generation (RAG) model** connected to a **Large Language Model (LLM)**, combined with computer vision and dynamic databases (DataStax) to offer deeply personalized fitness plans, food tracking, and workout analysis in real time.

Key challenges include ensuring high accuracy in workout recommendations, food calorie estimation, real-time responsiveness, and scalable data management.
The goal is to create a seamless, adaptive, and intelligent fitness journey for users of all levels.

INTRODUCTION

In an era where personal health tracking is becoming more important than ever, users demand fitness applications that are smart, adaptive, and truly personalized.
Most traditional fitness apps focus heavily on pre-built templates, which fail to adapt to real-time user conditions or goals.

FiteX aims to bridge this gap by offering an **AI-driven platform** capable of dynamically analyzing users' physical metrics, recognizing food calories through images, mapping workout effectiveness through heatmaps, and creating real-time customized workout plans using an intelligent RAG-enhanced LLM system.

Key Points:

Dynamic Personalization: Real-time generation of workout and nutrition plans based on live user data.

Advanced AI Capabilities: Fine-tuned RAG model connected to a powerful LLM for adaptive plan generation.

Privacy and Scalability: Secure, scalable data handling using **DataStax AstraDB**.

PROJECT OUTLINE

1.Objectives

- To build a smart fitness platform that adapts to the user's body metrics and real-time progress.
- To implement AI-based food calorie estimation from user-submitted photos.
- To offer a heatmap-based visual feedback system tracking muscle engagement.
- To maintain a scalable, fast, and secure backend for data storage.

2. Literature Review

- **Fitness Personalization Studies**: Analysis of current fitness apps, their limitations in personalization, and the potential improvements through AI and RAG models.
- **Computer Vision in Nutrition**: Reviewed recent advancements in food recognition and calorie estimation from images.
- **Database Technologies for Real-time Applications**: Studied scalable NoSQL databases like Apache Cassandra (used in DataStax) for handling high-velocity fitness data.

6. System Design and Architecture

Architecture Overview:

The system architecture is designed to ensure smooth data flow from user input (body metrics, food photos) through AI models (for sentiment/workout generation) and deliver real-time actionable outputs (plans, recommendations).

Key Components:

Frontend:
Built using **React Native**, offering an intuitive and responsive mobile app interface.

RAG Model Fine-Tuned to LLM:
Retrieves fitness knowledge and generates personalized workouts dynamically.

Food Calorie Estimation:
NLP -based model processes food images to detect items and estimate calorie values.

Heatmap Visualization:
Generates user-specific muscle group heatmaps based on workout activity logs.

Database Management:
DataStax AstraDB (Cassandra-based) used for scalable storage of user data, workout logs, and food intake records.

7. Implementation

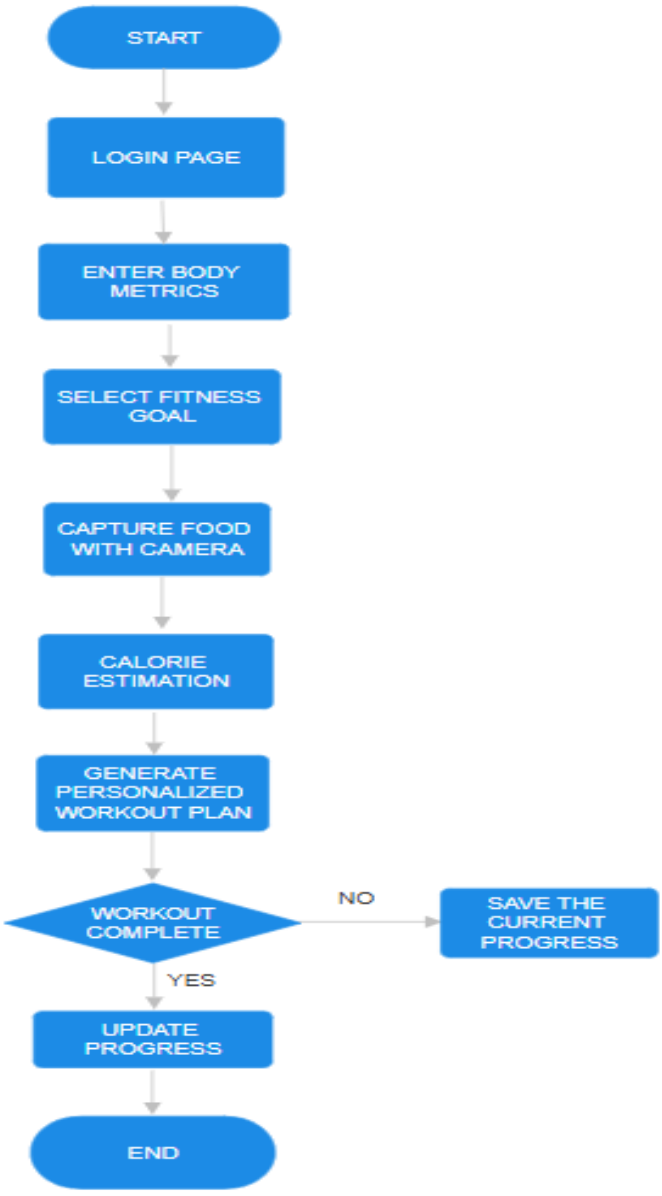
Tools and Libraries:

React Native: Cross-platform mobile app development.

LangChain / HuggingFace Transformers: For building the RAG model around the LLM.

DataStax SDK: To connect backend APIs to AstraDB securely.

1.2 CONTROL FLOWCHART



1. PROJECT DOCUMENTATION

GIT REPO LINK FOR THE PROJECT

ONLINE RESOURCES

1. **DataStax Astra DB**

Resource: [AstraDB docs]

Description: Free managed Cassandra DB where we are storing data.

2. React Native:

- [React Native Documentation]

SNAPSHOTS OF THE PROJECT