AI based diabetes prediction system

Phase-2

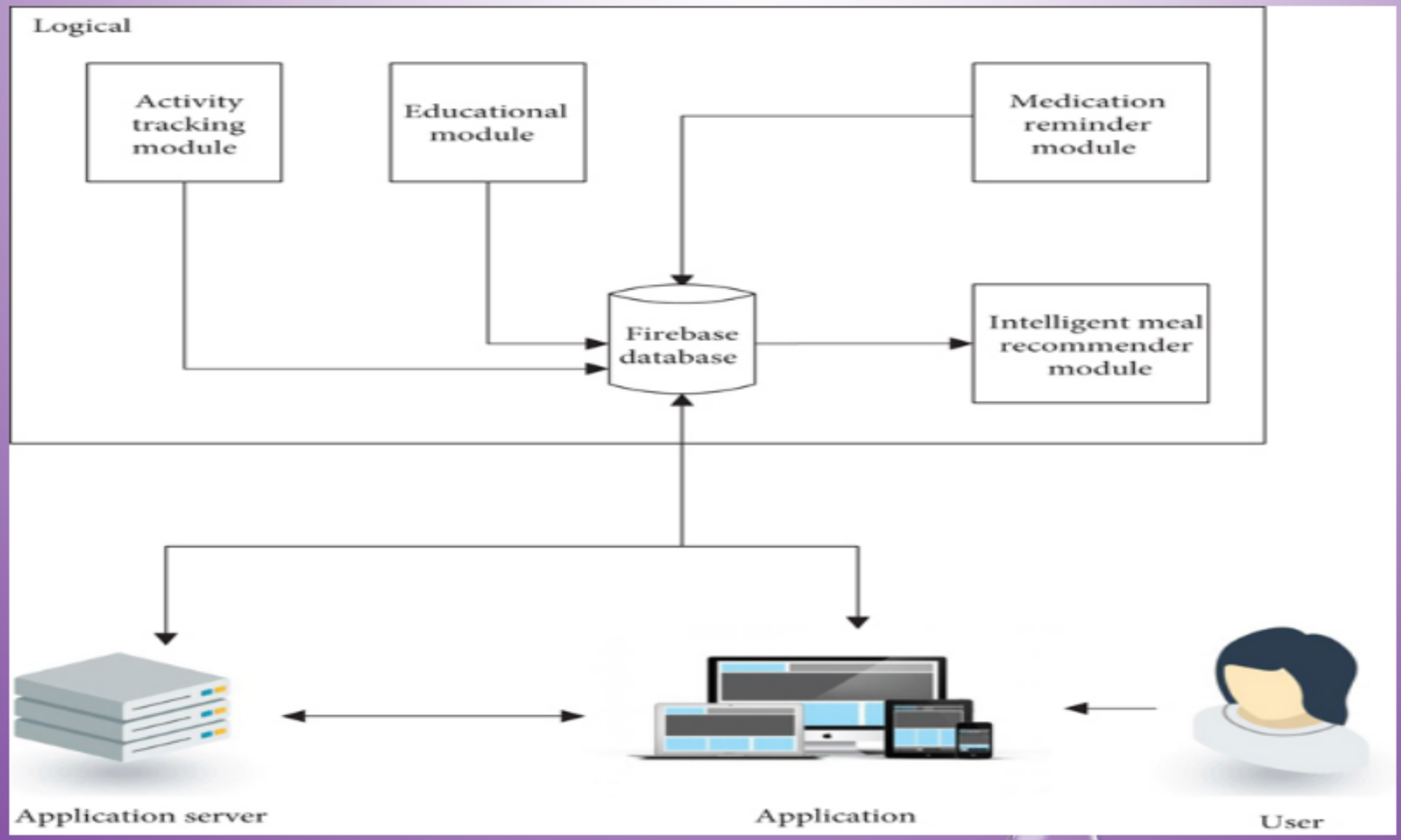
System Design and Development

- In the design and development of the architecture for the diabetes management system, the clinical requirements and design analysis of the system were based on discussions with collaborators from the Department of Nutrition and Food Science of the University of Ghana and Kwame Nkrumah University of Science and Technology (KNUST).
- From these discussions, the diet type of patients was determined to be an essential approach suitable for the diabetes management system. The following functionalities were mentioned:
- (1) Scheduling and reminding diabetic patients to take their medication and blood glucose readings,
- (2) recommending healthy meals for diabetics to keep their blood glucose levels in check,
- (3) encouraging and tracking the activity of diabetic patients,
- (4) providing a visual interface to help them make meaning of their readings and establishing a sufficient connection between the doctor and the diabetic patient using e-mail.
- Providing the diabetic patient with a data visualization tool to display the data in tables, charts, and an educational program for newly diagnosed and ongoing diabetes treatment is valuable for the treatment and management of diabetes.

System Architecture

- The system architecture for the Diabetes Management System presented below in Figure 1 is the conceptual model that defines the structure, behavioural interactions, and multiple system views that underpins the system development.
- It presents the formal descriptions of the systems captured graphically that supports reasoning, and the submodules developed as well as the dataflows between the developed modules.
- Figure 1 presents the components of the system architecture, which comprises:
- (1) Diabetes Intelligent Meal Recommender Module.
- (2) Educational Module for Diabetics with Food Recognition Engine.
- (3) Activity Tracking Module.
- (4) Medication Reminder Module.

Flowchart


Logical
Activity tracking module
Educational module
Medication reminder module
Firebase database
Intelligent meal recommender module
Application server
Application
User

- The architecture of a diabetes prediction system typically conslst of several components that work together to collect, process, and predict diabetes risk. Below is a simplified overview of a typical architecture for such a system:
- 1. Data Collection:o Electronic Health Records (EHRS): Patient data is often collected from electronic health records information medical history.
- 2. Feature Selection: Machine learning models are used to analyze these datasets. Feature selection techniques help identify the most relevant factors for predicting diabetes risk. Innovations may involve using deep learning models, featureengineering, or genetic markers.
- 3. Model Development: Various machine learning algorithms, such as logistic regression, decision trees, random forests, and neural networks, are employed to create predictive models. Innovations include the use of deep learning models like convolutional neural networks (CNNs) or recurrent neural networks (RNNs) for improved accuracy.

- 4. Evaluation Metrics: Innovations may involve the development of novel eva modal norform M etrics to assess concidorina. may involve the development of novel evaluation metrics to assess model performance, considering factors like sensitivity, specificity, AUC-ROC, and precision-recall.
- 5. Explainability: Interpretable machine learning models and explainability techniques are essential for gaining trust in the predictions. Innovations in this area focus on making complex models more understandable to healthcare professionals and patients.
- 6. Real-time Monitoring: Some innovations include the integration of real-time monitoring and alerts, allowing patients and healthcare providers to take timely actions to manage blood glucose levels.
- 7. Personalization: Personalized diabetes prediction models consider patient characteristics and adapt over.

characteristics and adapt over time. Innovations in this area aim to provide tailored recommendations for each patient.

- 8. User-Friendly Interfaces: Innovations also extend to user interfaces, with the development of user-friendly apps and dashboards that make it easier for patients and healthcare professionals to access and interpret predictions.
- 9. Ethical and Privacy Considerations: Innovations in privacy-preserving techniques and adherence to ethical guidelines are crucial to protect patient data and maintain trust in these systems.It's important to note that the field of diabetes prediction systems is continuously evolving, with ongoing research and advancements.