**Project Overview** (GluMo)

App that monitors real time glucose levels

**Step 1.**

**Problem**: Diabetic patients need to continuously monitor their blood glucose levels to manage their condition effectively. Traditional methods can be invasive and require frequent manual checks which can be tedious, time consuming and uncomfortable.

**Existing Solutions**: Current CGM devices and apps to exist but lack in user friendly interfaces and gaps/opportunities that could be significantly improved.

**Justify Your Choice**: The development of the **GluMo** holds a significant personal importance to me because my fiancé needs to monitor her glucose levels daily. Living through the challenges she faces in managing her condition has motivated me to find a way to make her experience easier and more efficient. Watching her go through the inconvenience and stress of frequent manual glucose checks has made me aware of the burden this place on her daily life. The constant need to monitor and manage glucose levels can be emotionally taxing. It affects not only her well-being but also our shared experiences and activities. Creating an app that is a reliable system to monitor her glucose levels and alert her to any issues provides peace of mind to both of us. It ensures that she can quickly respond to potential problems, improving her overall safety. There are existing solutions that often lack comprehensive integration of glucose data with other important factors such as diet, exercise, and medication. This is essential for effective diabetes management. Many apps are not user-friendly and fail to provide a seamless experience. By focusing on an intuitive design and customizable features, I aim to create a solution that truly meets her needs. With features like predictive alerts and personalized insights, the app can help my fiancé make proactive decisions about her health. This reduces the likelihood of emergencies and improves her quality of life.

**Step 2.**

**Propose a Software Solution**: **GluMo** is a mobile application designed to provide real-time glucose level monitoring for diabetic patients using Continuous Glucose Monitor (CGM) devices. The app seamlessly integrates data from CGM devices to display users' current glucose levels, trends, and predictive analytics in an intuitive and user-friendly interface. Key features include customizable alerts for high and low glucose levels, historical data visualization, and secure data sharing with healthcare providers for remote monitoring and telemedicine consultations.

**GluMo** sets itself apart from existing solutions by offering a new approach to diabetes management. The app includes features for tracking diet, exercise, and medication intake. Users can easily log their meals, track their physical activity, and monitor their medication schedules, all within the same platform. By providing a comprehensive view of their health data, **GluMo** empowers users to make informed decisions about their lifestyle choices and medication management.

**GluMo** leverages machine learning algorithms to predict future glucose trends based on users' historical data. This predictive analytics feature enables users to anticipate fluctuations in their glucose levels and take proactive steps to maintain optimal health. Additionally, the app provides personalized insights and educational resources to help users better understand their condition and make positive changes to their lifestyle.

This user-friendly and proactive approach aims to enhance patient engagement and improve overall diabetes management. By streamlining the daily monitoring process and offering valuable insights and support, **GluMo** makes managing diabetes more efficient and less stressful for users like my fiancé, empowering them to lead healthier and happier lives.

**My Pseudocode**:

class GluMoApp:

def \_\_init\_\_(self):

self.running = True

self.CGM\_device = None

self.database = {}

self.user\_settings = {}

self.accountability\_partner = None

def receive\_glucose\_data(self):

while self.running:

glucose\_level = self.CGM\_device.get\_current\_glucose\_level()

self.display\_glucose\_level(glucose\_level)

self.store\_glucose\_data(glucose\_level)

self.check\_alerts(glucose\_level)

self.generate\_predictive\_alerts()

if glucose\_level < self.user\_settings['low\_threshold']:

self.notify\_accountability\_partner("low", glucose\_level)

elif glucose\_level > self.user\_settings['high\_threshold']:

self.notify\_accountability\_partner("high", glucose\_level)

if self.time\_for\_exercise():

self.remind\_to\_exercise()

def store\_glucose\_data(self, glucose\_level):

timestamp = get\_current\_timestamp()

self.database[timestamp] = glucose\_level

def check\_alerts(self, glucose\_level):

if glucose\_level > self.user\_settings['high\_threshold']:

self.send\_alert("High Glucose Alert", glucose\_level)

elif glucose\_level < self.user\_settings['low\_threshold']:

self.send\_alert("Low Glucose Alert", glucose\_level)

def send\_alert(self, alert\_type, glucose\_level):

alert\_message = f"{alert\_type}: Glucose level is {glucose\_level}"

print(alert\_message)

if alert\_type == "High Glucose Alert" and glucose\_level > self.user\_settings['emergency\_high\_threshold']:

self.contact\_emergency\_contacts(alert\_message)

elif alert\_type == "Low Glucose Alert" and glucose\_level < self.user\_settings['emergency\_low\_threshold']:

self.contact\_emergency\_contacts(alert\_message)

def generate\_predictive\_alerts(self):

historical\_data = list(self.database.values())

predicted\_glucose\_level = machine\_learning\_model.predict(historical\_data)

if predicted\_glucose\_level > self.user\_settings['high\_threshold']:

self.send\_alert("Predicted High Glucose Alert", predicted\_glucose\_level)

elif predicted\_glucose\_level < self.user\_settings['low\_threshold']:

self.send\_alert("Predicted Low Glucose Alert", predicted\_glucose\_level)

def contact\_emergency\_contacts(self, alert\_message):

print(f"Emergency Contact Alert: {alert\_message}")

def display\_glucose\_level(self, glucose\_level):

print(f"Current Glucose Level: {glucose\_level}")

def notify\_accountability\_partner(self, condition, glucose\_level):

message = f"Hi {self.accountability\_partner}, "

if condition == "low":

message += f"I am experiencing low glucose levels ({glucose\_level})."

message += "Please remind me to consume some fruit juice or glucose tablets."

elif condition == "high":

message += f"My glucose levels are high ({glucose\_level})."

message += "Please remind me to drink plenty of water and avoid sugary foods."

print(message)

def time\_for\_exercise(self):

current\_time = get\_current\_time()

preferred\_exercise\_time = self.user\_settings['exercise\_time']

return current\_time == preferred\_exercise\_time

def remind\_to\_exercise(self):

print("It's time to exercise! Don't forget to stay active.")

def log\_meal(self, meal\_details):

timestamp = get\_current\_timestamp()

self.database[timestamp] = meal\_details

def analyze\_meal\_impact(self, meal\_details):

pass

def track\_medication(self, medication\_details):

timestamp = get\_current\_timestamp()

self.database[timestamp] = medication\_details

**User Interaction**:

**Home Screen**

Upon launching the **GluMo** app, users are greeted with a visually appealing home screen that provides a snapshot of their current glucose status. The home screen displays their current glucose level in large, easy-to-read text, along with indicators for trends such as whether glucose levels are stable, rising, or falling. Users can quickly glance at their glucose status without navigating through multiple screens, allowing for swift and efficient monitoring of their condition. Additionally, important alerts, such as high or low glucose levels, are prominently displayed on the home screen to ensure users are immediately aware of any critical issues requiring attention. This intuitive design enhances user experience by providing essential information immediately and minimizing the time and effort needed to access key features of the app.

**Glucose Monitoring**

**GluMo** offers comprehensive glucose monitoring features, empowering users to track their glucose levels over time and gain valuable insights into their health status. Through detailed graphs and charts, users can visualize their glucose data in various time frames, such as daily, weekly, or monthly views. This visualization allows users to identify patterns and trends in their glucose levels, helping them make informed decisions about their diet, medication, and lifestyle choices. Users can input additional information, such as meals, medication intake, and physical activities, to correlate with glucose fluctuations and gain a deeper understanding of the factors influencing their glucose levels. By providing customizable and interactive monitoring tools, the app enables users to take proactive steps towards better managing their diabetes and achieving their health goals.

**Meal Logging**

Users can easily log their meals, including details such as carbohydrate intake, meal times, and portion sizes. The app provides a comprehensive database of foods and nutritional information, making it convenient for users to select and track their meals accurately. Additionally, users can access personalized meal recommendations and dietary guidelines tailored to their glucose levels, dietary preferences, and health goals. By logging their meals and receiving actionable feedback, users can make more informed choices about their diet and optimize their glucose management efforts effectively.

**Medication Tracking**

For users managing diabetes through medication, staying on top of their treatment plan is essential for maintaining optimal health. **GluMo** includes medication tracking features to help users track their medication intake with ease. Users can log their medication doses, including insulin injections, oral medications, and other supplements, and set reminders for their medication schedules to ensure timely administration. The app also maintains a detailed medication history, allowing users to review their medication intake over time and monitor their adherence to prescribed treatments. By providing convenient medication tracking and reminders, the app empowers users to stay disciplined with their medication regimen and achieve better health outcomes.

**Exercise Reminder**

Regular physical activity plays a crucial role in managing diabetes and improving overall health and well-being. To encourage users to stay active, **GluMo** includes a built-in exercise reminder feature. Users can set their preferred exercise schedule and receive friendly reminders to engage in physical activity at designated times. The app offers customizable exercise preferences, allowing users to select their preferred activities, duration, and intensity levels. Additionally, users can receive motivational messages and tips to stay motivated and committed to their fitness goals. By incorporating exercise reminders into their daily routine, users can foster healthy habits, boost their energy levels, and enhance their glucose management efforts effectively.

**Community Support**

Living with diabetes can sometimes feel overwhelming, but with **GluMo**, users never have to face their challenges alone. The app features a vibrant community forum where users can connect with others managing diabetes, share experiences, and seek support and advice from peers. The community forum serves as a valuable platform for users to engage in meaningful discussions, exchange tips and strategies, and provide encouragement and motivation to one another. Whether it's sharing success stories, asking questions about managing diabetes, or simply offering a listening ear, the community forum fosters a sense of belonging and camaraderie among users. By joining the community, users can gain valuable insights, build meaningful connections, and feel empowered on their diabetes management journey.

**Emergency Assistance**

In case of emergencies, quick and timely assistance is paramount for users managing diabetes. **GluMo** includes an emergency assistance feature that provides users with peace of mind and ensures they can access help when needed. With the tap of a button, users can activate the emergency assistance feature, which notifies their designated emergency contacts and shares their current location. This feature is especially valuable in situations of severe hypoglycemia or other medical emergencies, where immediate intervention is crucial. By providing users with a reliable and efficient emergency assistance mechanism, the app helps safeguard their health and well-being, offering reassurance and support during critical moments.

**Personalized Insights**

Understanding how lifestyle factors impact glucose levels is essential for effective diabetes management. **GluMo** provides users with personalized insights and recommendations based on their individual glucose trends, lifestyle habits, and health goals. Through advanced analytics and machine learning algorithms, the app analyzes users' glucose data to identify patterns, trends, and correlations with various factors such as diet, exercise, medication, and stress levels. Based on these insights, the app offers actionable recommendations and suggestions to help users optimize their diabetes management strategies. Whether it's adjusting dietary choices, modifying exercise routines, or implementing stress-reduction techniques, users receive personalized guidance tailored to their unique needs and preferences. By empowering users with actionable insights, the app enables them to make informed decisions, take proactive steps towards better health, and achieve greater control over their diabetes management journey.