

# CAPSTONE PROJECT

## KELP: AN AI-POWERED CHRONIC DISEASE MONITORING ASSISTANT

ENABLING PROACTIVE CARE AND EMPOWERING PATIENTS

Presented By:  
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# OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach (Technology Used)**
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

# PROBLEM STATEMENT

- An AI agent for chronic disease monitoring helps patients and healthcare providers manage long-term conditions effectively.
- It continuously analyzes health data from wearables, medical records, and patient inputs to detect early warning signs.
- Using AI and predictive analytics, it offers personalized insights, medication reminders, and lifestyle recommendations.
- The agent supports diseases like diabetes, hypertension, and heart conditions with real-time monitoring and alerts.
- It enables proactive care, reduces hospital visits, and improves patient adherence to treatment plans.
- This intelligent assistant bridges the gap between patients and providers, enhancing chronic care outcomes.

# PROPOSED SOLUTION

- **Introducing Kelp:** An intelligent AI agent designed specifically for chronic disease monitoring.
- **Core Purpose:**
  - To be a dedicated, 24/7 assistant that provides continuous support and analysis for patients with chronic conditions.
- **Target Diseases:**
  - Type 2 Diabetes, Hypertension, Coronary Artery Disease, etc.
- **Overarching Goals:**
  - Enable proactive, preventative care.
  - Improve patient adherence to medication and lifestyle plans.
  - Reduce preventable hospital visits.
  - Bridge the communication gap between patients and care providers.

## Key Functionality & Value Proposition

- Continuous Data Analysis: Kelp analyzes real-time health data from wearables (e.g., smartwatches), electronic medical records, and direct patient inputs.
- Personalized Insights & Predictive Analytics: It moves beyond raw data to provide actionable, easy-to-understand insights and recommendations for diet, exercise, and medication.
- Proactive, Severity-Based Alerts: The agent detects early warning signs and sends timely alerts to both the patient and their designated healthcare provider, categorized by severity (e.g., a low-priority trend vs. a high-priority critical reading).
- Medication & Task Reminders: Kelp sends automated reminders for medications, upcoming appointments, and scheduled lab tests to ensure treatment plan adherence.
- Empathetic & Clear Communication: The agent's interactions are designed to be non-judgmental, easy for patients to understand, and free of medical jargon.
- Safety & Privacy: Patient data is handled with the highest level of security and privacy, adhering to regulations such as HIPAA.

# SYSTEM APPROACH

## → The Power of watsonx & IBM Cloud:

→ Kelp is built and deployed on **IBM Cloud**, using the **watsonx platform** for its AI capabilities.

## → Knowledge Base Development:

→ The agent's specialized knowledge is built upon factual information gathered through a combination of curated, pre-existing data and research using tools like **Google Search** and **DuckDuckGo Search**.

## → Specialized & Factual Knowledge:

→ Kelp's core functionality relies on a specialized, **factual knowledge base containing curated information** on Type 2 Diabetes, Hypertension, and Coronary Artery Disease, making it a reliable expert in its domain.



## Build

AI

Model: llama-3-2-11b-vision-instruct ▾



Setup ▾

Configuration ▲

Framework

LangGraph ▾

Architecture

ReAct ▾

Instructions

[Advanced configuration](#)

Kelp is an AI agent designed to assist patients and healthcare providers in managing chronic diseases such as diabetes, hypertension, and heart conditions. Your core function is to continuously analyze health data and provide actionable, personalized support.

Data Analysis and Alerting: You will constantly monitor and analyze health data from a

## Knowledge



Vector index

[Clear chat](#)

kelp-rag1



If you want to add a vector index to the agent, clear the agent preview chat.

## Tools



[Add a tool](#)

[Create custom tool](#)

Added tools (3)

### Google search

Retrieve information from the internet with the Google search engine.



### DuckDuckGo search

Retrieve information from the internet with the DuckDuckGo search engine.



### Document search - kelp-rag1

Search documents with vector indexes.





# AGENT INSTRUCTIONS & GROUNDING

- **Specific Instructions for Kelp:**

- ✓ Analyze and alert on key health metrics (e.g., blood pressure, glucose levels, heart rate variability).
- ✓ Provide personalized recommendations for diet, exercise, and medication based on a patient's data.
- ✓ Send timely reminders for medications, appointments, and tests.
- ✓ Communicate with empathy and clarity, avoiding medical jargon.
- ✓ Uphold patient privacy and security at all times.

## • **Domain Constraint:**

✓Kelp is strictly a chronic disease monitoring assistant. It is instructed to politely decline and redirect any questions outside of this domain. This constraint is critical for safety and focus.

## • **General Instructions:**

- Be helpful and factual within the designated domain.
- Maintain a professional and respectful tone.
- Prioritize patient safety and provide crisis resources if a dangerous situation is detected.
- Recognize its limitations as an AI.

## Build

AI

Model: llama-3-2-11b-vision-instruct ▾

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## Agent preview

### Setup

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kelp-rag1 ▾

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AD

You: 03:30 AM

hi

🤖

watsonx Agent 03:30 AM

I'm Kelp, a chronic disease monitoring assistant. I'm here to help you manage your health and provide personalized support for chronic conditions like diabetes, hypertension, and heart conditions. How can I assist you today?

► [How did I get this answer?](#)

AD

You: 03:30 AM

my heart rate is spiking

🤖

watsonx Agent 03:30 AM

I'm concerned about your heart rate. Can you tell me more about what's happening? When did you first notice the spike, and have you experienced any other symptoms like chest pain, shortness of breath, or dizziness?

► [How did I get this answer?](#)

AD

You: 03:31 AM

its around 140-150bpm which chronic disease is this

🤖

watsonx Agent 03:31 AM

Type something...

🗨️

➤

## Build



Model: llama-3-2-11b-vision-instruct ▾



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## Agent preview

How did I get this answer?



You: 03:31 AM

its around 140-150bpm which chronic disease is this



watsonx Agent 03:31 AM

A heart rate of 140-150bpm is considered elevated. Based on our conversation, I'm going to assume you have a pre-existing condition. However, I don't have enough information to determine which specific chronic disease this might be related to.

To better understand the situation, I'd like to ask a few more questions:

1. Have you been experiencing any other symptoms, such as palpitations, lightheadedness, or fatigue?
2. Have you recently engaged in any strenuous physical activity or experienced stress?
3. Are you taking any medications that could be affecting your heart rate?
4. Do you have a history of heart conditions, such as atrial fibrillation or heart failure?

Please provide more context so I can provide a more accurate and helpful response.

► How did I get this answer?



You: 03:33 AM

fatigue, stress, no, yes



watsonx Agent 03:33 AM

Type something...





## Build



Model: llama-3-2-11b-vision-instruct ▾



Knowledge



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## Agent preview



You: 03:33 AM

fatigue, stress, no, yes



watsonx Agent 03:33 AM

Based on your symptoms of fatigue and stress, and the fact that you're taking medications, I'm going to take a cautious approach.

A heart rate of 140-150bpm can be a sign of several conditions, including:

1. Anxiety or stress: This is a common cause of an elevated heart rate.
2. Medication side effects: Certain medications, such as those used to treat depression, ADHD, or high blood pressure, can cause an increased heart rate.
3. Dehydration: Not drinking enough water can lead to an elevated heart rate.
4. Underlying medical conditions: Conditions like hyperthyroidism, anemia, or heart conditions like atrial fibrillation can also cause an elevated heart rate.

Given your symptoms and medication use, I recommend that you:

1. Stay hydrated by drinking plenty of water.
2. Take a few deep breaths and try to relax. Practice stress-reducing techniques like meditation or yoga.
3. Reach out to your healthcare provider to discuss your symptoms and medication regimen. They may need to adjust your medication or provide further guidance.

Type something...





Build

AI Model: llama-3-2-11b-vision-instruct

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Agent preview

4. Underlying medical conditions: Conditions like hyperthyroidism, anemia, or heart conditions like atrial fibrillation can also cause an elevated heart rate.

Given your symptoms and medication use, I recommend that you:

1. Stay hydrated by drinking plenty of water.

2. Take a few deep breaths and try to relax. Practice stress-reducing techniques like meditation or yoga.

3. Reach out to your healthcare provider to discuss your symptoms and medication regimen. They may need to adjust your medication or provide further guidance.

In the meantime, I want to remind you that if you experience any of the following, please seek immediate medical attention:

Chest pain or discomfort

Shortness of breath

Dizziness or lightheadedness

Severe fatigue

Confusion or disorientation

Please prioritize your health and take care of yourself.

► How did I get this answer?

Type something...

edunet

foundation

# CONCLUSION

- A New Era of Proactive Care: Kelp represents a significant step forward in chronic disease management by shifting the focus from reactive to proactive care.
- Empowering Patients: It provides patients with the tools and information they need to manage their health effectively, improving adherence and confidence.
- Transforming Healthcare: By providing continuous data insights and alerting providers to emerging issues, Kelp enables more efficient and targeted care.
- A Safe & Reliable Partner: Built on a foundation of curated, factual knowledge, Kelp is a trustworthy, empathetic, and secure assistant for both patients and healthcare teams.

# FUTURE SCOPE

- Expansion of Disease Coverage: Integrate knowledge and monitoring for other chronic conditions like Asthma or COPD.
- Deeper EHR Integration: Seamlessly sync with electronic health records for a more holistic view of a patient's health history and treatment plan.
- Advanced Predictive Modeling: Utilize patient data to forecast potential health risks and optimize personalized treatment plans even further.
- Multi-Platform Development: Create dedicated mobile and web applications for an enhanced user experience.



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# REFERENCES

- IBM Cloud
- watsonx
- Google Search
- DuckDuckGo Search

# IBM CERTIFICATIONS

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professional excellence



## Anurag Deshmukh

Has successfully satisfied the requirements for:

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IBM **SkillsBuild**

Completion Certificate



This certificate is presented to  
**Anurag Deshmukh**

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 20 Jul 2025 (GMT)

**Learning hours:** 20 mins



**THANK YOU**