Intern Task: Build & Deploy a Proactive RAG Agent for Pregnant Women Risk Management

Objective:

Build a **proactive, conversational chatbot** that uses **LlamaIndex** for **retrieval-augmented generation (RAG)** to assess **risk factors in pregnant women**. The bot should proactively **ask about symptoms**, retrieve relevant information from medical sources, and give **risk insights or suggestions**. The final chatbot should be **deployed on a free web hosting service** and publicly accessible.

Task Requirements

1. Use Case

- The agent will:

    o Start the conversation **proactively** by asking key symptom questions.

    o Collect user input (e.g., nausea, bleeding, dizziness).

    o Use RAG (via LlamaIndex + LLM) to pull relevant insights from documents (e.g., WHO guidelines, research).

    o Provide a **risk assessment response** (e.g., "Mild risk – monitor at home", "High risk – visit ER").

2. Technical Stack

- **Language Model**: Any LLM (e.g., Qwen, Gemini, OpenAI,..).

- **RAG Backend**: **LlamaIndex**.

- **Frontend**: Streamlit, Gradio, or simple HTML/JS interface.

- **Deployment**: Use any free platform like:

    o [Render](#)

    o [Hugging Face Spaces](#)

    o [Vercel](#)

    o [Streamlit Cloud](#)

3. Features

- Proactive Questioning: Ask 3–5 symptom-related questions before responding.

- RAG-Powered Answers: Fetch info from uploaded/indexed docs.

- Risk Level Output: Low / Medium / High + Suggested Action.

- Conversational: Simple, friendly, and empathetic tone.

5. Deliverables

- Working **public URL** of the deployed chatbot.

- GitHub repo with:

  o All code (backend, frontend, LlamaIndex setup).

  o Instructions to run locally.

  o Optional: Requirements.txt.

- README.md with:

  o Problem description

  o System architecture

  o Example queries and outputs

  o Deployment steps

Deadline:

Submit the working demo and GitHub repo within **2 weeks**.

Submission Format

Reply to this task with:

1. ✅ Link to deployed chatbot.

2. 💻 GitHub repo with code & docs.

RAG Knowledge Base

Level 2: Intermediate Knowledge Base for Pregnancy Risk Management

1. Symptom Categorization by Severity and Context

✅ **Normal (Low Risk)**

- **Mild Nausea**: Common in the 1st trimester due to hCG hormone.

- **Light Spotting**: Possible during implantation (first 4–6 weeks).

- **Mild Back Pain**: Due to ligament stretching.

- **Constipation & Gas**: Related to progesterone slowing digestion.

⚠️ **Medium Risk Indicators**

- **Persistent Vomiting > 3x/day**: Could suggest hyperemesis gravidarum.

- **Elevated Blood Pressure (≥140/90)**: Must monitor for preeclampsia.

- **Gestational Diabetes Symptoms**: Excessive thirst, fatigue, frequent urination.

- **Mild Vaginal Bleeding in 2nd/3rd Trimester**: Needs immediate OB evaluation.

🚨 **High Risk / Emergency**

- **Heavy Vaginal Bleeding + Cramping**: Miscarriage or placental abruption.

- **Severe Abdominal Pain (localized)**: Possible ectopic pregnancy (if early).

- **Blurry Vision + Headache + Swelling**: Classic triad of preeclampsia.

- **Fever > 38.5°C with chills**: Suspected intrauterine infection.

- **Reduced or No Fetal Movement**: Fetal distress, hypoxia, or demise.

2. Risk Factors & Triggers by Condition

Preeclampsia

- Risk increases with:

    o First pregnancy

    o Age <18 or >35

    o Obesity (BMI > 30)

    o Chronic hypertension

    o Diabetes or kidney disease

- Watch for:

    o Protein in urine

    o Severe headaches

    o Epigastric pain

    o Visual disturbances

Gestational Diabetes

- Risk increases with:

    o BMI > 25

    o Family history of diabetes

    o Previous macrosomia (>4kg baby)

- Symptoms often subtle:

    o Fatigue, thirst, blurred vision

    o Detected via glucose tolerance test (OGTT)

Preterm Labor

- Warning signs before 37 weeks:

    o Regular contractions

    o Lower back pressure

- o   Pelvic pressure

- o   Watery discharge or rupture of membranes

Placenta Previa

- Placenta covers cervix partially/completely.

- Classic symptom: **Painless bright red vaginal bleeding**

- Requires **C-section** if persists near term.

Ectopic Pregnancy

- Implantation outside uterus (commonly fallopian tube)

- Symptoms in 6–8 weeks:

    - o   Sharp one-sided pain

    - o   Dizziness or fainting

    - o   Shoulder tip pain (if internal bleeding)

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3. Red Flag Symptom Combinations

Symptoms Combination	Possible Condition	Risk Level
Severe headache + vision changes + swelling	Preeclampsia	High
Bleeding + sharp abdominal pain + low BP	Ectopic Pregnancy	High
Fever + vaginal discharge + abdominal tenderness	Chorioamnionitis (Infection)	High
No fetal movement after 28 weeks	Fetal demise or distress	High
Contractions < 37 weeks + cervical changes	Preterm labor	Medium–High

4. Symptom Timeline Reference (by Trimester)

First Trimester (Weeks 1–12)

- Risk: **Miscarriage, Ectopic Pregnancy**

- Symptoms: Nausea, spotting, fatigue

- Red flags: Severe pain, heavy bleeding, shoulder pain

Second Trimester (Weeks 13–27)

- Risk: **Gestational Diabetes, Cervical Insufficiency**

- Symptoms: Baby movement begins (~20 weeks), increased appetite

- Red flags: Lack of movement, contractions, leaking fluid

Third Trimester (Weeks 28–40+)

- Risk: **Preeclampsia, Preterm Labor, Stillbirth**

- Symptoms: Heartburn, Braxton-Hicks, swelling

- Red flags: Severe swelling, no fetal movement, bleeding

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5. Proactive Agent Sample Symptom Prompts (Dynamic)

- "Are you currently experiencing any unusual bleeding or discharge?"

- "How would you describe your baby's movements today compared to yesterday?"

- "Have you had any headaches that won't go away or that affect your vision?"

- "Do you feel any pressure or pain in your pelvis or lower back?"

- "Have you had a fever or noticed any foul-smelling discharge?"

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6. Risk Output Labels

Label	Triggers	Suggested Action
🟢 Low	Normal fatigue, light nausea	Self-monitor, routine prenatal follow-up
🟡 Medium	Spotting, mild hypertension	Contact doctor within 24 hours
🔴 High	Bleeding, pain, high BP, infection	Immediate visit to ER or OB emergency care