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CSC490 A1

Part One: Interest Statements

Our team is interested in improving access to preliminary medical guidance and triage. Many people experience uncertainty when they develop new symptoms, which can lead to unnecessary stress, delayed care, or inappropriate use of healthcare resources like emergency rooms. We believe technology can help address this issue by providing a convenient and accessible first point of contact for people to discuss their health concerns. In particular, we aim to investigate whether an AI-powered speech-based virtual doctor can assist users in better understanding their symptoms, determining the type of healthcare provider they should consult, and preparing more effectively for their appointments. As a team, we care about this problem because timely and accurate triage can reduce patient anxiety, improve the efficiency of healthcare systems, and empower people to make more informed decisions about their health.

Below are statements from our team members about what they are most excited to contribute to this project:

- Rayce: I am most excited to work on fine-tuning a large language model to behave like a doctor and handle symptom-to-diagnosis reasoning.

- Grant: I want to focus on integrating speech-to-text and text-to-speech technologies so that the system feels natural and conversational.

- Terry: I am interested in building the application infrastructure and ensuring we can store and summarize patient health history securely.

- Ali: I want to contribute by researching medical datasets, fine-tuning large language models for medical use, and evaluating their responses to ensure the system is safe and reliable for patients.

Part Two: Landscape Analysis

Relevant Item	Description	Commentary
MedPalm	Large language model developed by Google Research. Designed for medical purposes.	Demonstrates great medical knowledge, but is a research model, not a standalone application. Evaluated on benchmarks like MultiMedQA, but not deployed as a patient-facing service. Weights are not publicly available.
Ada Health	Digital health company that provides AI-powered symptom assessment and care navigation tools. Features a “symptom checker” chatbot.	Relies on adaptive question trees and Bayesian reasoning, not natural language. Users navigate through structured flows rather than speaking freely, as in a doctor's appointment.
Clearstep Health	Company offering AI healthcare assistants focused on self-triage, symptom checkers, care navigation, and patient-facing conversational tools.	Built mainly for hospitals, insurers, and health systems, deployed through partner websites/portals, not as a universally available consumer app.
Doctronic	“AI Doctor” service that combines AI-powered assessments + telehealth with human doctors.	No speech-to-speech capability. Generates symptom explanations but has heavy reliance on the human fallback service.
Hippocratic AI	Startup building a safety-first large language model for healthcare purposes.	Still in an early stage, taking a research direction rather than a deployable product. No voice focus.
AI Triage Research (Karolinska Institute)	Clinical study showing AI outperforming junior doctors in ER triage decision support.	Shows AI can safely outperform humans in triage sensitivity to some degree. Focused on ER and structured data (symptoms + vitals), not general outpatient. triage.

Babylon Health	AI symptom-checking startup.	Ambitious branding and has faced criticism for accuracy and safety. Over-promised capabilities. Eventually, it collapsed financially.
Buoy Health	Startup with an AI chatbot for symptom checking and care recommendations.	Uses decision-tree style branching logic - less flexible than LLMs. No speech support. Consumer-facing but mostly web/app text chat.
Mediktor	AI symptom checker and triage tool for hospitals and insurers.	Emphasizes clinical validation and multilingual support, but still primarily structured text chat. Voice layer missing.
ChatGPT, Gemini, DeepSeek, etc.	General large language models capable of strong medical Q&A, but not fine-tuned on medical data.	Not specialized in medicine. Prone to hallucination. No built-in structured safety. Voice mode exists for some, but they are not optimized for healthcare.

Part Three: Project Outline

Problem Statement

Patients often face long wait times for family doctors and feel uncertain about whether their symptoms require medical attention. This creates stress, delays care, and adds strain on healthcare systems. There is a need for an accessible and reliable source of preliminary guidance to help people understand their symptoms and determine what type of care to seek.

Proposed Solution

We propose a fine-tuned LLM delivered through a web application, enabling patients to consult an "AI Doctor" for actionable guidance and doctor recommendations. The system is not intended to prescribe or diagnose, but to provide clarity, reassurance, and direction. To ensure reliability, we will prioritize precision over recall, escalating to medical professionals only when confident. This approach acknowledges that many clinical visits are non-critical, offering comfort and a feasible plan when health uncertainty remains.

Technical Approach and Milestones

The technical implementation involves fine-tuning an open-source LLM such as Llama 3.2-3B to answer dedicated medical questions. Datasets - ideally, research papers and doctors' notes - will be used as training documents. The model and application will be hosted on a cloud provider of choice for inference and wrapped around a FastAPI server to stream responses back to the web client. A web client (React) will then be developed so end-users can access a voice agent-like interface to converse with our AI Doctor.

Milestone 1	Data Collection - Find appropriate resources to fine-tune LLM
Milestone 2	Tune-LLM and run evaluations
Milestone 3	Host LLM as an API endpoint in the cloud
Milestone 4	Create Local Instance of Web Application
Milestone 5	Deploy Web Application to the Cloud

List of Unknowns

1. Datasets and training material.
    a. Can we utilize a supervised learning style with patient statements and doctor diagnoses?
    b. Where will we find data to fine-tune the model?
2. To what extent will pre-built LLMs be utilized?
3. Web application features to be implemented (i.e. user authentication, voice-to-voice, chat interface)
4. Deployment details (where and what infrastructure will be used)

Part Four: Project Press Release

Introducing AI Doctor: Accessible Medical Guidance for Everyone

September 16, 2025
Toronto, ON

Today, our team is excited to announce AI Doctor, an LLM-powered web-based assistant designed to make healthcare more accessible by providing conversational and reliable preliminary medical guidance. About 60% of Canadian adults are not health literate[1]. This leads to misunderstandings and unnecessary stress, but AI Doctor aims to bridge that gap by helping people better understand their symptoms and find appropriate healthcare providers to contact.

Providing Guidance When People Need It Most

AI Doctor is not replacing human doctors, but it is a reliable first point of contact. By utilizing fine-tuned large language models and a user-friendly chat interface, AI Doctor alleviates stress and provides reassurance to patients in doubt. “Last weekend, I had some chest discomfort and had no idea if I should go to urgent care,” said Elon, a beta tester. “AI Doctor helped me understand what questions to ask and guided me to the right clinic. That gave me peace of mind.”

Accessible and Secure

Unlike traditional symptom checkers that rely on predefined question trees, AI Doctor uses natural conversation, powered by fine-tuned LLMs with the most recent data, to guide users in natural language. These models are integrated with speech-to-text and text-to-speech, making it feel like users are chatting with a real healthcare provider. In addition, AI Doctor is designed with patient privacy and safety at its core. Dr. Hesami, Family Physician and Project Advisor, commented: “Tools like AI Doctor give people more confidence about when and how to seek care. It even helps us physicians have more context when diagnosing them.”

Key Benefits

- **Convenient and accessible**: Patients can connect anytime through a simple web app by clicking a couple of buttons.
- **Conversational triage**: Natural chat experience with voice support.
- **Informed care:** Helps patients better prepare for appointments, especially those with limited healthcare knowledge.
- **Efficiency in healthcare systems:** Reduces unnecessary visits to clinics/hospitals for minor concerns, allowing professionals to attend to more severe cases and decreasing wait times.

Looking Ahead

Our team is committed to prioritizing precision and safety by referring to human healthcare professionals whenever the system is uncertain or lacks appropriate knowledge about specific medical conditions. With that, AI Doctor provides value to users by focusing on guidance without overstepping into proper medical diagnosis or prescription. “Our mission is to guide people to the right care when they feel lost about their health. We believe AI Doctor can not only help people make smarter decisions and reduce stress, but also ease the burden on the healthcare system,” said Ali Shabani, project team member.

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[1] Source: BC Medical Journal. 2023. Basic Health Literacy: Canada Is Doing Poorly. https://bcmj.org/blog/basic-health-literacy-canada-doing-poorly

Appendix - Iterations

Iteration 1: Focused on implementation (APIs, etc.), which was rejected for being too technical.

> **Accessible and Secure**
>
> Unlike traditional symptom checkers that rely on rule-based decision trees, AI Doctor leverages fine-tuned large language models trained on high-quality medical datasets to conduct flexible, natural conversations. The system integrates automatic speech recognition (ASR) for speech-to-text and neural text-to-speech (TTS) synthesis, enabling a seamless voice interface that feels like chatting with a real healthcare provider. To ensure trustworthiness, AI Doctor is deployed through a cloud-based API layer with encrypted data transmission, session isolation, and logging for evaluation. It also includes anonymization protocols and safeguards against hallucinated outputs.

This is an example of the paragraph with too many technical words that would not be relevant to an average person reading this press release. The team decided to use simpler terminology.

Iteration 2: Less technical and more impact-oriented, but the patient perspective was not emphasized well enough compared to healthcare system benefits.

> AI Doctor is not designed to replace physicians but to streamline the pathway between patients and the appropriate level of care. By leveraging fine-tuned large language models and an accessible web interface, the system standardizes initial triage and minimizes inefficiencies caused by inappropriate ER visits.
>
> **Key Benefits**
>
> - **Convenient and accessible:** Patients can connect anytime through a simple web app by clicking a couple of buttons.
> - **Automated triage workflows:** AI Doctor conducts structured, voice-enabled conversations that reduce the need for manual intake and initial screening.
> - **Operational efficiency:** By redirecting non-critical cases away from clinics and hospitals, AI Doctor reduces the burden on healthcare facilities and helps reallocate resources toward patients with urgent needs.

These are examples where the patient benefits were mentioned but not emphasized well enough. The team decided to rewrite these parts to better balance the emphasis on different advantages.

Iteration 3: Impact-oriented and balanced, but lacked supporting data and convincing quotes.

Added some quotes and statistics to the content to be more convincing:

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"Last weekend, I had some chest discomfort and had no idea if I should go to urgent care," said Elon, a beta tester. "AI Doctor helped me understand what questions to ask and guided me to the right clinic. That gave me peace of mind."

Dr. Hesami, Family Physician and Project Advisor, commented: "Tools like AI Doctor give people more confidence about when and how to seek care. It even helps us physicians have more context when diagnosing them."

Iteration 4: Final version with the right balance of patient value and system benefits, and supporting data.