



Automated Medical Transcription & Form Generation System Using NLP

Senior Project for Data Science Degree at Lebanese University

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Presentation Outline

- Introduction
- Problem Statement
- System Overview
- Implementation Workflow
- User Interface Walkthrough
- Evaluation & Accuracy
- Time Saved & Gains
- Future Work

1. Introduction

Why it's matter?

- Healthcare documentation is crucial but fragmented
- Manual EMR note-taking: time-consuming, human-error prone
- Voice-to-form automation can streamline workflows



2. Problem statement

Challenges we're tackling

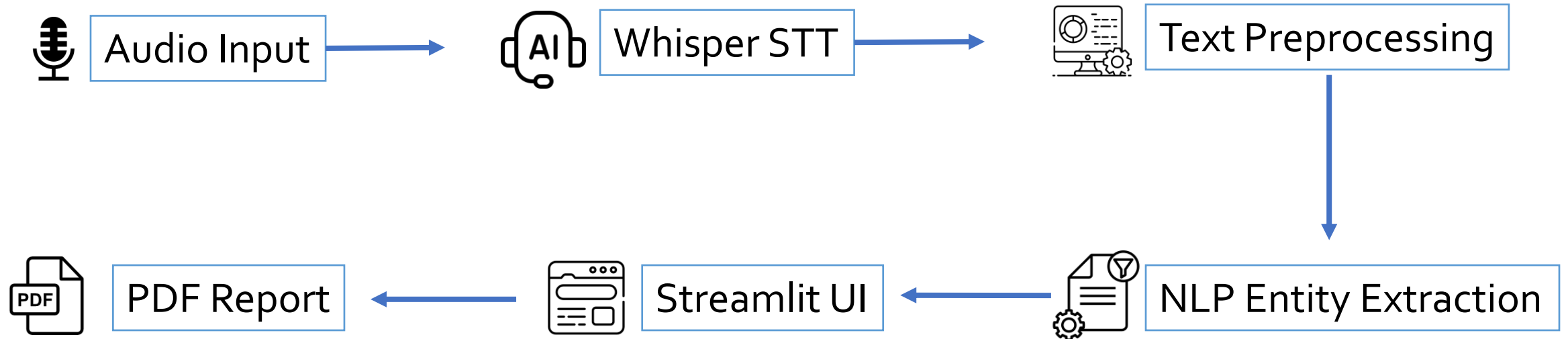
- **Key Issue:** Clinicians and Doctors spend excessive time on manual documentation, leading to burnout and errors.
- **Gap:** Lack of affordable, domain-specific voice-to-form tools.

Solution? Automated Medical Transcription System



3. System Overview

System Architecture



4. Implementation Workflow

How it works?

1. Audio Input

The system accepts two types of input:

- **Uploaded audio** files (.wav, .mp3)
- **Live-recorded** audio using microphone support

These are saved temporarily and queued for processing.

✂ **Libraries:** sounddevice, wavio, tempfile

2. Speech-to-Text Transcription

Whisper, an open-source ASR model by OpenAI, is used to transcribe speech into raw text.

- Chosen model: **base** for optimal trade-off between speed and accuracy.
- Handles diverse accents, noisy recordings, and medical terminology fairly well.

✂ Library: whisper

📄 Output: transcribe.txt

4. Implementation Workflow

How it works?

3. Text Preprocessing


- Raw transcripts may contain errors like:
 - Misspelled medical terms (e.g., “mitformin” instead of “metformin”)
 - Filler words, broken sentences
- Preprocessing steps:
 - **Whitespace normalization**
 - **Manual dictionary-based corrections**
 - **Grammar check** via `language_tool_python`
 - Optional **entity detection** using *scispaCy*

 Output: `cleaned_transcript.txt`

4. Implementation Workflow

How it works?

4. NLP Information Extraction

- Uses **Regex-based rules** to extract structured data from the cleaned transcript.
 - Extracted fields include:
 - Patient name, age, gender, symptoms
 - Medications, allergies, surgeries
 - Diagnosis, treatment plan, follow-up, doctor name
 - Rule-based logic ensures fast and transparent results.
-  Output: extracted_info.txt (key-value pairs)

4. Implementation Workflow

How it works?

5. Interactive Streamlit Interface

- Streamlit displays extracted data in a **structured form UI**.
- Each field is **editable**, allowing for human validation and correction.
- Sections:
 - Patient Details
 - Medical History
 - Diagnosis & Treatment
 - Follow-Up

🔧 Library: streamlit, widgets like `st.text_input()`,
`st.text_area()`

The screenshot displays a web-based form titled "Patient Medical Form". At the top, there is an "Upload Audio (MP3/WAV)" section with a "Drag and drop file here" area, a "Limit 200MB per file • MP3, WAV" note, and a "Browse files" button. Below this is a "Record Your Voice" section with a red "START" button and a "SELECT DEVICE" link. The form is organized into several sections, each with a title and a corresponding input field:


- Patient Details:** Includes "Full Name" (text input), "Age" (number input with a value of "0"), and "Gender" (dropdown menu with "Male" selected). Below these is a "Date of Visit" field with the value "2025/07/10".
- Symptoms:** A large text area for entering symptoms.
- Medical History:** Contains four sub-sections: "Chronic Conditions (e.g. diabetes, asthma)", "Current Medications", "Allergies", and "Previous Surgeries", each with a text input field.
- Physical Examination Findings:** A large text area for recording findings.
- Diagnosis:** A text input field for the diagnosis.
- Treatment Plan:** A large text area for detailing the treatment plan.
- Follow-Up Instructions:** A text input field with a note "Follow-up in (e.g. 2 weeks, no follow-up)".
- Doctor Information:** Includes "Doctor's Name" (text input) and "Signature" (text input).

4. Implementation Workflow

How it works?

6. PDF Generation

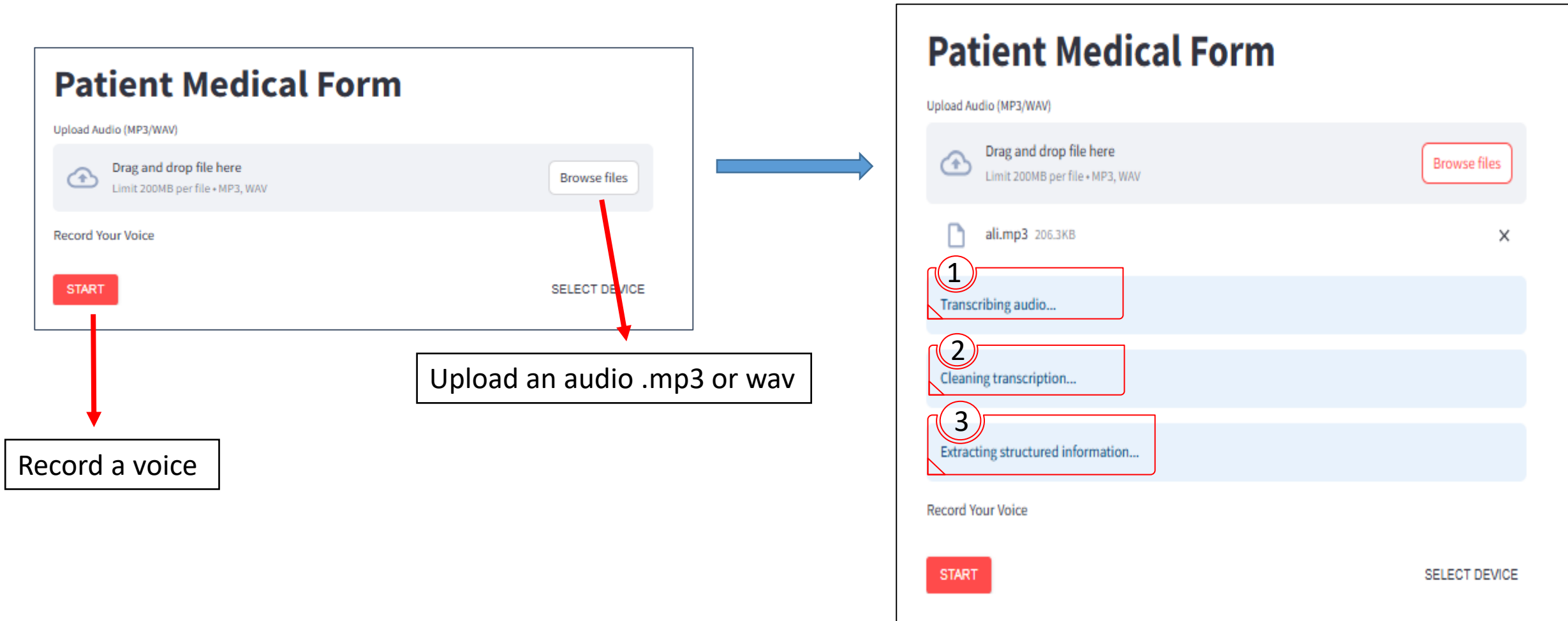
- After reviewing and editing the form, users can download the filled form as a PDF.
- **FPDF** creates a professional-looking document.
- Includes:
 - Section headers
 - Multiline text fields
 - Timestamps, optional clinic header/footer

 Output: medical_record_{name}.pdf

Patient Medical Record		
Patient Details		
Full Name: Sarah Johnson	Age: 45	Gender: Female
Date of Visit: July 10, 2025		
Symptoms		
a persistent cough and fever that lasted for two weeks		
Medical History		
Chronic Conditions: Asthma	Allergies: penicillin	
Current Medications: albuterol	Previous Surgeries: None	
Physical Examination Findings		
chest sounds are wheezy		
Diagnosis		
acute bronchitis		
Treatment Plan		
antibiotics and rest		
Follow-Up Instructions		
one week		
Doctor Information		
Doctor's Name: Adam Green		
Signature: _____		

5. User Interface Walkthrough

User-facing interface



5. User Interface Walkthrough

User-facing interface

Follow-Up Instructions

Follow-up in (e.g. 2 weeks, no follow-up)

two weeks

Doctor Information

Doctor's Name

Muhammad Abdullah

Save as PDF

Save as pdf button



Patient Medical Record

Patient Details

Full Name: Ali Abdullah Age: 42 Gender: Male
Date of Visit: June 10, 2024

Symptoms

persistent headaches for three weeks rated seven out of 10 in severity

Medical History

Chronic Conditions: Diabetes Allergies: None
Current Medications: metformin 1000 milligrams Previous Surgeries: None

Physical Examination Findings

blood pressure is 130 / 85 MMH

Diagnosis

tension type headache

Treatment Plan

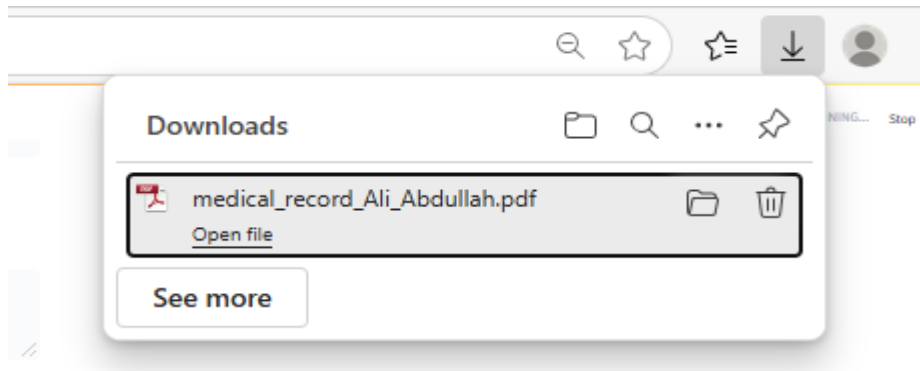
paracetamol 500milligrams is needed

Follow-Up Instructions

two weeks

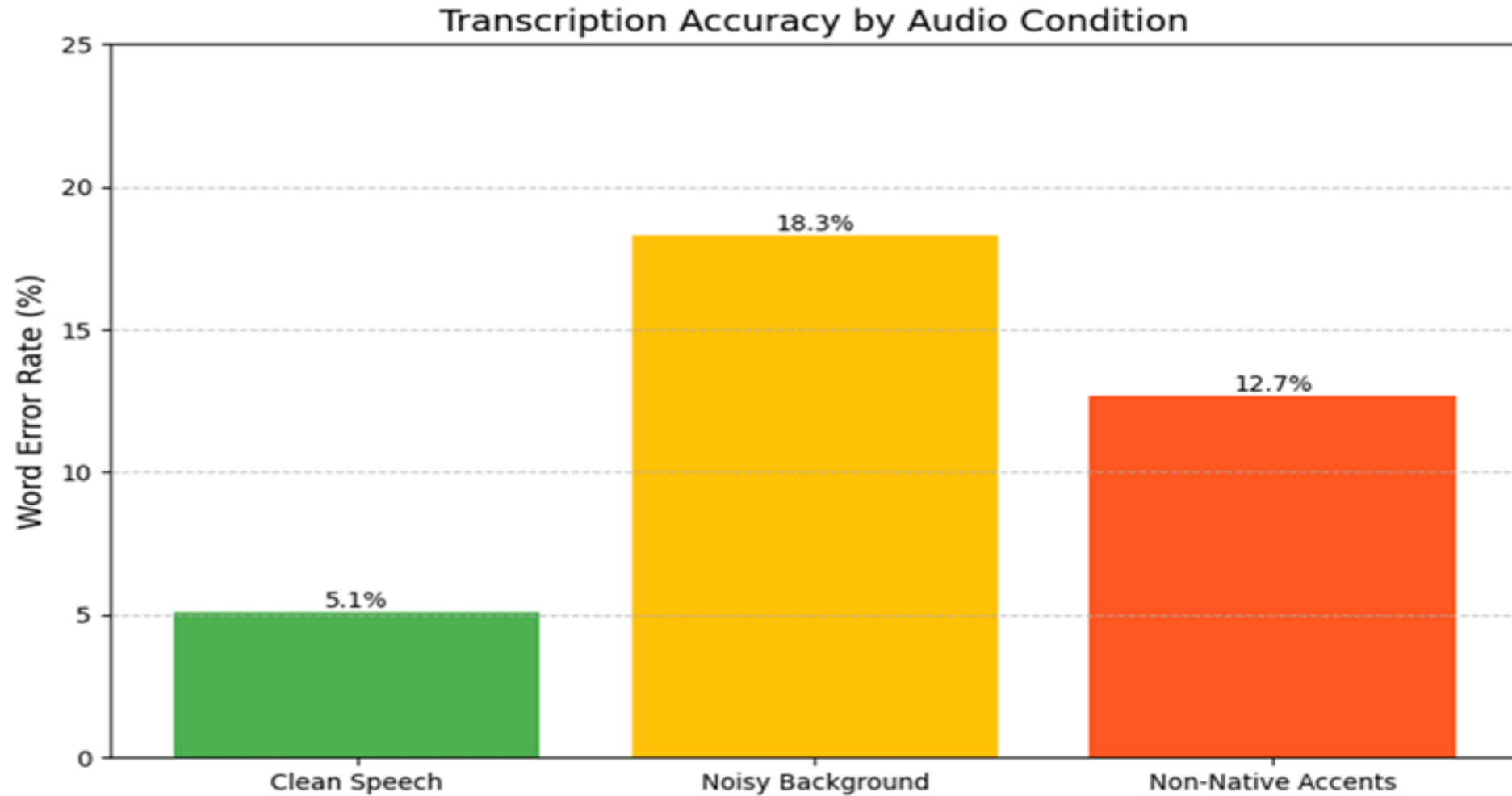
Doctor Information

Doctor's Name: Muhammad Abdullah
Signature: _____



6. Evaluation and Accuracy

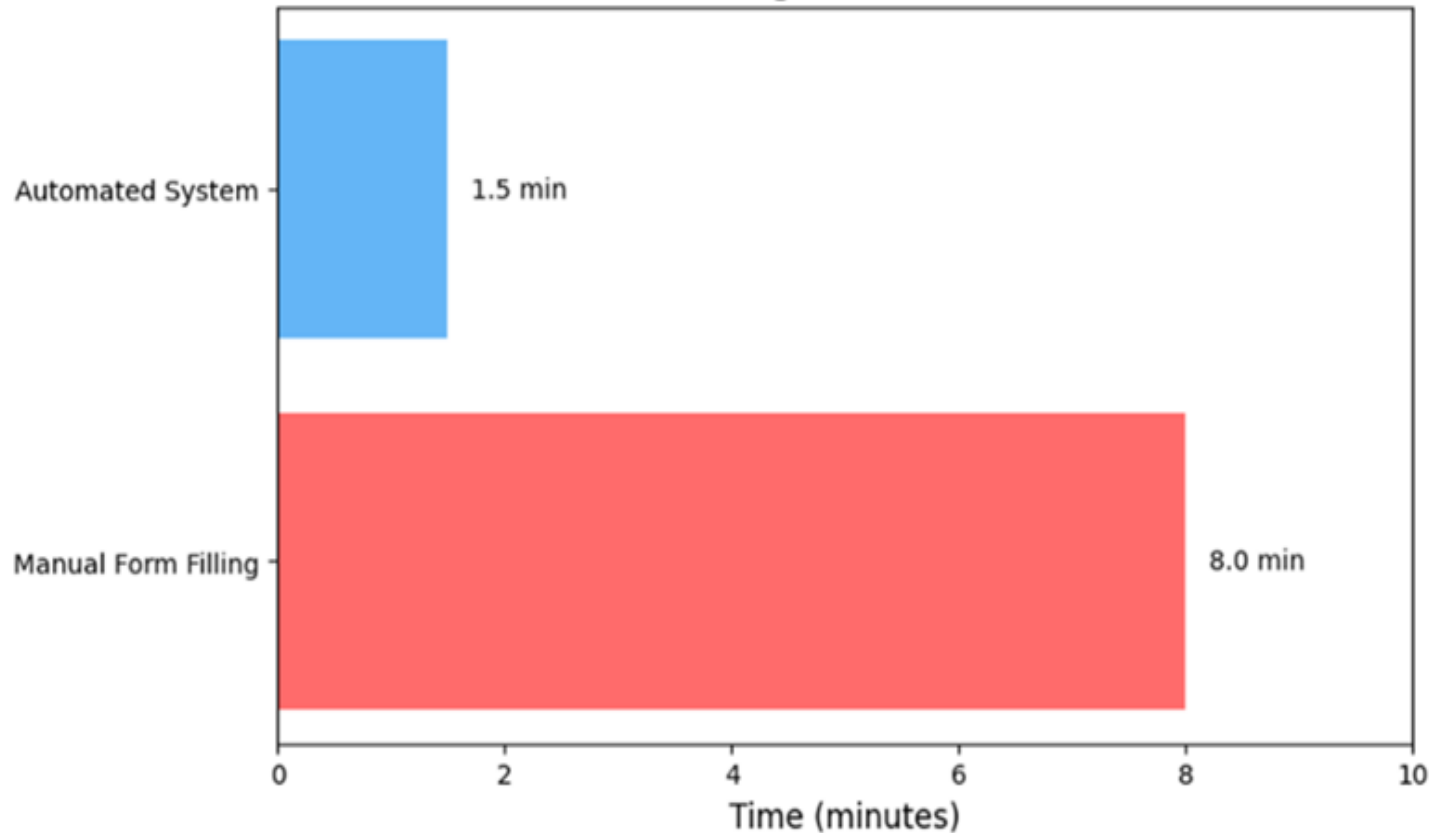
Performance Metrics



7. Time Saved and Gain

Efficiency benefits

Time Savings with Automation



- Manual Documentation: 8–15 minutes per patient (data entry + proofreading).
- Automated Workflow: 1–2 minutes (audio upload + minor edits).

40-patient workday



7 hours saved

8. Future Work

What's next?

1. Multilingual Support

- **Why?**
 - Lebanon is a **trilingual country**: Arabic, French, and English are all used in clinical contexts.
 - Many doctors speak in Arabic-accented English or even mix languages during consultations.

2. Integration with Hospital Systems (EHR/EMR)

- **Why?**
 - Right now, the system outputs a PDF—but it's **not connected to digital health records**.
 - Clinics need data in **HL7/FHIR** format for interoperability.

8. Future Work

What's next?

3. Enhanced NLP with LLMs (Large Language Models)

- **Why?**
 - Regex is fast and transparent, but it can't handle:
 - Variations in phrasing
 - Conditional or nested medical logic
 - Implicit expressions

4. Security, Legal & Ethical Compliance

- **Why?**
 - The current prototype works locally, but scaling to clinics means handling **real patient data**.
 - You must comply with **HIPAA, GDPR**, and Lebanese data laws.

Thank you for your time and attention.

① Questions?