AutoMed: Applications of OpenAI's Davinci Model on the Modern EMR

Heal AI, LLC

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Introduction

Abstract

In this paper, we introduce AutoMed, the modernization of the EMR with automation features fueled by Chat GPT. The primary task for automating the process of medical care is to replace data entry and endless human validation of codes, so that clinicians can focus on delivering better care and insurance companies can focus on better coverage without fear of up scaling. In order to effectively show the power of natural language models such as the Davinci model created by OpenAI, the AutoMed prototype will simply include a web application that patients can login to, validate their insurance, talk with an AI medical assistant, and have a properly scribed medical encounter to send to insurance providers with the proper CPT code. The goal of this product is to act as a proof of concept that natural language models can transform healthcare.

Legal Disclaimer

Contents

Introduction to the Team

- Daniel Oukolov
  - Woodberry Forest School (Cum Laude)
  - Davidson College (Economics, Computer Science)
  - Bright Ideas Medical Consulting (BI Developer)
  - Soccer, Swimming, Judo, Jiu-Jitsu
- Olsen Budanur
  - George C. Marshall High School
  - Virginia Tech (Computer Science)
  - Davidson College (Computer Science)
  - Affirm (Software Engineer)
  - Sports, Finance, and Board games
- Vehbi Karaagac
  - George C. Marshall High School
  - George Mason University(Computer Science)
  - Science Logic (Software Engineer)
  - Soccer
- Spencer Hawkins
  - University Highschool
  - Davidson College (Computer Science, Performing Arts)
  - Truist (Software Engineer)
  - Fitness, Acting, and Baking

The prototype

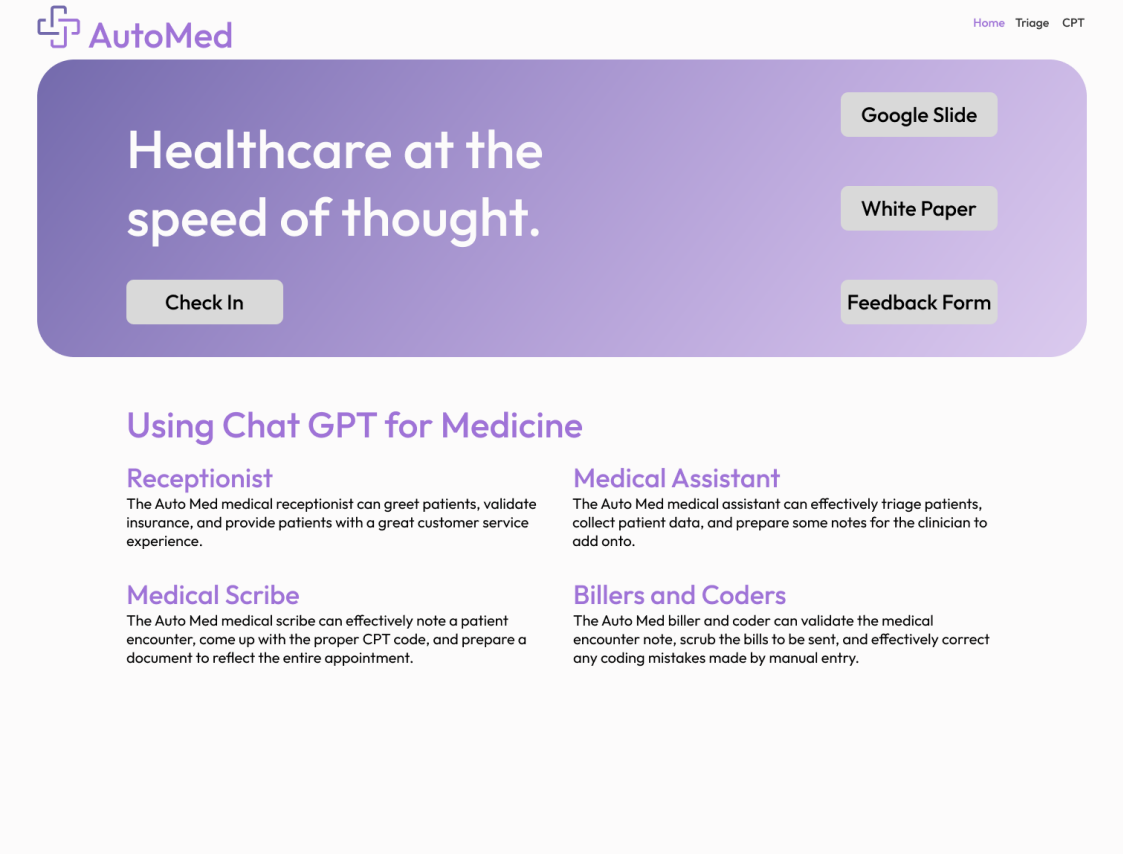

Figure 1: Website Design

Our medical experience as a team is limited to small primary care private practice settings, so the current workflow that we are attempting to automate follows:

Automated Roles

Medical Receptionists
Medical Assistants
Medical Scribes
Medical Billers and Coders

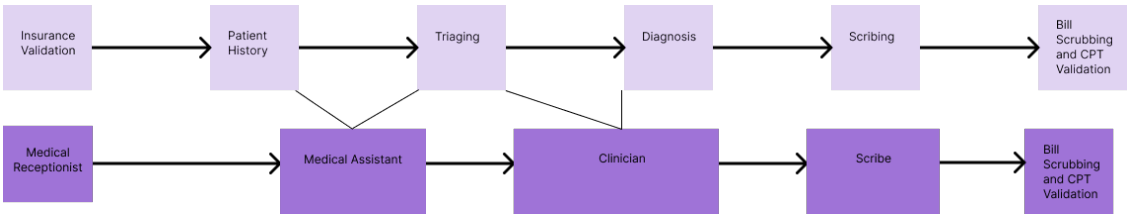

Figure 2: Medical Processes and Roles Aided by AutoMed

Our goal for this first initial prototype is to have a patient login to the website using their gmail or apple account and be instantly greeted by an AI language model:

“Hi, who are you here to see today?”

The user’s response will be then followed up by:

“What insurance will you be using today?”

The user’s response will then be followed by:

“Are you experiencing any symptoms?”

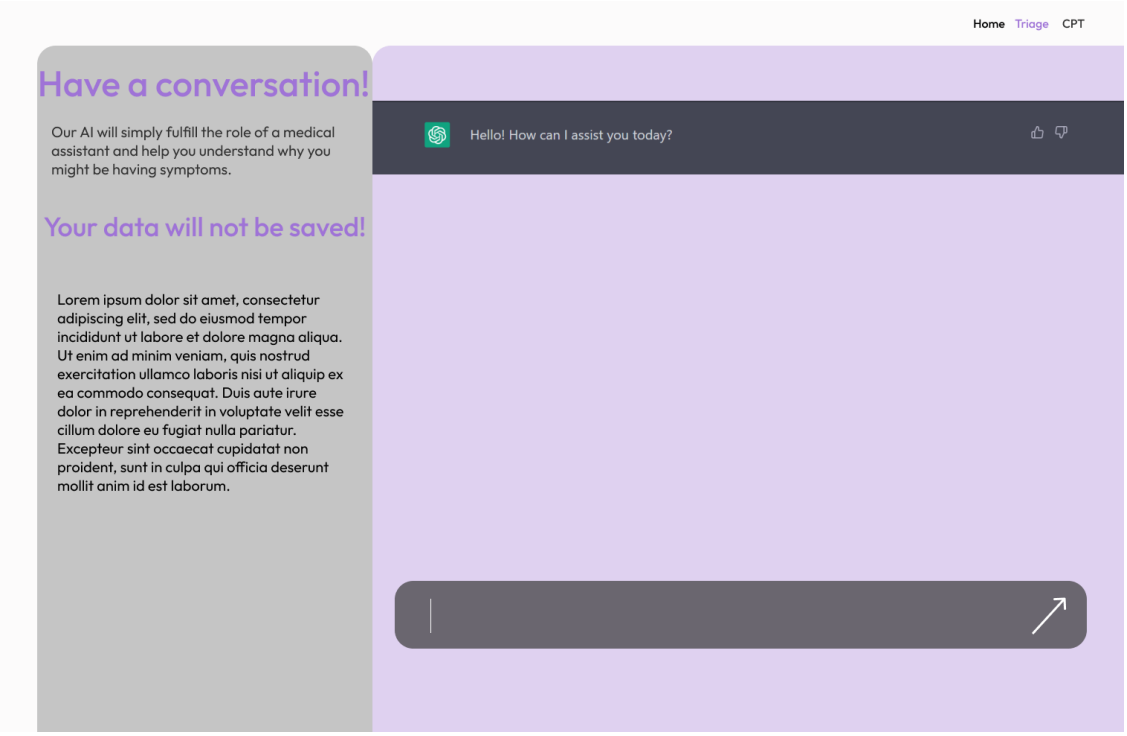

Figure 3: Triage Interface

The user's response will then be recorded. Based on the triaging, the AI will be able to output a formatted patient encounter documents as follows:

1. Composite Codes (These codes combine a number of procedures that typically occur in conjunction with one main procedure.)
    - Example: 0001F: heart failure assessed (includes all of the following):
    - Blood pressure measured
    - Level of activity assessed
    - Clinical symptoms of volume overload assessed
    - Weight recorded
    - Clinical signs of volume overload assessed
2. Patient Management (Includes patient care provided for specific clinical purposes like pre- and postnatal care.)
    - Example: 0503F: Postpartum care visit
3. Patient History (Describes measures for select elements of patient history or symptom review)
    - Example: 1030F: Pneumococcus immunization status assessed
4. Physical Examination
    - Example: 2014F: Mental status assessed
5. Diagnostic/Screening Processes or Results (Includes results of tests ordered, including clinical lab tests and radiological procedures)
    - Example: 3006F: Chest X-ray documented and reviewed
6. Therapeutic, Preventive, or Other Interventions (Describes pharmacologic, procedural or behavioral therapies)
    - Example: 4037F: influenza immunization ordered or administered
7. Follow-up or Other Outcomes (These codes describe the review and communication of test results to a patient, patient satisfaction, patient functional status, and patient morbidity or mortality)
    - Example: 5005F: patient counseled on self-examination for new or changing moles
8. Patient Safety (Includes codes that describe patient safety precautions)
    - Example: 6015F: Patient receiving or eligible to receive foods, fluids, or medication by mouth
9. Structural Measures (This short section includes codes that describe the setting of the delivered care, and also covers the capabilities of the healthcare provider)
    - Example: 7025F: patient information entered into a reminder system with a target due date for the next mammogram

Scalability

1. Initial Prototype
    - Foremost, our focus would be to provide a proof of concept that a natural language AI model could be effectively used to aid in the process of medical notation, scribing, and billing. A simple web application with OpenAI's API will be enough to show a proper application of the technology. Our only goal is to show that patients can interact with this AI with medical notes being outputted accurately. Unfortunately, without proper integration into an EMR, our prototype cannot access patient history, prescriptions, or patient documents. However, our plan is to use HL7 FHIR to slowly build up the prototype.
2. AWS Tools
    - Amazon offers an API that aids in the gathering of medical data from unstructured medical texts and even conversations if applied to recording devices. We could potentially use this service to implement an extra layer of medical scribing and billing aid by recording conversations between patients and doctors. The natural language model, with the help of AWS, will be able to interpret the encounters into natual language and properly coded medical notes.
3. HL7 FHIR
    - HL7 FHIR is the API with which modern day healthcare inoperability is being developed on. The ability to share data and patient documents securely is paramount to the development of this AI tool. With shared patient documents and patient history scraped from EMRs, our application could effectively code and scribe for any patient encounter.
4. EMR Development
    - If AutoMed is not able to scrape data from other established EMR companies, then the company will be forced to develop our own prototype of EMR dedicated to auto-entering patient data using various medical devices that can connect and upload patient information into the EMR. For example, we could utilize AWS anistening devices to update prescriptions, patient information, and we could even engineer scales and blood pressure monitors to auto fill data into an EMR.

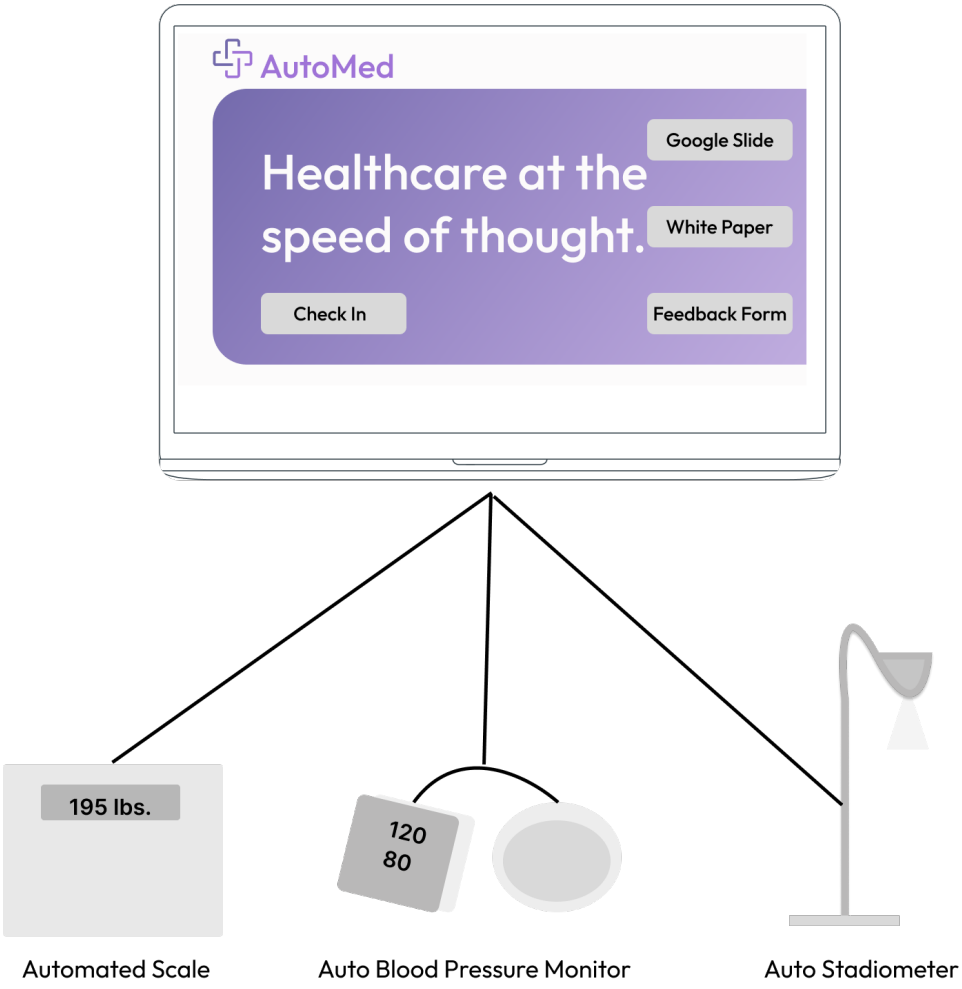

Figure 4: Incorporation of Medical Devices

Feedback

We are asking for advice from any medical professionals who wishes to aid in the process of the development of a prototype for an automated EMR. Please click feedback form button on the front of the website to give our team honest and brutal feedback.