

# IntelliScribe: Web Application for EHR/EMR Automation in Physician Offices

Savani M. Shubh, *Member, IEEE*

**Abstract** (The abstract should not exceed 250 words. It should briefly summarize the essence of the paper and address the following areas without using specific subsection titles.): Objective: Briefly state the problem or issue addressed, in language accessible to a general scientific audience. Technology or Method: Briefly summarize the technological innovation or method used to address the problem. Results: Provide a brief summary of the results and findings. Conclusions: Give brief concluding remarks on your outcomes. Clinical Impact: Comment on the translational aspect of the work presented in the paper and its potential clinical impact. Detailed discussion of these aspects should be provided in the main body of the paper.

**Index Terms**—Biomedical Computing, Biomedical Communication, Natural Languages, Web Services

## I. INTRODUCTION

IN a study published by the American Journal of Emergency Medicine, experts found that physicians spend more than 43% of their time with data entry for patients' electronics health records (EHRs) – while only spending 28% of their time interacting face-to-face with patients and 12% reviewing tests and observations [1].

Almost half of a physician's time is spent on data entry and administrative work – instead of treating patients and evaluating their needs. This study highlights a serious problem in the healthcare industry, as many studies and accounts have shown that ER physicians are spending too much time on EHR creation and management – taking valuable time away with patients. Instead of seeing more patients or spending more time reviewing patients' conditions, ER physicians are burdened with the overwhelming documentation required by EHRs. In fact, EHR documentation is one of the main contributors to burnout among ER physicians.

There are many factors that can influence data entry time for patient reports – including server/mainframe responsiveness to typing skills. In addition, the time spent differs by specialty, where internal medicine physicians spend on average 18-22 minutes on EHR reports while sports medicine/rehabilitation physicians spend on average 8-10 minutes on EHR reports per patient. The breakdown of the time spent on EHRs shows that chart review (33%),

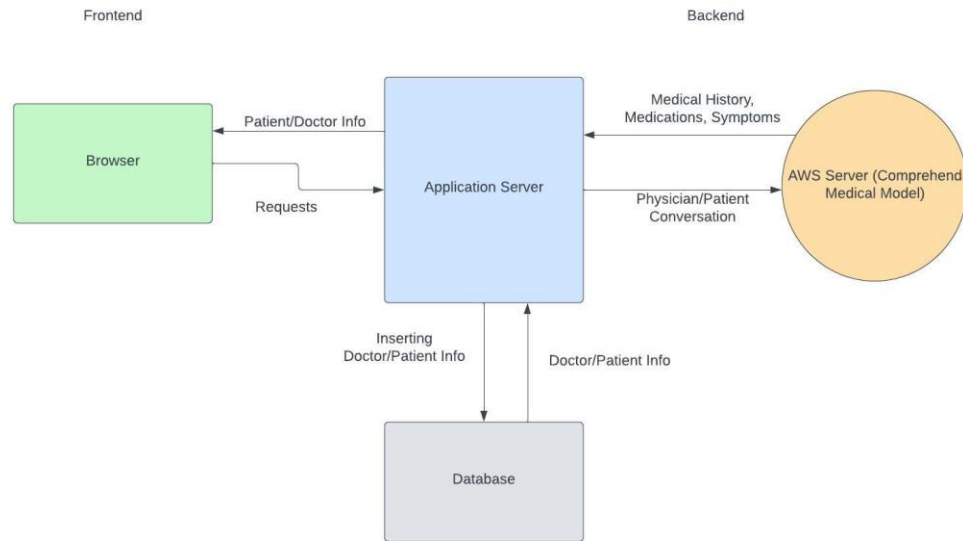
documentation (24%), and ordering (17%) are the three main culprits in the reason why physicians spend an excessive amount of time on EHR reports – with documentation being the most frustrating for physicians.

## II. ANALYSIS OF APPLICABLE STANDARDS

Currently, there are two common solutions that physicians are using to reduce the amount of time they spend on EHRs: in-person and virtual medical scribes.

The first solution that most physicians started to implement in their practices and hospitals is an in-person medical scribe that would sit in the office with the doctor and patient and record patient data/history. This notetaking improves patient care quality as it eliminates the need for physicians to physically document the patient's condition and history. However, there are several limitations to in-person medical scribes. One instance is that there is little regulation/training for medical scribes, restricting the number of tasks that a scribe can do – such as prescribing medicine, scheduling X-rays, and recommending additional tests. This still requires physicians to spend an adequate amount of time on filling out patients' EHRs. Furthermore, in-person medical scribes inside the medical room often make patients uncomfortable – leaving them less inclined to share vital information about their health and data. This can lead to incomplete data and inconclusive diagnosis of a patient's condition.

A solution to this privacy issue is virtual medical scribes. These medical scribes would be called in through phone and listen in on the conversation the physician is having with their patients. This perceived sense of privacy



has led to more physicians adopting this solution. Nevertheless, the issue with virtual medical scribes is that there is a lack of standard in terms of training and knowledge. In addition, the cost of virtual medical scribes is high for physicians at \$50,000/year per scribe. This heavy price is justifiable for large hospital systems; however, smaller hospitals and clinics cannot afford to pay for as many medical scribes – leaving them behind due to their lack of resources.

In the past couple of years, with advances in machine learning (ML) technologies, a new option has arisen that allows physicians to keep the sense of privacy that virtual medical scribes offer without having to compromise with the high cost and lack of training. These new software platforms use natural language processing (NLP) to read and understand a physician’s notes and voice commands in the same way that human scribes can. With the press of a button, the software can listen in on the physician’s conversations with his/her patients – gathering and analyzing the data on the patient’s health history, current symptoms and illnesses, and test results. The algorithm uses the information gathered to create EHRs and patient documents – saving physicians hours from manual data entry and clerical work and giving them more time to allocate to their patients. These solutions are not only cheaper than a physical/virtual human scribe but also can work around the clock and can be improved through simple software updates.

There are several AI medical scribes in the market currently; yet they contain several flaws in their development. The first is that these models have not been trained to understand physicians with different accents and slang terms for medical terminology. This flaw could result to an inaccurate diagnosis, harming the patient’s health and the physician’s reputation as a healthcare provider. To overcome these challenges AI medical scribes, need to be trained on a diverse, more inclusive dataset. In addition, another concern brought up is that it is hard for these software platforms to create the necessary forms/documents for patients with special illnesses and diseases – often requiring physicians to not always use the AI for their patients. Furthermore, AI medical scribes struggle at extracting and summarizing data from the physician-patient

conversation, as the conversations are not structured – containing laymen terms, mental thoughts, and disruptions/distractions caused by outside noise.

### III. PROJECT WORK

IntelliScribe is an AI medical scribe that uses NLP and voice processing technologies to build, document, and order patient EHRs for ER physicians. This tool will help physicians spend more time assessing the patient and reviewing their test results. Since the tool eliminates the need for a physician-assistant or scribe to do manual data entry, the patient feels more comfortable talking to their physician about their problems and health concerns. The user will be able to access the model through a web application. The EHR documents created will be stored in a database – linking the patient and doctor to it.

#### Registration Form

The first aspect of the web application that was developed was the

### IV. CONCLUSION

### V. RECOMMENDATIONS

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