Ramakrishnan_Nandini_Proj1

1. Introduce the domain. Give us background on the specific domain you researched (cognitive rehabilitation for people with traumatic brain injury, elementary school education) and what types of tasks/activities are part of that world that you feel could benefit from support via audio-based interfaces.

The domain I chose for this project is remote doctor appointments, or telemedicine. Telemedicine is the emerging field targeting the accessibility of doctor's appointments remotely (Piedmont Internal Medicine, 2023). Through this service, patients don't necessarily need to come into the office to receive treatment; rather, they need to have a good webcam, microphone, and internet connection. Since the covid pandemic began, various health care providers have been trying to provide these kinds of services to patients who may not necessarily be able to come into the office due to scheduling conflicts or long distances. Offering healthcare remotely also makes coordinating appointments easier for doctors and helps patients reach more specialized providers, as doctors don't have to spend time preparing their office for the next patient, and people who are in need of help now have the option to look beyond offices that are in their immediate vicinity (Haleem, et al., 2021). Therefore, telemedicine increases the accessibility of healthcare for patients, streamlines the workflow of hospitals, and helps the providers reach more people (Haleem, et al., 2021). Tasks and activities that are part of telemedicine and could benefit from support via audio-based interfaces are synchronous communication, voice data collection, and protecting doctor-patient privilege. Audio-based interfaces can enable real-time interactions between healthcare providers and patients, allowing for effective communication (Haleem, et al., 2021). Additionally, collecting data from patients' voices may help doctors better diagnose vocal conditions. Finally, audio interfaces for telemedicine and telehealth have the potential to better protect patients' privacy and confidentiality, as conversations over call are more secure than written or typed-out messages (HRSA, 2023).

2. Describe the specific user needs you have identified. What sort of frustrations, problems, and barriers does a person currently encounter when doing these tasks and what are the impacts of them (e.g. wasted time, poor training outcomes, money lost, physical injury etc.). What are the strategies these same people are currently employing to overcome these problems and why are they not yielding ideal results? The key is to focus on scenarios where the user's experience might be improved by improving their continuous "situational awareness" of the state of their bodies, physical environments, virtual environments/data, the activities of other people etc. that could be provided via an audio channel.

Some user needs within telemedicine are proper technology support, a good video interface platform, and a secure internet connection (AAAAI, 2023). For telemedicine to be effective, both patients and doctors need to have technology and devices that are able to support

the virtual appointments, and the platform that is used for the appointments needs to be able to facilitate productive communication between doctors and their patients. Furthermore, especially in the field of telemedicine, faster internet speeds will improve the quality of any diagnoses and doctor-patient interactions (AAAAI, 2023). Some frustrations, problems, and barriers that a person may experience when engaging in telemedicine (whether they're the doctor or the patient) are patient privacy and confidentiality, physical examination and diagnostics challenges, proper remote healthcare training, and lack of close doctor-patient relationships (AlJardarli, et al., 2022). Compared to in-person appointments, virtual exchanges may be more susceptible to privacy concerns, as hackers and data breaches pose danger (Gajarawala & Pelkowski, 2021). Additionally, doctor diagnoses may not be fully accurate when doctors and patients don't meet face-to-face (AlJardali, et al., 2022). Furthermore, doctors may need specialized training on working with remote platforms so that their prescriptions are more accurate, and the lack of face-to-face interaction may cause patients to feel like they are not being seen by the doctor as people, rather more as work the doctor has to get done (AlJardali, et al., 2022). On the other hand, the strategies doctors and patients may employ to overcome these problems are using encrypted messages for doctor-patient exchanges, better webcams and microphones, and maximizing audio and video-based communication rather than text and messages. Unfortunately, these strategies don't currently yield the ideal results, as there is no way to guarantee confidentiality with online communication, and there's no way to fully match an in-person meeting with the latest available technology. First off, no online messages will ever be 100% safe from hackers and data breaches (Gajarawala & Pelkowski, 2021). However, audio communications are not recorded and cannot be accessed as easily. In addition, even with all the newest advances in technology currently, there is no way to match the effectiveness of an in-person doctor's appointment with a remote one. Both the ability to correctly diagnose a patient and form strong doctor-patient connections are extremely hard to do remotely, and with the current technology, remote meetings still do not even come close to the efficacy and satisfaction provided by in-person doctor's appointments (AlJardali, et al., 2022).

3. List the specific information channels, data, events that if provided to the user would improve outcomes (e.g. what math problem on the worksheet each of the teacher's 1st grade students are working on, the pose and forces on a tennis player's forearm and hand, a team's interactions with a Git code repository, the current anxiety level of a patient during an online counseling). A good project will focus on a scenario(s) where there is a lot of information to be conveyed to the user and currently the user is not getting this information with the frequency, precision, or low latency that is needed and/or the presenting it via audio would reduce a users' distractions or cognitive load. Don't worry if this data might be difficult to sense and collect in real-life.

If provided to the user, real-time patient vital signs, information on whether the patients have been sticking to their medication schedule, symptom progression and timeline, emotional well-being assessments, patient questions and concerns, and proper treatment communications

would improve the effectiveness of telemedicine and remote doctor's appointments. First, giving doctors access to real-time patient vital signs will not only improve doctor diagnoses in certain scenarios, but it will also add some of the feeling from in-person appointments to telehealth ones (WITHmyDOC, 2023). Second, information on whether patients have been sticking to their medication schedule lets doctors keep tabs on their patients and make sure they are on the road to recovery (Benjamin, 2012). Next, making symptom progression and timeline data available to doctors helps doctors understand the development and continuation of patient illnesses, identify potential causes, and make informed decisions on how to help and treat their patients (Benjamin, 2012). On the other hand, emotional well-being assessments help both sides of the spectrum; doctors will be better able to form connections with their patients, and patients will feel more like the doctors are genuinely acting with the patients' interests in mind (Ancker, et al., 2023). On the same note, properly addressing patient questions and concerns, as well as making it seem like patients have the ability to bring their questions up to their doctors can foster better relations between doctors and patients, thus increasing the efficacy of telemedicine (Ancker, 2023). Finally, constructive and understandable treatment communication from doctors to patients is essential to get the most out of a telemedicine appointment. To achieve this, interpreter services, communication aids, and universally-understandable language should be used during remote doctor's appointments (HRSA, 2023).

4. Provide a list of sources for your information (and they must be explicitly referenced in your text). You should have at least five different references. Websites, books, academic papers etc. are fine.

References

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