Research Statement
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Human-computer interaction (HCI) is a topic of research that focuses on improving how people and computers interact by creating interactive computer interfaces that meet people's requirements. The greatest advantage of incorporating HCI into any system is user satisfaction. Regardless of the environment, incorporating HCI into any system effectively ensures a better user experience, leading the user to achieve maximal utilization of the system's potential, resulting in better outcomes. The evolving nature of user requirements is reflected in the multiple tasks that can be performed by devices today, such as voice control, touch screen devices, and many others, as technology advances. I would prefer to pursue my research on the usage of computing techniques on the development and applications of HCI and assistive technologies for enhancing the quality of life.

During my Doctoral research, I started doing research on exploring the stressors that were affecting people's mental well-being. As the sudden appearance of COVID-19 had a negative impact on the overall healthcare settings in many countries, frontline healthcare professionals, including physicians, nurses, community health workers, etc. were extremely susceptible to various stressors due to the nature of their job and the increased demand of attending to their duties at that time. Even though the frontline healthcare professionals were the main line of defense in the battle against the COVID-19 pandemic, the healthcare system frequently overlooked their mental health, according to a substantial amount of news attention. Considering this reasoning, I took the opportunity to explore and validate a workplace stress management mobile app for healthcare professionals at the time of the COVID-19 pandemic. To that end, I moved my focus of the ongoing research to identify the strategies to address and cope with COVID-19 induced stressors in healthcare settings and designed a prototypical mobile app called *StressFree* to help healthcare professionals manage stress in workplaces.

After successful investigation on the stress management strategies for healthcare professionals and seeing the sudden emergence of the public health crisis globally because of an insufficiently trained workforce and healthcare facilities during the peak of the COVID-19 pandemic, I initiated research towards my Doctoral dissertation on designing and developing a relational agent as an alternative to healthcare providers such as doctors, nurses, and caregivers. A relational agent is a type of socially interactive agent that is a specialized computerized virtual human/computational artifact that uses believable and empathetic behaviors to build and maintain long-term social-emotional relationships with its human users. Moreover, restrictions on in-person visits to healthcare facilities for health services and care influenced many to explore this domain where people can obtain such services from a relational agent at home. Although this study began with the goal of determining the feasibility and acceptability of relational agents in delivering essential healthcare services at home during the COVID-19 pandemic, it was later focused on providing healthcare services to COVID-19 patients at various stages by performing four main tasks: testing guidance, support during self-isolation, handling emergency situations, and promoting post-recovery mental well-being. Based on the use cases of RAs in COVID-19 related health services, my dissertation aimed to propose a novel design framework for RAs in healthcare contexts without the direct assistance from the healthcare workers. My research outcomes have been published in several renowned journals and conference

venues including International Journal of Environmental Research and Public Health (Q1, IF 4.6), UIST (A* Rank), and DESRIST (A Rank). More works are under preparation to be submitted to journals like ACM Transactions on Computer-Human Interaction, Journal of Medical Internet Research, etc.

In the near future, I intend to build empathy-driven intelligent relational agents and social robots that can understand human communication behaviors such as humor, emotions, credibility, and offer viable solutions to socio-technical and socio-economic problems in order to assist individuals who struggle with socio-technical and socio-economical communication issues, affordable healthcare services, and mental well-being. In order to improve people's quality of life in many healthcare and social domains, I will use my extensive experience with advanced Artificial Intelligence, Data Analytics, and HCI techniques to extend my ongoing research on a relational agent for healthcare contexts. My endeavor will focus on inventing novel relational agents for offering affordable social and healthcare services targeting (i) pregnancy and maternal health, (ii) chronic diseases including Diabetes, Alzheimer's, and Cancer, (iii) mental well-being, (iv) older adults, and (v) substance addiction and abuse. In a brief, my aim is to develop novel relational agents as alternatives to human healthcare providers, focusing on the areas and non-life-threatening scenarios over time. I am certain that my present and future initiatives will benefit the global population, particularly underprivileged communities. My work will continue to be disseminated throughout the field through peer-reviewed publications in highly regarded scholarly journals and conference proceedings.

Undergraduate students' involvement in scientific research is valuable for students. Having the experiences of research as a student during my undergraduate study and working as a mentor of multiple undergraduate research students at Daffodil International University, Bangladesh, to involve undergraduate students in research, initially, I will include, but not limited to the following steps-

1. Incorporate inquiry-based learning.
2. Frequent and consistent feedback.
3. Clear directions and guidance.
4. Assessment of student performance that rewards effort along with outcomes.
5. Break down the activities into smaller components.

Over time, students will be ready to take more responsibility by their own and at the same time they will need less direction to carry out their jobs. At this stage, when I will introduce new knowledge and techniques to a student, my job will be to answer the student's questions, offer him appropriate challenges, ask him the right questions, and help him to overcome any overly burdensome roadblocks by sharing knowledge with him.

At the graduate level, I expect students to be ready to initiate their own research projects, with, and sometimes without, the direction from me. At this level, students will possess advanced levels of knowledge and research ability that they can leverage to formulate their

research questions, discovering new information by answering those research questions, and applying their learning into other disciplines and fields of study.

Having multi-disciplinary research experiences, I have the leverage to attract both undergraduate and graduate students, who are interested in different disciplines of HCI and pervasive computing research. The success of student involvement in my research is evident in the publications in which I supervised students and mentees working on different research ideas and projects. In addition to preparing students for undergraduate and graduate research, I have plans to submit research proposals in various national and international funding/grant sources so that I can aid my future research students by establishing a research lab and conducting multidisciplinary cutting-edge research on *HCI*, *Healthcare Informatics*, *Pervasive Computing*, *Digital Health Interventions*, *Applied Machine Learning*, and *Assistive Technologies*.