Productivity CoachBot: a Social Robot Coach for University Students with ADHD

Himanshi Lalwani, Maha Elgarf, and Hanan Salam

جامعة نيويورك أبوظبي
NYU ABU DHABI

Introduction

Attention-Deficit Hyperactivity Disorder (ADHD) is a chronic mental disorder characterized by inattention, hyperactivity, and impulsivity, often persisting into adolescence and adulthood [1], [2]. Around 25% of college students receiving disabilities services are diagnosed with ADHD, facing challenges in academic, psychological, and social domains [3]. While treatment options like therapy and medication exist, direct tools such as socially assistive robots to assist individuals with ADHD, especially beyond childhood, are lacking. To bridge this gap, our research introduces customized software tools integrated into LuxAI's QTrobot, tailored for young adults with ADHD aged 18 to 24. These tools aim to provide personalized support through Conversation, Schedule Generation, Voice Note Reminders, the Pomodoro Technique, and Engagement Detection modules. Preliminary evaluation with three college students, experiencing time and task management challenges despite lacking an official ADHD diagnosis, shows promising results for the system's future usability.

Scenario

In our scenario, the robot assists the student in managing and completing their tasks. It generates a schedule by taking into account the student's deadlines and priorities. Subsequently, it vocally reminds the student of the day's tasks. When a student decides to enter a focused work session, indicating their commitment to complete their personal tasks on their desktop and to remain within their workspace, the robot activates a Pomodoro timer to structure their work time effectively. The Pomodoro timer is a technique that structures work time into short intervals, traditionally 25 minutes in length, followed by brief breaks, aiming to enhance productivity. Throughout the session, the student can interact with the robot for assistance if needed. Additionally, engagement detection mechanisms are employed during the focused sessions to gauge the student's involvement levels. If disengagement is detected, interventions are initiated to redirect the student's focus back to their tasks.

After finalizing the scenario, an interview with a wellness counselor and clinical psychologist at the local institution confirmed its accuracy and alignment in addressing challenges faced by college students with ADHD.

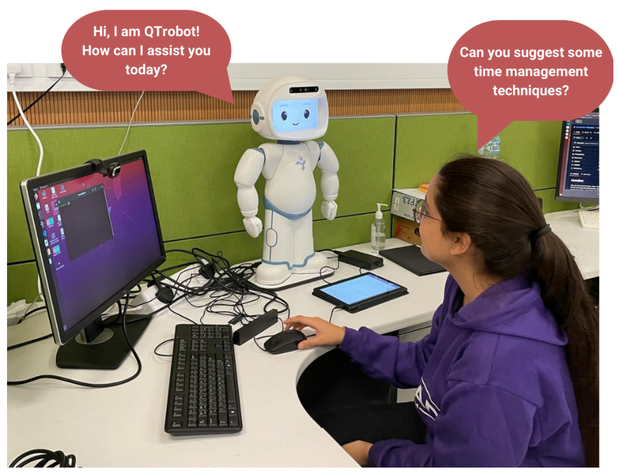

Figure 1. Sample interaction between a student and the robot.

System Architecture

Based on our scenario, our system consists of the following modules:

Conversation Module: This module allows students to engage in voice-based, multi-turn conversations with QTrobot on various topics using the Google Speech-To-Text and ChatGPT APIs, as can be seen in fig. 1. It transforms QTrobot into a dynamic social assistant, providing relevant and emotionally responsive interactions.

Schedule Generation Module: Implemented in Python, this module utilizes ChatGPT and prompt engineering techniques for efficient schedule generation based on the tasks and priorities provided by the student via a text based interface, as can be seen in fig. 2. Through this integration, the robot serves as a valuable tool to alleviate stress, aiding students in effectively managing academic responsibilities.

Voice Note Reminders Module: This module facilitates the robot in delivering timely spoken reminders for scheduled tasks, assisting students in combating procrastination and staying organized.

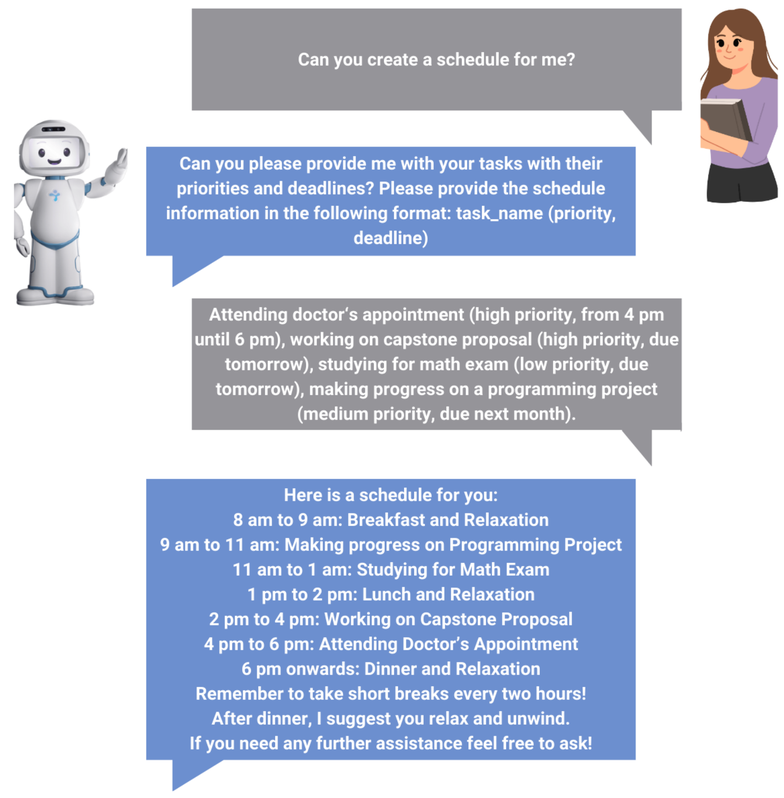

Figure 2. Sample input for schedule generation and the generated schedule.

The Pomodoro Technique Module: This module implements a Pomodoro timer and displays its visualization on the robot's screen. It promotes effective time management and encourages essential rest periods.

Engagement Detection Module: This module utilizes rule-based and machine learning models to detect engagement levels during Pomodoro work sessions. When disengagement is detected, the robot initiates dialogue to re-engage the user.

Evaluation

In a preliminary evaluation involving three students, aged 21 to 22, without ADHD diagnoses, our system showed promising results. Participants struggled with task organization and time management and found the robot's schedule generation accurate and voice note reminders beneficial. They appreciated the usefulness of Pomodoro sessions and engagement detection. Overall satisfaction was high, and participants expressed a willingness to recommend the system to others. Improvement suggestions included implementing weekly schedules, blocking distracting websites, and enhancing the schedule generation input interface's clarity.

Limitations and Future Work

Our work introduces a practical tool for students with ADHD, with the robot acting as a productivity coach through conversations, schedule generation, task reminders, pomodoro sessions, and engagement detection. Preliminary evaluation shows promising performance, but a limitation arises with LuxAI's speech parameters causing timeouts for voice-input to the schedule module. To address this, alternative voice recognition techniques are being explored. Future plans include fine-tuning ChatGPT and integrating advanced models like GPT-4. Additionally, due to time constraints, the preliminary evaluation involved only three non-diagnosed students. Therefore, in the future, we plan to enhance evaluation methods by conducting further usability testing, especially with students diagnosed with ADHD, and conducting long-term studies to guide our ongoing efforts to refine the system.

References

[1] R. J. Resnick, "Attention deficit hyperactivity disorder in teens and adults: They don't all outgrow it," eng, *Journal of Clinical Psychology*, vol. 61, no. 5, pp. 529–533, May 2005, ISSN: 0021-9762. DOI: 10.1002/jclp.20117.

[2] R. A. Barkley, M. Fischer, L. Smallish, and K. Fletcher, "The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder.," *Journal of abnormal psychology*, vol. 111, no. 2, p. 279, 2002.

[3] G. J. DuPaul, L. L. Weyandt, S. M. O'Dell, and M. Varejao, "College students with adhd: Current status and future directions," eng, *Journal of Attention Disorders*, vol. 13, no. 3, pp. 234–250, Nov. 2009, ISSN: 1557-1246. DOI: 10.1177/1087054709340650.