Autism Therapy System

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Certification

This is to certify that **Abdul Samad Qureshi 2020F-BCS-239** and **Farrukh**, **2020F-BCS-234, Raja Zafar Ali, 2020F-BCS-254** and **Nikhil, 2020F-BCS-246** have successfully completed the final project **Autism Therapy System,** at the **Sir Syed University Of Engineering & Technology**, to fulfill the partial requirement of the degree **Bachelors Of Computer Science**

External Examiner

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Project Title (mention project title here)

Sustainable Development Goals

(Please tick the relevant SDG(s) linked with FYDP)

SDG No	Description of SDG	SDG No	Description of SDG
SDG 1	No Poverty	SDG 9	Industry, Innovation, and Infrastructure
SDG 2	Zero Hunger	SDG 10	Reduced Inequalities
SDG 3	Good Health and Well Being	SDG 11	Sustainable Cities and Communities
SDG 4	✓ Quality Education	SDG 12	Responsible Consumption and Production
SDG 5	Gender Equality	SDG 13	Climate Change
SDG 6	Clean Water and Sanitation	SDG 14	Life Below Water
SDG 7	Affordable and Clean Energy	SDG 15	Life on Land
SDG 8	Decent Work and Economic Growth	SDG 16	Peace, Justice and Strong Institutions
		SDG 17	Partnerships for the Goals

Range of Complex Problem Solving			
	Attribute	**Complex Problem**	
1	Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues.	
2	Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models.	
3	Depth of knowledge required	Requires research-based knowledge much of which is at, or informed by, the forefront of the professional discipline and which allows a fundamentals-based, first principles analytical approach.	
4	Familiarity of issues	Involve infrequently encountered issues	
5	Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering.	
6	Extent of stakeholder involvement and level of conflicting requirements	Involve diverse groups of stakeholders with widely varying needs.	
7	Consequences	Have significant consequences in a range of contexts.	
8	Interdependence	Are high level problems including many component parts or sub-problems	
Range of Complex Problem Activities			
	Attribute	**Complex Activities**	

1	Range of resources	Involve the use of diverse resources (and for this purpose, resources include people, money, equipment, materials, information and technologies).	
2	Level of interaction	Require resolution of significant problems arising from interactions between wide ranging and conflicting technical, engineering or other issues.	
3	Innovation	Involve creative use of engineering principles and research-based knowledge in novel ways.	
4	Consequences to society and the environment	Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation.	
5	Familiarity	Can extend beyond previous experiences by applying principles-based approaches.	

Abstract

The Autism Therapy System is an innovative interactive mobile application meticulously crafted to offer therapeutic assistance to children diagnosed with Autism Spectrum Disorder (ASD). This project, rooted in the intersection of technology and healthcare, aims to address the pivotal need for accessible and effective therapeutic tools tailored for ASD. The application is designed with a deep understanding of the unique challenges faced by children with ASD, focusing on enhancing their social communication and cognitive skills.

Providing a user-friendly interface, the application offers a range of engaging and educational activities. These activities are not only enjoyable but are also scientifically designed to stimulate learning and interaction in a manner that resonates with the cognitive patterns of children with ASD. This approach ensures a balance between fun and functionality, making therapeutic sessions less intimidating and more appealing to young users.

A key feature of the Autism Therapy System is its adaptive nature, allowing it to tailor its content and difficulty levels to the individual needs of each child. This customization is achieved through a combination of artificial intelligence algorithms and input from experienced therapists and parents. Regular feedback from these stakeholders is integral to the app's continuous improvement, ensuring that it remains an effective and up-to-date tool for ASD therapy.

The development of this application follows a rigorous methodology, employing the latest in software development and user experience design. It stands as a testament to the power of interdisciplinary collaboration, bringing together experts in software engineering, child psychology, and user interface design.

The anticipated outcome of this project is multifold. Primarily, it aims to provide a supplementary tool that aids in the conventional therapeutic process, offering a new avenue for skill development and learning for children with ASD. Additionally, by making this tool widely accessible, it seeks to bridge gaps in therapy availability, especially in under-served or remote areas where traditional therapy resources are scarce. Furthermore, this system aims to empower parents and caregivers, providing them with a resource that can be used at home, thereby fostering a more inclusive and continuous learning environment.

In conclusion, the Autism Therapy System is not just a technological endeavor but a step towards a more inclusive and understanding world for children with ASD. Its development and implementation have the potential to make a significant impact in the field of ASD therapy, offering a blend of innovation, compassion, and practicality.

Undertaking

I certify that the project **Autism Therapy System** is our own work. The work has not, in whole or in part, been presented elsewhere for assessment. Where material has been used from other sources it has been properly acknowledged/ referred.

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Acknowledgement

We truly acknowledge the cooperation and help make by [**Name of Acknowledger], Designation** of **[Address of Organization].** He has been a constant source of guidance throughout the course of this project. We would also like to thank [**Name of Acknowledger**] from [**Designation]**, [**Address of Organization]** for his help and guidance throughout this project.

We are also thankful to our friends and families whose silent support led us to complete our project.

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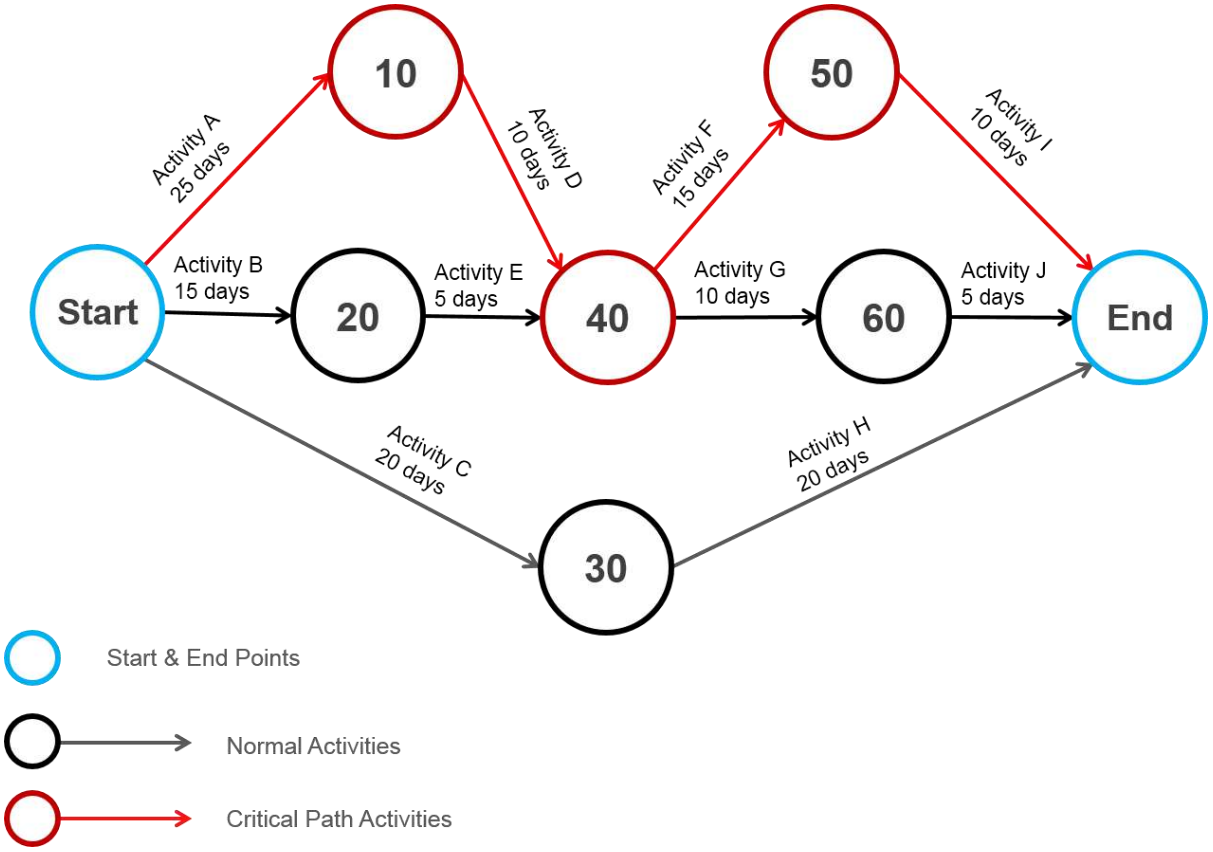

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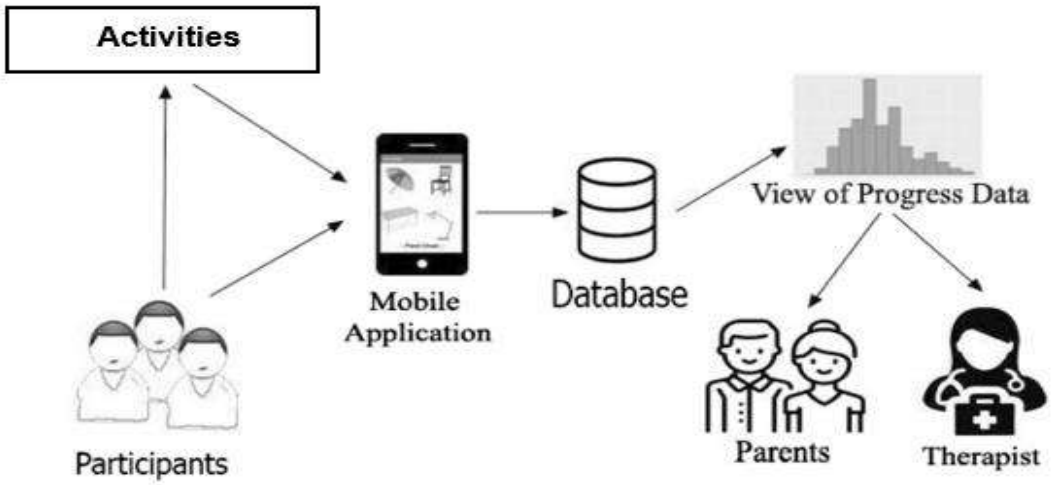

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Chapter 1

1.1 Introduction

The **Autism Therapy System** is an interactive mobile application developed to assist children with Autism Spectrum Disorder (ASD) in their therapeutic journey. Utilizing user-friendly interface and engaging activities, it aims to help improve social, communication, and cognitive skills in a fun and interactive way. The app incorporates feedback from therapists and parents for a well-rounded, effective tool.

1.2 Statement of the problem

Autism Spectrum Disorder affects 1 in 54 children, indicating a significant need for effective therapies. However, traditional therapy methods can be costly and inaccessible to some families. There's a need for a cost-effective, engaging, and accessible tool that supplements traditional therapy, ensuring continuous and consistent support for children with ASD.

1.3 Goals/Aims & Objectives

The objective is to develop an app that provides a supplementary therapeutic platform for children with ASD. By the end of this project, we aim to have an app with activities validated by therapists, a progress tracking feature for parents and therapists, and a user-friendly interface.

1.4 Motivation

The motivation for creating the Autism Therapy System stems from the significant challenges faced by children with Autism Spectrum Disorder (ASD) in developing social and cognitive skills. Traditional therapies can be limited in reach and effectiveness, particularly in underserved areas. The project aims to bridge this gap by leveraging technology to provide engaging, personalized therapeutic content. Through an interactive mobile application, the system seeks to enhance the accessibility and effectiveness of ASD therapy, offering a complementary tool that integrates inputs from therapists, parents, and artificial intelligence. This approach not only addresses the immediate needs of children with ASD but also contributes to broader efforts in innovative, inclusive therapeutic practices.

1.5 Assumption and Dependencies

Assumptions:

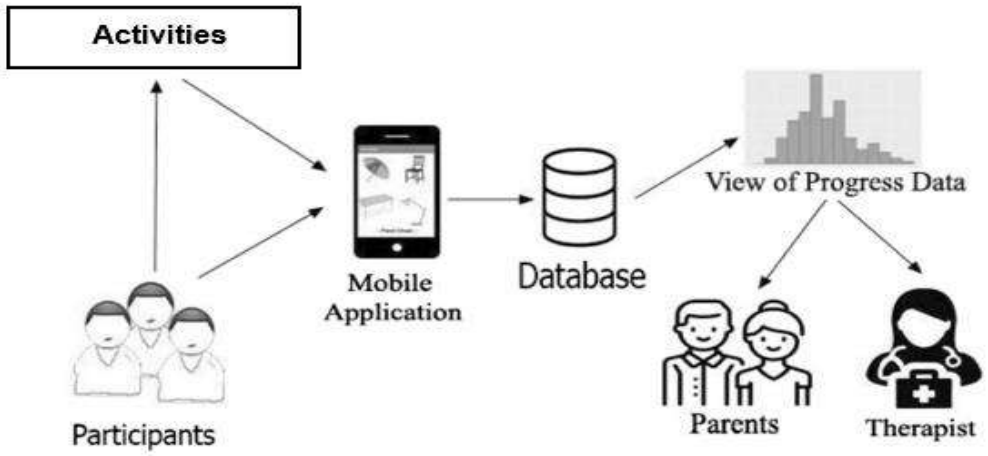
- Users (children with ASD) will benefit from digital, interactive therapy tools.
- Caregivers and therapists will support and facilitate the use of the application.
- Access to smartphones or tablets is available for the target demographic.
- The app's activities are suitable and adaptable for various ASD severity levels.

Dependencies:

- Reliable software development resources and expertise.
- Continuous input and feedback from child psychologists and ASD therapists.
- Stable internet connectivity for updates and potential cloud-based features.
- Ongoing funding for development, maintenance, and updates of the application.

1.6 Methods

We propose utilizing the Agile Development methodology, iterating based on feedback from a small user group of therapists, parents, and children with ASD. The system architecture consists of a front-end mobile application, a back-end server for data management, and an analytics engine for progress tracking.



1.7 Report Overview

Autism Spectrum Disorder (ASD), setting the stage for the "Autism Therapy System" capstone project. It begins by tracing the historical recognition of ASD as a developmental disorder and highlights its global prevalence. The section defines the core features of ASD, the diagnostic criteria, and the complex etiology. It also categorizes ASD into severity levels, emphasizing the range of abilities and challenges individuals face.

The impact of ASD on individuals and their families is discussed, shedding light on the emotional, social, and economic aspects. It outlines current therapeutic approaches and their limitations, leading to the exploration of the role of technology in ASD therapy. Finally, it underscores the critical need for innovative and accessible therapies, particularly in underserved areas, setting the context for the project's significance.

Chapter 2

2.1 Historical Overview of ASD Therapies

The historical progression of therapies for Autism Spectrum Disorder (ASD), offering insight into the changing landscape of ASD interventions over time. It begins by tracing the origins of ASD recognition and understanding, emphasizing significant milestones in the field.

The historical development of therapeutic approaches, from early methods characterized by behavioral management to more contemporary, multidisciplinary approaches. It sheds light on the evolution of thought regarding ASD, illustrating how earlier paradigms have given way to a more comprehensive and nuanced understanding of the disorder.

Key historical developments, influential figures, and pivotal moments in the ASD therapy landscape are discussed, providing context for the current state of ASD interventions. This historical perspective not only highlights the progress made in addressing ASD but also underscores the need for innovative and personalized therapies, as discussed in the subsequent chapters of this report.

Through a retrospective lens, readers gain a deeper appreciation of the challenges and achievements in the field of ASD therapy, setting the stage for the exploration of contemporary therapeutic innovations in the following sections.

2.1.1 Evolution of Therapeutic Approaches of ASD

Therapeutic approaches employed in the treatment of Autism Spectrum Disorder (ASD). It begins by providing an overview of the most commonly used therapeutic methods, including Applied Behavior Analysis (ABA), speech therapy, and occupational therapy.

The section critically examines the strengths and limitations of these traditional therapeutic approaches. It assesses their effectiveness in addressing core symptoms of ASD, such as social communication challenges and repetitive behaviors. Additionally, it explores the factors that contribute to the success or limitations of these therapies, considering the individualized needs of children with ASD.

The evaluation also takes into account the diverse severity levels within the autism spectrum and how therapies are tailored to meet the unique requirements of each child. Ethical considerations, such as the importance of consent and respect for the autonomy of individuals with ASD, are discussed within the context of these therapies.

By providing a thorough evaluation of traditional therapeutic approaches, this section sets the stage for the exploration of innovative and technology-driven interventions, as discussed in subsequent chapters of the report. It emphasizes the need for personalized and inclusive therapies to address the complex challenges posed by ASD effectively.

2.1.2 Traditional Therapeutic Approaches

Applied Behavior Analysis (ABA): A detailed examination of ABA, including its principles, techniques, and the role of behavior modification in shaping desired behaviors in individuals with ASD. The section also highlights the effectiveness of ABA in addressing behavioral challenges.

Speech Therapy: An exploration of speech therapy as a vital component of ASD therapy, focusing on its role in improving communication skills, speech development, and language comprehension in children with ASD.

Occupational Therapy: A comprehensive overview of occupational therapy and its application in addressing sensory sensitivities, motor skills, and daily living skills in individuals with ASD. The section also discusses the significance of sensory integration in occupational therapy.

Strengths and Limitations: An assessment of the strengths and limitations of these traditional therapeutic approaches, highlighting their respective areas of effectiveness and challenges. The section also discusses the importance of individualized therapy plans based on the severity of ASD symptoms.

Chapter 3

1. 3.1 Summary and Future work

Personalized Learning Paths:

Current Insight: Tailoring educational content to individual needs is crucial for engaging users with diverse learning styles and abilities.

Future Work: Expand adaptive algorithms to create dynamic learning paths that adjust in real-time based on user interactions and progress.

Real-Time Progress Tracking:

Current Insight: Monitoring progress in real-time helps therapists and caregivers make informed decisions about the user's development.

Future Work: Introduce more granular tracking metrics and predictive analytics to forecast future learning milestones and challenges.

Collaborative Platform:

Current Insight: A platform that enables collaboration can facilitate a supportive network among therapists, educators, and family members.

Future Work: Develop a secure, multi-user interface where stakeholders can work together synchronously or asynchronously to support the user's development.

Therapist Validated Activities:

Current Insight: Ensuring that activities are validated by professionals gives credibility and assures the efficacy of the therapeutic content.

Future Work: Implement a peer-review system where therapists can submit, review, and approve new activities, keeping the content fresh and reliable.

Parental Controls:

Current Insight: Giving parents control over content and data ensures child safety and aligns learning with parental expectations.

Future Work: Provide more customizable control options, including content filtering and usage limits, while maintaining an easy-to-use interface.

Supportive Community Platform:

Current Insight: Community support is beneficial for sharing experiences and strategies among users and caregivers.

Future Work: Build a moderated community forum with enhanced features like private messaging, topic subscriptions, and expert Q&A sessions.

Cognitive Skill Development:

Current Insight: Cognitive development is a key focus in autism therapy, with activities designed to enhance various cognitive functions.

Future Work: Integrate AI to analyze user responses and tailor cognitive exercises that challenge and develop specific cognitive skills.

Neurodiversity Support:

Current Insight: Embracing neurodiversity means providing support that acknowledges the wide range of abilities and interests among users.

Future Work: Develop features that accommodate different sensory preferences and learning modalities, promoting inclusion and accessibility.

Feedback and Idea Exchange Hub:

Current Insight: User feedback is essential for continuous improvement and user satisfaction.

Future Work: Create a structured feedback loop with users and stakeholders that drives the iterative design and development process.

Family Engagement Insights:

Current Insight: Insights into how families engage with the app can inform the creation of features that facilitate family involvement.

Future Work: Use data analytics to provide families with insights into their engagement, suggesting ways to better support their member's development.

Progress Monitoring Dashboard:

Current Insight: Dashboards that visualize progress help users and caregivers track achievements and set goals.

Future Work: Develop more interactive and personalized dashboards with actionable insights, goal setting, and achievement tracking.

Chapter 6

7.1 Conclusion & Recommendation

Conclusions are the last section people read in your paper, and therefore it is what they leave remembering. You need to make sure they walk away thinking about your paper/project just the way you want them to. Your conclusions need to do three main things:

1. Recap what you did. In about one paragraph recap what your research question was and how you tackled it.
2. Highlight the big accomplishments. Spend another paragraph explaining the highlights of your results. These are the main results you want the reader to remember after they put down the paper, so ignore any small details.
3. Conclude. Finally, finish off with a sentence or two that wraps up your paper. I find this can often be the hardest part to write. You want the paper to feel finished after they read these. One way to do this, is to try and tie your research to the "real world." Can you somehow relate how your research is important outside of academia? Or, if your results leave you with a big question, finish with that. Put it out there for the reader to think about.

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