FACULTY OF COMPUTING
UTM Johor Bahru

Semester I 2025/2026

AUTI CONT

Subject   : Technology and Information Systems (SECP 1513)

Section   : 05

Task   : Design Thinking

Group   : 04

Team Members : 1. Ong Shi Yun (A25CS0338)

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Video link   : https://drive.google.com/drive/folders/1oM-gepcWdEYBWAK23vTgSCc-j8zg1nou?usp=drive_link

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1.0 INTRODUCTION

Design thinking is generally defined as an analytic and creative process that engages a person in opportunities to experiment, create, and prototype models, gather feedback, and redesign. (Razzouk & Shute, 2012). Autism spectrum disorder (ASD) is among the most prevalent neurodevelopmental disorders in children (Sandhya J Kadam & Malika Goel, 2025). From the research, we know that the prevalence of ASD has been increasing annually and with high treatment costs yet limited efficacy (Huihui et al., 2025). Therefore, we are going to design an application that can be widely implemented in society to support families and teachers of children. It is a real-time monitoring application that detects the heartbeat of the autistic child and distinguishes stress levels by using heart rate variability (HRV). Parents and teachers will receive alerts and advice from the application. (word count: 134)

2.0 PROBLEM, SOLUTION, AND TEAM WORKING

2.1 Problem

Autistic children often experience difficulties in emotional regulation, communication, and adapting to changes in their daily environment. These challenges can cause emotional stress and behavioral issues, affecting their learning and social development. They will face difficulty expressing their feelings. In addition, parents and teachers often feel stressed because they lack proper knowledge and guidance when handling emotional or behavioral problems. They are also unable continuous emotional monitoring, making early intervention difficult.

2.2 Solution

Our group proposes a mobile application that can detect heartbeat of the autistic child to support emotional monitoring and guidance. The application is portable and easy to use, allowing parents and teachers to monitor the child's emotional state in real time and access guidance whenever needed. This application can reduces stress for parents and teachers by providing structured guidance and timely support. The strengths of this solution include real-time monitoring, multiple supportive features, and convenience.

2.3 Team Working

Since our group consists of four members, we worked together to complete the report. One member was responsible for the video, while two members focused on designing the application interface. One of the major challenges is over reliance on ideas generated by ChatGPT during the initial stage. After the presentation, we realized that other groups had similar ideas, which made our project not unique. When disagreements occurred, we set aside personal ideas and referred to research findings and lecturer feedback. This approach helped us reach a consensus and improve the overall quality of our project.

3.0 DESIGN THINKING PROCESS: STEPS, DESCRIPTION, AND EVIDENCE

3.1 EMPATHY PHASE

As a first step for this project, the discussion is conducted through our Telegram group to brainstorm ideas and opinions regarding the application or website that we want to create. As a result of this discussion, we came up with a few ideas such as creating a prototype for parents and teachers who handle autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD). However, we finalized our decision by creating an application for parents and teachers who handle ASD kids. Our team members agree that we should improve the service and add some new features to this system to make it one of the best apps that many parents and teachers can use.

On the 10th of December, all students were assigned to do a simple presentation by explaining our ideas during class time to receive feedback from the lecturer on the first part of the project. Our group received some comments from the lecturer like our idea was too common, she asks us to breakdown the problem and make it more detailed. We have all accepted all the comments and feedback, and we were able to correct the mistakes in project part 2. When the class over, we reviewed the task distribution for the second part of the project, and everyone gets back to work on their work progress.

After receiving feedback from our lecturer, we reviewed and discussed it again in our Telegram group. The main advice was to choose either ASD or ADHD. Our lecturer asks us to focus on one thing. To solve this problem, we divided our tasks. For example, a person searches for more information about ASD, and two other people think about improvisation on design thinking, and another person searches for teachers or parents to interview them. By doing this, we could finish our design thinking earlier than the due date. In this phase, we had an online meeting to solve all the problems we had gone through throughout this journey. From this phase, we could solve the problem we faced before. Other than that, we also came up with a better idea.

On 7th January 2026, we had a final consultation session with our lecturer. We presented three ideas which are autism survey and booking appointment to the therapist, learning material for the teachers, and an application connected with a smartwatch that tracks heartbeat of the autism kid. Finally, we decided to do a detailed design thinking on the application we mentioned before.

On 8th January 2026, we did an interview with a nurse who is working in a pediatrician ward in Hospital Batu Gajah. These are some of the interview questions we asked:

1) Can you describe your role and responsibilities in the pediatric ward?

2) What age group of children do you mostly care for?

3) What signs do children usually show when they are stressed, anxious, or uncomfortable?

4) Are there moments when you feel current methods are not enough?

5) Do parents struggle to understand or manage their child's emotions in the ward?

6) What do you think children need most to feel safe and calm in the ward?

7) What support do nurses need to manage children more effectively?
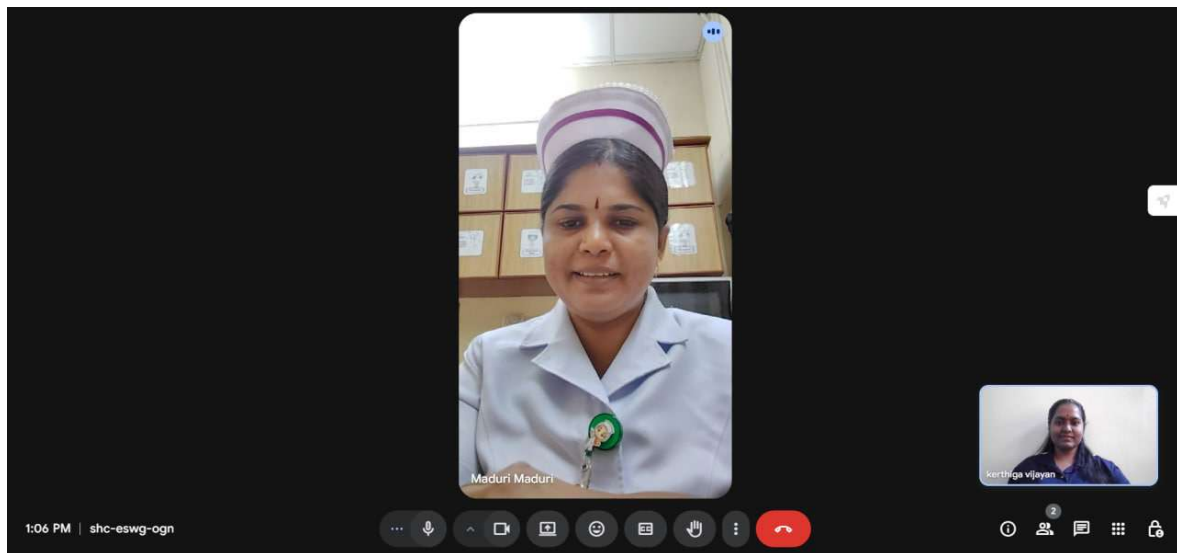
3.2 DEFINE PHASE

Main problems faced during empathy phase:

No.	Problems	User Needs
1.	Children with autism experience stress and meltdowns.	Autism kids need a way to show and ease their emotional stress to reduce emotional meltdowns.
2.	Autism kids can't express their emotions.	Children with autism need a way to tell their emotional discomfort non-verbally so that teachers and parents can understand their needs early.
3.	Teachers and parents has lack tools to detect or manage stress early	Teachers and parents need a way to detect and manage stress levels in autistic children at an early stage so that immediate support actions can be provided.
4.	Teachers and parents cannot track their children's tantrum pattern	Teachers and parents need a way to track and analyze tantrum patterns in children with autism so that triggers can be identified and prevented.

3.3 IDEATE PHASE

In the ideation phase, our team focused on generating a lot of possible solutions based on the user needs identified in the defined phase. We have generated five ideas by doing a proper group discussion and mind maps. These ideas include autism spectrum disorder (ASD) survey website, appointment booking website, learning material app, music app, and an application that connects to a smartwatch.

After the first consultation session with Dr. Azurah, she gave us a few of her opinions on our ideas. She considered some facts like relevance to an autistic child, long-time impact, and easy to use. From this advice, our team narrows down the idea by choosing survey, learning material and an application that connects to a smartwatch.

After the second consultation, we finalized the idea. We choose to do an application that can connect parents' and teachers' phone to the kid's smartwatch for the prototype phase. The team chooses this idea because it directly addresses the main problems identified earlier. This led to the development of a non-functional prototype to visualize how the solution would work in a real-world setting.

3.4 PROTOTYPE PHASE

In this phase, our team create a non-functional prototype using Canva. We use Canva because it allow us to create a design more efficiently. This is also time effective and easy to present the concept, user flow and main features.

Our design will start with a login page continued by edit the profile section. Other than that, we also include a section where teachers and parents can connect their phone with the app. It is a cloud-based connection so that the teachers and parents can connect the device from any distance.

This app will summarise weekly and monthly of the heartbeat range of the autistic kid. In the first 7 days of usage, the app will read the heartbeat pattern of the child and set the maximum and minimum heartbeat level. The smartwatch will have a sensor called stress monitor sensor which will detect these heartbeats and HRV. If the heartbeat reach the maximum level, the app app will send alarm notice to the teachers and parents.

3.5 TEST PHASE

In this final phase, we created a non-functional prototype which was evaluated through a Google Form survey to collect feedback. The prototype was shared with parents of children with autism, teachers, and a healthcare department experienced in autism care. Participants were first shown the Canva-based application mock-up and then asked to complete a Google Form to provide their opinions and suggestions.

The survey included questions on interface, ease of understanding, usefulness of features, and overall suitability for autistic children. Most respondents indicated that the prototype was easy to understand, even without detailed explanation. The stress monitoring and tantrum tracking features were perceived as useful for supporting early intervention. However, some respondents suggested improvements, such as clearer labels for icons, simpler navigation, and customizable alert settings to suit different user preferences.

Based on the survey feedback, several improvements were proposed. The interface design was refined by simplifying visuals, enhancing icon clarity, and reorganizing screen layouts. These improvements were intended to enhance usability and ensure the application better supports autistic children, parents, and teachers in real-world settings.

4.0 DESIGN THINKING ASSESSMENT POINT

The final design of our project, called AutiCont can be accessed by guardians such as teachers or parents. The design demonstrates how to support a child with autism through four main features. This application is designed to monitor the autistic child's physiological stress levels through heart rate and the data is collected from a smartwatch. When systems detect an abnormal heart rate, they will provide a notification. Thus, the parents and teachers will offer calming support for those autistic children. These features aim to enable parents and teachers for their timely intervention and make it easier to provide support and manage autism in daily situations.

No.	When to evaluate	What can be assessed	Example
1.	End of Project Demo	System availability and notification clarity	The guardian tests the system and provides feedback on the accuracy and ease of use of the notifications.
2.	Between Phases	Effectiveness of heart rate monitoring and alarm timing	Review heart rate data to assess whether the alarm was triggered at the appropriate time.

5.0 DESIGN THINKING EVIDENCE

5.1 Empathy

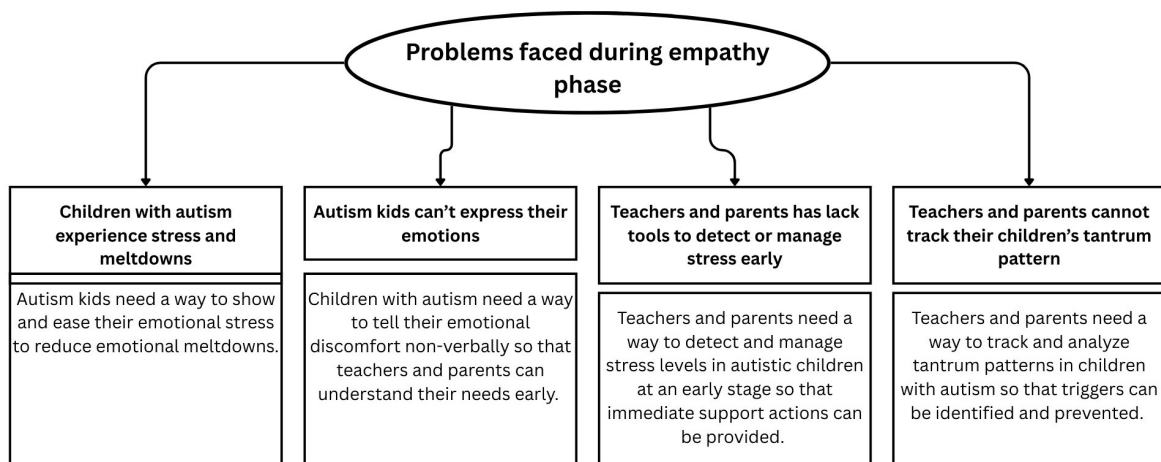Name of the person we interviewed: Mathuri Dewi A/P Krishna Kumar

Age: 46 years

Background: She is a pediatrician ward nurse for around 12 years and experienced handling autistic kids.

| No.	Questions	Answer
1.	Can you describe your role and responsibilities in the pediatric ward?	My main responsibilities are administering medication and assisting the doctors during rounds. Not only that, I also help the kids calm down before treatment.
2.	What age group of children do you mostly care for?	Usually, I take care of kids around 3-12 years old.
3.	What signs do children usually show when they are stressed, anxious, or uncomfortable?	In my observation, children usually cry, sometimes become very quiet. Some of them even tightly cling to their parents and some throw tantrums. Since kids are not good at expressing their feelings, their stress is shown via behavior.
4.	Are there moments when you feel current methods are not enough?	Yes, when children are extremely anxious or scared of medical procedures. However, we lack of tools that continuously monitor a child's emotional state or alert us early before the kids become overwhelmed.
5.	Do parents struggle to understand or manage their child's emotions in the ward?	Yes of course they do, many parents and teachers are unsure on how to handle the kids who has autism. Some parents can know their kid's behavior in home but not at public places which make them more difficult to manage them.

6.	What do you think children need most to feel safe and calm in the ward?	In my point of view, children with autism need predictability, sensory comfort, and clear communication. They feel safer when they know what will happen next and when their sensory needs are respected. Visual aids, calming tools, and consistent routines help them feel more in control and reduce anxiety.
7.	What support do nurses need to manage children more effectively?	Honestly speaking, we need tools that can help identify stress levels in children with autism, especially for those who are non-verbal. Support systems that provide early alerts when stress increases would be very helpful. We also need better training and resources focused on autism care, sensory management, and communication strategies.

Define

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                    ┌─────────────────────────────┐
                    │  Problems faced during empathy │
                    │            phase               │
                    └─────────────────────────────┘
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| Children with autism experience stress and meltdowns	Autism kids can't express their emotions	Teachers and parents has lack tools to detect or manage stress early	Teachers and parents cannot track their children's tantrum pattern
Autism kids need a way to show and ease their emotional stress to reduce emotional meltdowns.	Children with autism need a way to tell their emotional discomfort non-verbally so that teachers and parents can understand their needs early.	Teachers and parents need a way to detect and manage stress levels in autistic children at an early stage so that immediate support actions can be provided.	Teachers and parents need a way to track and analyze tantrum patterns in children with autism so that triggers can be identified and prevented.

12

Ideate

The brainstorming function was used during the ideation phase. Multiple ideas were generated through this phase. The team conducted structured sessions where each member contributed freely and recorded for further evaluation. After the brainstorming sessions, ideas were assessed based on feasibility and user need, which also lead to the selection of the final system features. The tools used are the social media platform, which is Telegram.
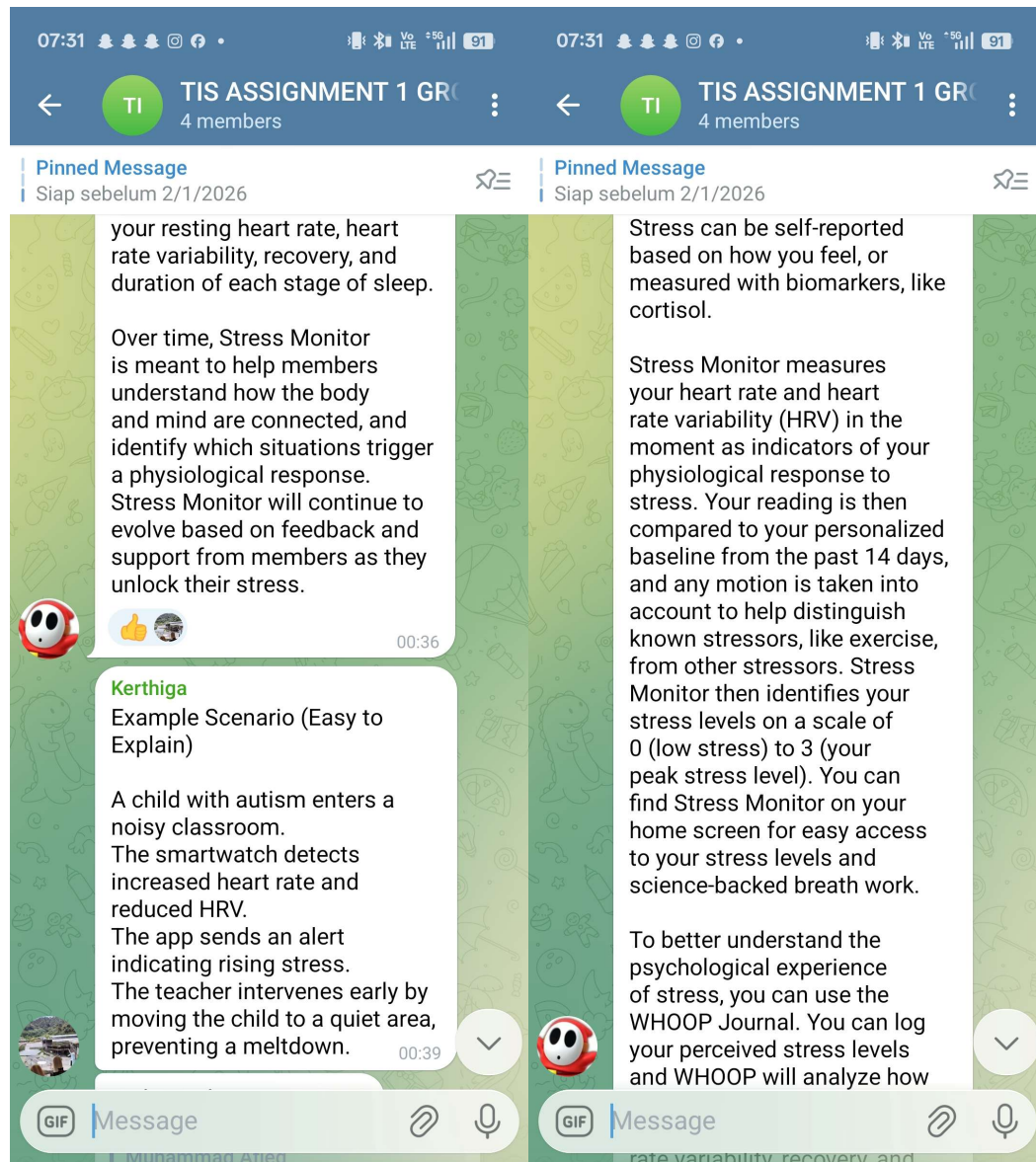
Prototype

At the initial stage , an application is planed which has a function of survey which available to collect information from a child with autism. Secondly, learning material that are provided to improve child's focus and learning development. Thirdly, booking an appointment features for further help from a professional doctor. Lastly, heart rate monitoring function to notice their heart beat from time to time by connected to any smartwatch with possible solution to calm them. There are also notification for user keep updated and always informed, making it easier for guardians to manage and support the child.

Login/Register Screen
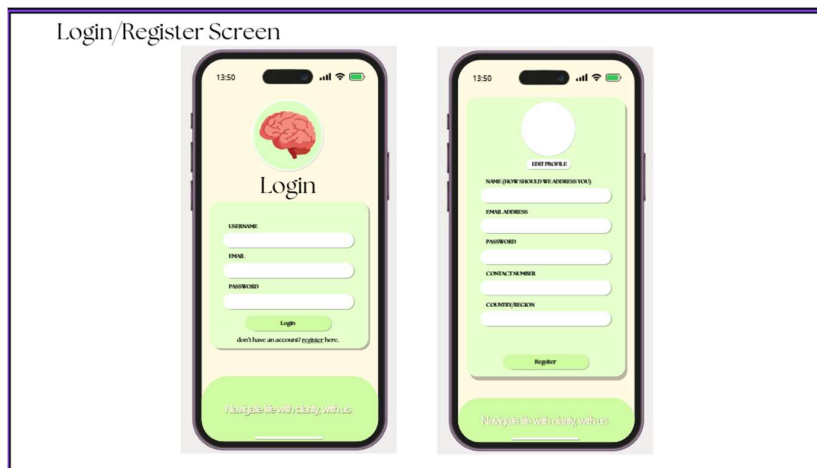
Homescreen

Survey Screen
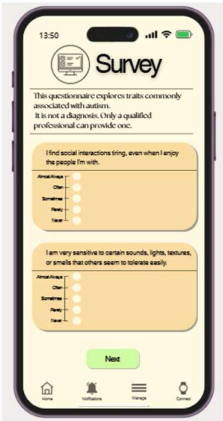
Learning Material Screen
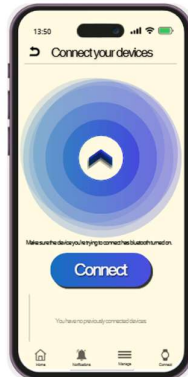

Booking Appointment
Screen
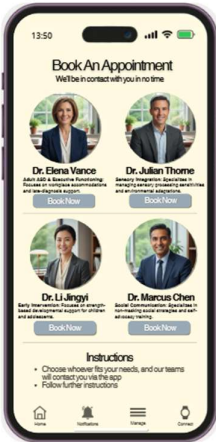
Alert Screen

Notifications Tab Screen

Management Tab Screen

Connction Tab
Screen

17
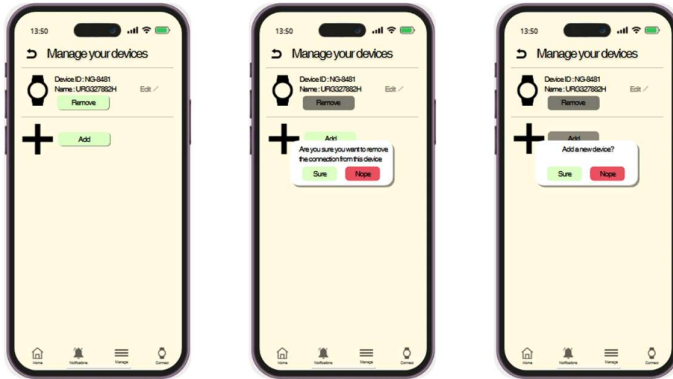
After consulting with our lecturer and doing our research, we realize we have to specific out function on our application. Only one function is enough.
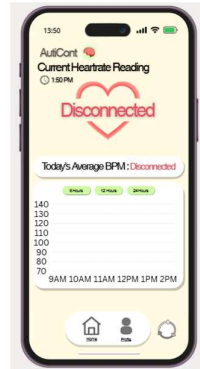
Login Page

Register Screen

Edit Profile Screen

Homescreen

Homescreen

Homescreen

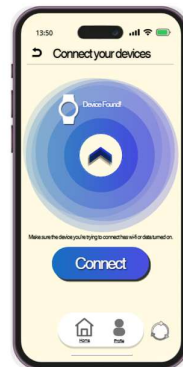## Summary Monthly Screen

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Summary Weekly Screen

Both Summary Screen

Profile Screen

Management Tab Screen

Connection Tab
Screen

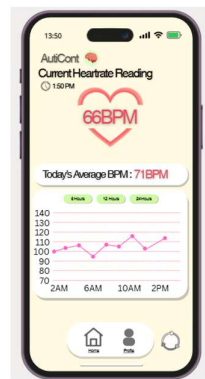## Management Tab Screen
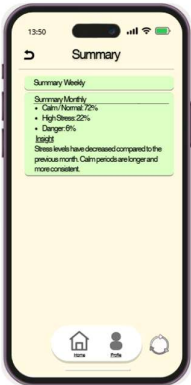

Profile Screen

Homescreen

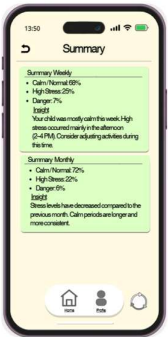Homescreen

Homescreen

Summary Screen

Summary Monthly Screen

Summary Weekly Screen

Both Summary Screen

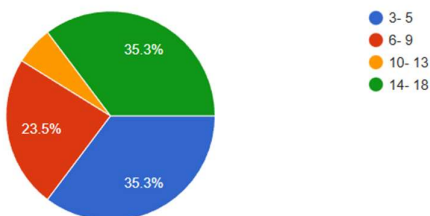# Test

What is your role?
17 responses

Pie chart legend:
- Parent
- Teacher
- Therapist
- Caregiver
- Medical staff

52.9%, 11.8%, 11.8%, 11.8%, 11.8%
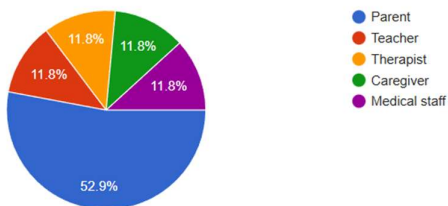
The age range of the child you care for:
17 responses

Pie chart legend:
- 3- 5
- 6- 9
- 10- 13
- 14- 18

35.3%, 35.3%, 23.5%

How often does the child experience stress or emotional discomfort?
17 responses

Pie chart legend:
- Never
- Rarely
- Sometimes
- Often
- Very often

35.3%, 47.1%, 11.8%
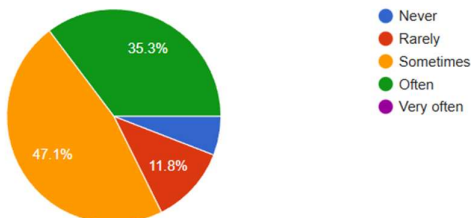
What are the common signs of stress you observe? *(Select all that apply)*
17 responses

Sign	Count
Meltdown	6 (35.3%)
Withdrawal	4 (23.5%)
Repetitive movements	6 (35.3%)
Increased heart rate / breathing	9 (52.9%)
Difficulty communicating	11 (64.7%)
Lost of motivation in doing things	1 (5.9%)
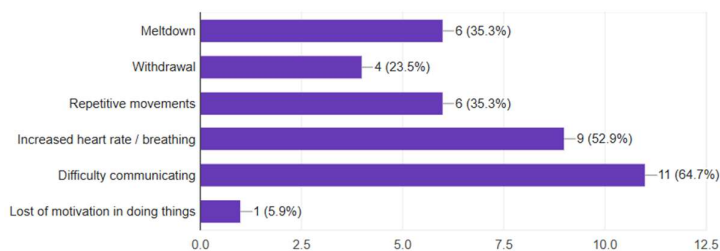
How difficult is it to identify the child's emotional state?

17 responses

- Very easy
- Easy
- Neutral
- Difficult
- Very difficult

41.2%
29.4%
17.6%
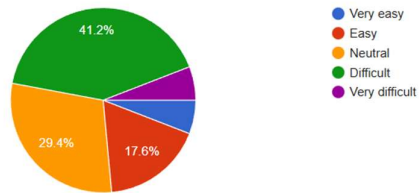
How do you currently monitor the child's emotional or behavioral changes?

17 responses

Copy chart

Observation only	7 (41.2%)
Notes or diary	4 (23.5%)
Verbal communication	12 (70.6%)
Digital tools / apps	5 (29.4%)
No structured method	1 (5.9%)
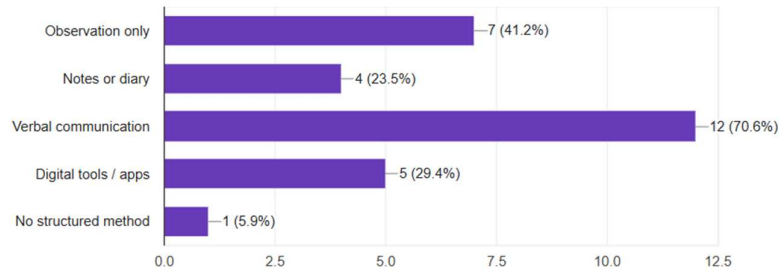
Copy chart

How effective is communication between parents and teachers regarding the child's behavior?

17 responses

- Very effective
- Effective
- Neutral
- Ineffective
- Very ineffective

52.9%
23.5%
11.8%
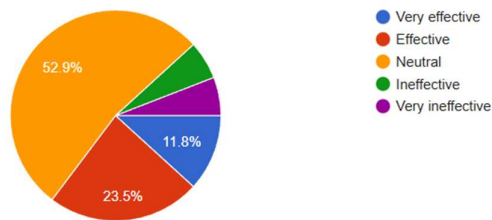
Copy chart

Would real-time stress alerts be helpful in managing the child's behavior?

17 responses

- Very helpful
- Helpful
- Neutral
- Not helpful

29.4%
52.9%
17.6%
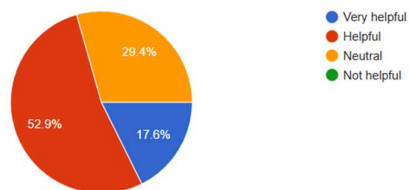
How comfortable are you with using a smartphone app to support the child?

17 responses

- Very comfortable
- Comfortable
- Neutral
- Uncomfortable
- Very uncomfortable

29.4% 17.6% 41.2%
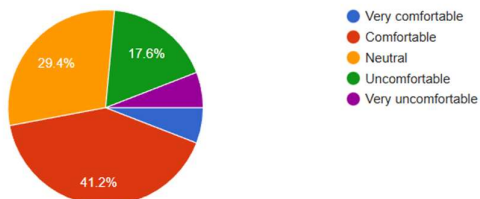
How useful would it be to track behavioral progress over time?

17 responses

- Very useful
- Useful
- Neutral
- Not useful

58.8% 17.6% 23.5%
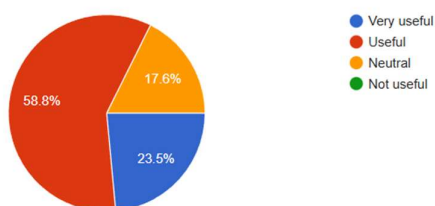
Which features would you find most helpful? *(Select all that apply)*

17 responses

Feature	Count
Stress level monitoring	12 (70.6%)
Heart rate tracking	7 (41.2%)
Behavior trend reports	7 (41.2%)
Early warning alerts	10 (58.8%)
Parent–teacher data sharing	7 (41.2%)
Daily summaries	7 (41.2%)
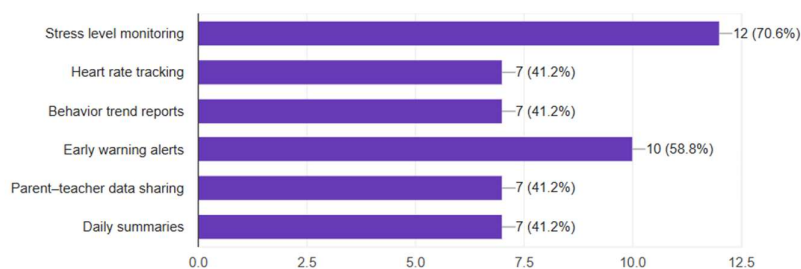
How important is data privacy and access control in such an app?

17 responses

- Extremely important
- Important
- Neutral
- Not important

29.4% 17.6% 52.9%

27
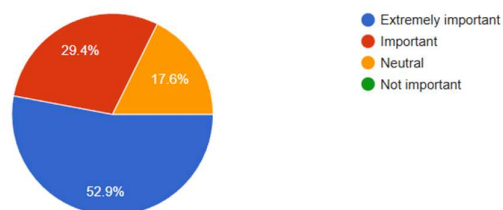
How do you think a smartwatch-connected app could support you better?

17 responses

easier for access

easy to jot down immediately

Extremely useful

Tract child emotion

It allows access to smartwatch based features helps

Nice

Superb

Good

It could provide real-time alerts for physiological stress spikes and GPS tracking for safety, allowing for faster intervention during meltdowns or wandering.

How do you think a smartwatch-connected app could support you better?

17 responses

Got to monitor our every steps in life

A smartwatch-connected app could provide real-time support by giving gentle reminders, visual or vibration cues, and alerts based on the child's stress or activity levels. It could help with daily routines, emotional regulation, and safety monitoring while allowing caregivers to track progress and respond quickly when support is needed.

By providing real-time alerts for unusual heart rate patterns or sleep disturbances, giving parents peace of mind without constant checking.

—

Easily accessible and immediate alert for times when doing sports. parents wont be using phone all the time unlike smartwatch

Convenient and better track of progress

i can always monitor my child everytime and every where

How do you think a smartwatch-connected app could support you better?

17 responses

A smartwatch-connected app could provide real-time support by giving gentle reminders, visual or vibration cues, and alerts based on the child's stress or activity levels. It could help with daily routines, emotional regulation, and safety monitoring while allowing caregivers to track progress and respond quickly when support is needed.

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—

Easily accessible and immediate alert for times when doing sports. parents wont be using phone all the time unlike smartwatch

Convenient and better track of progress

i can always monitor my child everytime and every where

Able to track conditions and emotions of children from time to time

Are there any concerns you have about using wearable technology for children with autism?

17 responses

no

im not sure

No

Not really

The gadget used might be uncomfortable for them

Nice

Ya

More explanation give

Key concerns include sensory discomfort with the strap/material, data privacy, and the device's durability against rough daily use.

Are there any concerns you have about using wearable technology for children with autism?

17 responses

Overstimulation

Yes, some concerns include data privacy and security, sensory discomfort from wearing the device, over-dependence on technology, and whether the child is willing to wear it consistently. It is also important that the device is customizable to suit each child's sensory needs.

I have no major concerns.

—

Child might get easily stimulated

Not really

Feel uncomfortable or irritating on the skin

I am Afraid that children with autism would feel less secure about wearable technology and would try to get rid of it

If AutiCont app existed, what would success look like for you and the child?

17 responses

likely

yes

Extremely successful

Track child stress

Higher efficiency in understanding the children allows better communication and solutions to problems related to the child

Nice

Superb

Yes

Success would be greater independence for the child in their daily routines and reduced anxiety for the

6.0 INDIVIDUAL REFLECTIONS

1. Ong Shi Yun (A25CS0338)

What is your goal/dream with regard to your course/program?	As a network and security student, designing this application is for the autistic child and makes their life meaningful. The target users of this application are the people closest to them, which are teachers and parents. This application can reduce struggle they face when supporting autistic child in their daily life. Although now my main field study is network and security, I always have a goal which is to develop technology solutions by applying my technical knowledge. One of my dreams is to be involved in a project that supports educational and health such that autism child. Therefore, through this course, Technology and Information System, I hope I can build a strong foundation in information systems, networking and security and contribute a wonderful project.
How does this design thinking impact on your goal/dream with regard to your program?	Through this design thinking project, I have gained valuable experience. During the project, my group members and I needed to communicate effectively to identify our tasks and decide what we should develop. We must organize our tasks in an appropriate and structured way. We brainstormed ideas and determined which solutions were most suitable for our project to achieve our goal. I learned the importance of understanding needs, emotions, and challenges before developing a system. Instead of focusing on system performance or security, I also consider usability, accessibility, and real-life impact.
What is the action/improvement/plan necessary for you to improve your potential in the industry?	I believe it is necessary to improve my communication skills. We are able to work more efficiently when we can clearly express our needs and ideas. Since working with teachers, parents and developers requires clear communication, this skill is very important. From a technical perspective, I need to gain more hands-on experience by using real tools, stimulations and small projects. Thus, I will keep on improving myself and stay updated with the current technology trend and industry requirements to avoid becoming outdated and meet industry expectations so that I can adapt myself smoothly to the IT industry in the future.

2. Kerthiga A/P Vijayan (A25CS0238)

What is your goal/dream with regard to your course/program?	My goal as a computer network and security student is to create a meaningful application for parents and teachers who handle autism spectrum disorder (ASD). I want to use what I learned in the Technology and Information System class to solve this problem and make technology more useful and accessible for parents and educators. This goal feels realistic because I am committed to my studies and passionate about design.
How does this design thinking impact on your goal/dream with regard to your program?	Through this task, I've gained valuable skills, such as putting myself in the teacher's and parents' shoes, and I understand the problem more closely in my heart. We've also developed unique problem-solving techniques and learned to work cooperatively in teams. Design thinking has made me willing to try new ideas and become more open-minded. This helps me learn something from failure. This change in mindset helps me go through challenges with creativity and stability.
What is the action/improvement/plan necessary for you to improve your potential in the industry?	I also realize that I need to improve certain skills like prototyping tools and user research methods. To overcome this problem, I have planned to enroll in workshops related to design thinking to enhance my portfolio. Last but not least, I would like to hear some advice from my lecturer and course mates about our design and take it as a lesson for upcoming projects.

3. Muhammad Afieq Bin Hasbullah (A25CS0095)

What is your goal/dream with regard to your course/program?	As a network and security student, my personal goal is to use technology responsibly to support society by solving real-life problems. I aspire to develop secure and reliable applications that not only function efficiently but also protect user data and emotional well-being. The application we designed aims to provide hope and guidance to parents of children with autism. This goal is closely related to my course, as the knowledge gained from Technology and Information Systems helped me understand how system design, information flow, and security considerations are essential in building applications that users can trust. Without this foundation, our application would not be realistic or meaningful in a real world context.
How does this design thinking impact on your goal/dream with regard to your program?	The design thinking process changed the way I think and solve problems. I learned to understand problems from the users' perspective instead of focusing only on technical aspects. By learning about autism and the emotional challenges faced by parents and teachers, I realized that technology should focus on human needs first. This helped me prioritize user emotions and accessibility when creating solutions. Working in a team improved my communication and teamwork skills, as we shared ideas, accepted feedback, and improved our design together. Design thinking also taught me to be open-minded, try new ideas, and learn from failure. Overall, this experience helped me approach challenges with more creativity, empathy, and confidence.
What is the action/improvement/plan necessary for you to improve your potential in the industry?	Through this project, I also became more aware of my limitations and areas for improvement. To become more successful in the future, I need to further develop my technical skills in network security, system reliability, and secure application development. I also need to improve my ability to communicate technical ideas to non-technical users. As an action plan, I intend to gain hands-on experience through internships, practical training, and additional learning opportunities related to cybersecurity and system design. I will also continue applying design thinking principles in future projects. The challenges I face today serve as valuable lessons that will prepare me for greater responsibilities and achievements in my future career.

4. Halden Naning Anak Roy (A25CS0228)

What is your goal/dream with regard to your course/program?	The goal is to simply provide the best for the people who are not in the best position to help themselves. Being a computer science student, I want to bridge that gap between the unfortunates to be as fortunate as the people who have the privilege to do normal activities without any obstructions, mentally and physically.
How does this design thinking impact on your goal/dream with regard to your program?	I've learned a lot of things from trials and errors in developing this system. Learning to put myself in the other person's shoes. Predicting every single possibility of actions one might want to do. Other than that, I've learned to see and open my eyes to other types of illnesses which i never really understood before, the symptoms, effects, and others.
How does this design thinking impact on your goal/dream with regard to your program?	A few things I discovered I had to improve is the ability to decide one thing from the very start. One solution to fix such problem is to plan everything extremely thoroughly before starting to develop anything. Such a problem is extremely dangerous, the reason being is that changing anything at the last minute can result in a mixed up between the discussion and the development itself within the team. Making it confusing for others to contribute their part.

7.0 ROLE OF TEAM MEMBERS

No.	Name	Matric Number	Role
1.	HALDEN NANING ANAK ROY	A25CS0228	System Developer
2.	KERTHIGA A/P VIJAYAN	A25CS0238	Project Coordinator & Report Author
3.	MUHAMMAD AFIEQ BIN HASBULLAH	A25CS0095	Ideation & Design Contributor
4.	ONG SHI YUN	ACS250338	Video editor & Co- Author for Report

8.0 CONCLUSION

This project demonstrates how design thinking can be applied to solve real-world problems faced by autistic children and their guardians. By focusing on empathy and user needs, our team was able to understand the emotional, behavioral, and practical challenges experienced by parents and teachers when supporting children with autism. This approach helped us move beyond general ideas and develop a solution that is grounded in real experiences and meaningful needs.

Through the design thinking process, we designed AutiCont, a mobile application that combines emotional monitoring, learning materials, professional support, and real-time heart rate tracking. Each phase, from ideation to testing, allowed us to refine our ideas based on feedback and improve usability. The system aims to provide timely guidance, reduce stress, and support early intervention in a simple and accessible way.

Overall, this project highlights the value of teamwork, reflection, and continuous improvement. It shows that technology, when designed with empathy, can play an important role in supporting emotional well-being and improving quality of life for both children with autism and their caregivers.

9.0 REFFERENCE

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