

CRITERION C: CREATING THE SOLUTION

C1(Making Plans): Construct a logical plan, which describes the efficient use of time and resources, sufficient for peers to be able to follow to create the solution

Flowchart depicting the overview of the Production Plan:

Production Plan - Gantt Chart:



Legend:
One cell is 40 minutes

4	6	1	1	1	1	2	2
t	t	0	1	3	8	0	4
h	h	t	t	t	t	t	t
F	F	h	h	h	h	h	h
e	e	b	b	b	b	b	b
b	b						

Task 1: Make the individual sketch for each component of the hoodie

Subtask 1.1

Make all the separate parts of the hoodie such as pocket, arms, hood and outline of actually hoodie on to be used as a cutting plan

Using an online application of the arms, hood, pocket and outline of the hoodie. These parts will be sketched to scale with high accuracy. These pieces of paper will then be used as molds in task 3 while cutting the fabric. The dimensions for each arm should be x. The dimension of the hood will be x. The length of the pocket will be x. The dimensions of the outline of the main hoodie will be x. These sketches will be 2 dimensions only having the length and the width of each component not including the depth of each part. After an accurate sketch for each part has been made the parts will be cut out to their exact dimensions and those parts will be saved to be used later.

Subtask 1.2

Create a sketching plan for the therapeutic accessories

Similar to the above cutting plan for the hoodie, now make the cutting plan for the therapeutic accessories of the hoodie, these include many different nylon straps, the velcro straps, weights,

black straps, memory foam and buckles. These will later help me while making the product.									
Task 2: Material sourcing									
Subtask 2.1: Buy all necessary materials Go to the clothing store owned by my grandfather and buy all necessary clothes and fabrics required for my product. All the fabrics and materials which are needed for making the product consist of. 2m x 0.75m x 1.5mm of cotton-polyester of the color dark blue. This cloth will be used to make an actual hoodie including the sleeves, hood and body of the hood. If all the fabric is used efficiently with minimal waste while making the hoodie this much fabric will suffice. A normal hoodie also has a depth of 1.5 normalizing the experience of wearing a therapeutic hoodie. Additionally having such a thick cloth also provided stability and strength to the fabric allowing me as a designer to attach multiple bands and straps to the hoodie without damaging the material. The next materials which are needed are nylon and velcro to make the elastic nylon straps pressure straps for the arms. The nylon will be 3.5m x 2 inches x 2.5mm. These dimensions are perfect to provide comfort to the user and at the same time have great functionality. The long length of the nylon allows the user to be able to easily adjust the nylon while the medium length allows the nylon straps to be able to cover a great area of the users forearm and elbow and the thin depth allows for breathability through the nylon. The velcro will be 1m by 2cm long. The memory foam which will be used as supportive padding will be 46 cm by 10cm long. These dimensions will be perfect to cover all aspects such as back and shoulder support. The weighted inserts which will be made out of small soft yet dense metal will be 0.25 kilograms in weight with dimensions of 4cm by 2cm. 4 such metal interests will be purchased. This will help add a little weight to the hoodie while not making it too heavy. 8 straps adjustures made out of plastic will also be used to adjust the length of the nylon straps and for compressive therapy.									
Task 3: Fabric cutting									
Subtask 3.1: Cut all the fabric in the necessary parts making the outline of the hoodie Using basic fabric cutting machines, fabric scissors and a tape measure for measurements cut all parts of the fabric in necessary shapes. While cutting separate parts of the fabric for the hoodie follow the cutting plan step by step with all measurements being very precise. For big cuts such as the main body of the hoodie and sleeves it is recommended to use the fabric cutting machine, however for cuts which require extreme prescience and are very small such as the hood use the fabric scissors.									
Subtask 3.2: Cut all the materials to make the necessary pressure and weighted straps After cutting all parts for the main hoodie, cut the therapeutic accessories. The quantity of each accessory, along with the dimensions are mentioned in the cutting plan. Follow the instructions in the cutting plan with great precision. To cut these accessories in the required sizes some of the key tools and machinery which could be used consists of band saw to cut the nylon straps and the metal inserts while basic scissors to cut the memory foam.									
Task 4: Assembly of hoodie									
Subtask 4.1 Assemble to arms, pocket and hood to the outline of the hoodie To attach the main body of the hoodie use a single needle lockstitch machine, this machine is the industrial standard while making clothing equipment like Hoodie. Using this machine is fairly easy and also provides durability and is suitable for high stress areas. For the attachment of sleeves, hood and cuffs a sewing machine will be used. While a seam machine is a little more									

[illegible]

[illegible]

C2 (Demonstrating Technical Skills): Demonstrate excellent technical skills when making the solution...

Excellent Technical Skills - No challenges faced

Aspect	Justification
Cutting arms of hoodie	Cutting the arms of the hoodie to their required shape by using fabric scissors and the cutting plan as a reference was a very easy task which I was able to complete in limited time with precision. This is because the arms of the hoodie were the only parts which I could cut with fabric scissors due to their extremely simple shape. The fabric scissors also made it much easier and effortless to cut the arms of the thick cloth when compared to the other machines I had to use to shape out the other parts of the hoodie. Additionally as the arms of the hoodie had no pattern or complicated shape despite the high precision needed using a measuring tape and the cutting plan as a guide I was able to cut the arms with high precision.
Cutting black straps and memory foam	Cutting out the black straps and the memory foam was also a relatively easy task due to the material of each fabric and the simplicity of the shapes. Both the memory foam and the black straps were cut with the use of just fabric scissors, using fabric scissors is a much easier way for me to cut fabric as I am more familiar with it and it gives more control while cutting. While cutting the black strips the width required by me was the original width of the black strips, so I just had to cut the strips in the length I required. While cutting the memory foam into the required shapes due to the extreme fragile texture of foam it is very easy to cut the fabric.
Coding the vibrator motors	Coding the vibrator motors was also a fairly easy task for me to do, this is because I already had a similar code made for only one vibrator motor, to complete the code and make it operational for all 6 vibrator motors I had to only make some minor changes to the code. Additionally I have worked with arduino's in the past so I didn't have to refer to any external sources while modifying the code.
Making the cutting plan	While incorporating a high level of precision in the cutting plan was a minor challenge, making the whole cutting plan was an overall easy task to do. This is because from my criteria B, I already had all the required measurements of each material I was going to use, adding those dimensions into a website despite the precision was a very easy task. In addition to that the cutting only included the 2d dimensions of each aspect, rather than the 3d dimensions making it furthermore easier to make the cutting plan.

Intermediate level of Technical Skills – Some challenges faced

Aspect	Justification
Cutting nylon straps	While the nylon strips were in the strips were easily cut using a fabric scissor and no adjustment needed to be made to the width of the nylon straps, due to this elasticity and stretch like quality of nylon when I was cutting the nylon straps to the length desired the nylon straps tend to stretch when not needed. Due to this it was very difficult to cut the straps to the perfect length, to be able to do so I would have to place the straps against a table and hold them in a very specific manner while cutting them unlike the regular black straps which were fairly easy to cut.
Attaching the pocket to hoodie	After cutting out the pocket separately, attaching it to the main body of the hoodie was a fairly challenging task, to ensure the pocket is functional I had to make sure that the hole of the pocket is not stitched onto the hoodie. This was challenging as there was limited space to attach the pocket of the hoodie and it needed to be ensured that the pocket was tightly attached to the hoodie. In addition to this for the pocket to be functional it had to be open from the inside with no stitches or loose threads present. Doing this was particularly challenging as to attach the hoodie a sewing machine was required and this was my first time using a sewing machine.
Attaching the nylon straps	After cutting the nylon straps in their required lengths, attaching them to the hoodie was also a challenge. To allow the nylon straps to be able to be stretched when the hoodie is worn and to permit the nylon straps to perform pressurised therapy it had to be ensured that the straps were only attached from their ends. If stitched like a normal band the nylon straps won't stretch properly as a result of the thick fabric of the hoodie holding it back. Improperly attaching the nylon straps could also result in the fabric of the hoodie getting damaged. To stitch the nylon straps properly the ends of the nylon straps had to be attached to the hoodie with great strength so the straps don't detach from the hoodie while also ensuring no seams or marks were left from the straps.
Avoid seams	The product design had to ensure that there are no seams in the hoodie. I tried different stitch styles, however each of the methods resulted in cloth overlap and feel of stitch. How it was tackled: I had to think out of the box and decided to use a cushion pasted over the stitch to ensure that ADHD children do not feel the same thereby activation their sensory cells

High level of Technical Skills – Aspects which were very challenging and took a lot of time

Aspect	Justification
Attaching the hood	The hood of the hoodie was a very tricky object to assemble as it had an extremely complex shape which needed to be attached on a specific point of the hoodie. A single needle locksmith machine was used to perform this task due to this extreme precision required and the complication of the task. Before this I had never used a single locksmith machine adding to the difficulty of the task. Additionally I had to make sure that there were irritable seams present which may cause discomfort to the customer, any mistake while performing this task would also be catastrophic as the hood took extremely long to make itself and I didn't have the materials to make another hood.
Using the a single locksmith machine	The material used for Hoodie is thicker than usual material used for t-shirts. The sewing machine available with me did not have the ability (thickness of needle to pierce cloth & gaps in the machine for cloth to pass). I had to borrow an industrial grade sewing machine, which required specialised training to operate. The simple task for sewing became a massive task consuming a significant amount of my time
Using a needle to stitch	It was not possible to stitch the elastic bands and nylon straps onto the hoodie and the combination of thick cloth along with these materials would not pass through the sewing machine. After breaking couple of sewing machine needles I had the fall on using a thick needle and manually attaches these items onto the hoodie
Attaching	Attaching weights on the hoodie proved to be extremely challenging. While the fabric used was strong, however there is a tendency for weight to drag the fabric down on side with gravity. I had to use extreme

weights	care and precision while attaching the weights on the shoulder area of the hoodie. It ensured the weights are placed in the exact centre and would not fall on one side, then it was dragging the hoodie along with it. A cushion was also attached in the shoulder area from inside to support the weight
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C3 (Following the Plan): Follow the plan to create the solution, which functions as intended

Process Logs

Date: 4/2/25; **Task:** Making the cutting plan and purchase the cloth

Description: In this task I had to make the digital cutting plan for each component of the hoodie and purchase all the required materials to make the actual hoodie. The cutting plan had to include all aspects and parts of the hoodie along with all the accessories, while the digital cutting plan didn't necessarily have to be by scale but it had to have all measurements and dimensions of all parts of the hoodie with the accuracy of 1mm. This cutting plan had to be made with extreme care as this is the foundation of therapeutic apparel and any inaccuracy while making the cutting plan directly impacts the final product. To buy all the necessary materials I had to go to multiple different shops and even cities. To buy all the basic materials such as the elastic bands, velcro, weights, buckles and padded foam I was able to go to a local wholesale shop and purchase all these materials at a discounted price. However, for the main fabric of the hoodie it wasn't available in any shop in Mumbai, hence I had to order it from cloth from a different city.



Challenges: The main challenges I faced in this session were making an accurate cutting plan and purchasing the cloth due to lack of supply. While making the cutting plan a challenge faced was getting high accuracy, even though the cutting plan was online and the measurements of each aspect could have been changed easily making the cutting plan with accuracy of 1 mm was challenging. Purchasing the correct type of cloth was also a major challenge faced by me, as I live in Mumbai, a relatively hot city there were no shops which sold thick hoodie material which was required to make the product. Due to this, after searching for the cloth all over Mumbai I had to order the cloth from a small and cooler city in India called Bhiwani. This was a major challenge as this did not only set me back a lot of time I could now see the cloth before buying it which made it challenging to decide which cloth to choose.

To do: (i) Make the hoodie; (ii) Make a therapeutic straps; (iii) Make the circuit and code for vibrator motor; (iv) Integrate everything

Reflection: Today was a great day for us as we were able to finish all the work, however the time taken to do so exceeded the original plan. In the original plan I was supposed to complete the cutting plan in 80 minutes which I was able to do successfully, however I was supposed to buy the cloth in only 40 minutes, whereas the actual process ended by taking 4 days including time taken for the cloth to be shipped to my house. In my opinion the cutting plan is of high accuracy with all the necessary elements included and the cloth along with all the accessories is also perfect for making the therapeutic apparel required, although the time taken was not ideal, to complete the product on time I will now have to work faster with greater efficiency in the upcoming tasks.

Date: 11/2/25; **Task:** Fabric cutting

Description : Today's goal was to cut all the fabric and materials in their necessary shapes and sizes according to the cutting plan to make each aspect of the therapeutic apparel.. For cutting different types of fabrics into different shapes and sizes a variety of tools from fabric scissors to fabric cutting machines were needed. This task was fairly simple as only the cutting plan needed to be followed, however it was tedious with a high level of attention needed for every as.

There was only a limited amount of fabric available and making a mistake while cutting the fabric may lead to a shortage of fabric for future tasks. This task was supposed to take a total of 80 minutes.



Challenges: While cutting all necessary parts required to make the therapeutic apparel some of the main challenges faced by me were cutting the thick cloth required to make the hoodie and cutting the nylon bands to their proper length. As the thickness of the cloth required to make the hoodie was more as compared to other fabrics a normal pair of fabric scissors couldn't be used and a fabric cutting machine had to be used. As I have never used a fabric cutting machine this was a major challenge for me. Additionally cutting the nylon straps into their desired lengths was also a major challenge as while holding the nylon straps they usually would stretch by a few mm which gave incorrect measurements. Due to this I had to hold the nylon straps in a very specific and precise manner.

To do: (i) Assembly the hoodie and the apparel; (ii) Make the circuit and code for vibrator motor; (iii) Integrate everything

Reflection: Today was an overall good day as I was able to finish all the required work with great precision and without wasting much resources in the allocated time. One major concern I had today was the wastage of too many resources impacting the future workflow, however that was not an issue. Despite me completing my work on time today due to the major backlog from the previous session I still remain on a time crunch with me falling behind on my original action plan.

Date: 18/2/25; **Task:** Assembly

Description : Today's task was to assemble all the components which were cut in the previous session. This includes completing the fully assembled hoodie and assembling all the apparel/accessories individually to be later attached on the hoodie. For this task I made use of a single needle locksmith machine and a sewing machine. These machines allowed me to easily work with all fabric and make precise stitches. The time given for this task was 120 minutes.



Challenges: There were 2 main challenges I faced while assembling different parts of the product. The first main challenge was the assembly of the hood of the hoodie to the body. The hood of the hoodie was a very tricky object to assemble as it had an extremely complex shape which needed to be attached on a specific point of the hoodie. A single needle locksmith machine was used to perform this task due to this extreme precision required. Additionally I had to make sure that there were irritable seams present which may cause discomfort to the customer, any mistake while performing this task would also be catastrophic as the hood took extremely long to make itself and I didn't have the materials to make another hood. The second major challenge was assembling the pocket of the hoodie, which was not

as big of a challenge as the hood attaching the pocket was also a major challenge as it needed to be insured that the pocket is strongly attached to the hoodie and there are no strings inside the pocket itself.

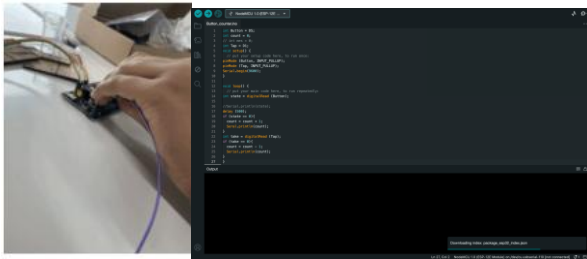
To do: (i) Make the circuit and code for vibrator motor; (ii) Integrate everything

Reflection: Today was a very successful day, as not only was I able to complete all the tasks given in the required time I was able to do them with high precision. The tasks I did today were the most difficult tasks while making the hoodie and the aspect which I thought I would make a mistake in. I was also able to complete all the tasks in precisely 120 minutes, while there is a backlog pending, I am very proud and happy of the work I completed today.

Date: 24/2/25; **Task:** Calibrating the vibrator motors

Description : Today's task was making the circuit and the code of the vibrator motors which would work by the click of a button and ensure the vibrator motors worked perfectly. I have done tasks like this before and am experienced in making the circuit hence the tasks shouldn't be very challenging. In total there should be 6 vibrator motors all controlled by 1 button calibrated in 80 minutes.

Photos:



Challenges: There were only a couple of challenges that I faced in this task which were. These challenges were the incorrect connection of the vibrator motors and misunderstanding as to where to use a resistor. While connecting the vibrator motors due to an excess amount of vibrator motors and wires the pins which I connected to the arduino were wrong in the start as I messed up the connections between the GND pin and the 5V pin. Additionally while connecting the 10 ohm resistor to the breadboard a crucial mistake was made due to which I almost internally damaged all the vibrator motors.

To do: (i) Make the circuit of my product; (ii) Make the code for my product

Reflection: This day was really important for us and we were able to do a lot in this class even though we did not make our own actual product. The making of the sensor gave us a glimpse of how we need to make our circuit as well and it was fortunate for us that this class activity to get us familiar with sensors was including the ultrasound sensor which is our main sensor. Overall, this class helped us understand how our circuit should be made and exactly how it should be made as we learnt about the connections and stuff.

Date: 26/2/25; **Task:** Completing the product

Description: Today's task was to integrate all aspects of the product to make one final therapeutic apparel. The machines used while doing this were sewing machines as a basic needle and thread. The ideal time given for this task was 160 minutes as it is the final and most important step, however as I have already exceeded the time expectation I have to work quickly to be able to finish the task on time.



Challenges: There were a lot of minor challenges I faced while integrating all components such as attaching the weights in the correct spot, properly attaching the black support straps and adding the memory foam for comfort, however the few major challenges I faced were properly attaching the nylon straps and ensuring the hoodie was comfortable to wear. While attaching the nylon strap only 1 or 2 points of the nylon straps had to be attached to the hoodie, if many points were attached to the hoodie the nylon wouldn't stretch properly and would hinder the functionality. The next challenge was to ensure there were marks or stitches which could affect the comfort of the product while wearing it. Due to this I had to recheck after every stitch that there was no mark, and if there was a mark carefully remove the stitch and seal it properly.

Reflection: Today was the day I completed my product and am extremely happy with it. Integrating all aspects of the product was extremely challenging, especially integrating the vibrator motors into the hoodie, due to high safety risks and comfort issues I decided to remove the vibrator motors from the product altogether. While this may impact the functionality of the product it is better to do so in the long run. Completing this step took exactly 160 minutes, while I was able to complete all the tasks in their time given due to the original delay while purchasing the cloth the whole process of making the hoodie was delayed. Overall I feel I was able to make a successful product without too much extra time taken.

C4 (Changes to the Solution): Fully justify changes made to the chosen design and plan when making the solution

Changes made	Initial plan	Justification for changes made
Not including vibrators or sensors: Some element of functionality was sacrificed while developing final product due to lack of time and resources 	I also explored building vibrators and sensors, but was not comfortable with limited testing time to ensure safety. Use of batteries and wires to transmit current present inherent risks associated with (i) overheating of batteries; (ii) Batteries catching fire; (iii) loss of current from wires resulting in shocks. The use of electronics would have also made maintenance of the product extremely complicated.	Use of electronics would require significantly more time and investment. I could have considered (a) placing batteries on shoulders could have been replaced weight and perform dual function; (b) explored a comprehensive assembly of battery and vibrators/sensors with limited wiring; (c) use either fixed or detachable pockets to provide flexibility for use and maintenance; (d) explore new generation rechargeable lithium batteries; (e) hybrid model where electronics are optional thereby addressing the needs customers at all different price points
Weight being attached rather than inserted in pockets 	Adjustable weights were an integral part of my product design. This would have enabled care givers to adjust the weight as per child's needs and reduce the need to keep buying new clothes (if the weight needs of a child changes). Adjustable weights would have also helped the child to continue wearing the same hoodie throughout the day, as during easy time they can remove the weights. However, I was not able to build this feature as it required making customised pockets which was not feasible without specialised machines.	Pockets for adjustable weights: (a) I could have used different fabric / material for pockets in different location of the hoodie and this would have possibly addressed concerns are pockets tearing due to weights; (b) Stitch pockets before putting together the hoodie would have enabled putting pockets using normal sewing machines; (c) I could have also used weighted jellies pouches instead of solid weights as they spread pressure over a wider area.
Seams: I was able to ensure that there are sharp seams which could irritate users 	Seams are a constant source of irritation and were identified as a key criterion during the design phase in Bii. The feedback providers felt that a very challenging situation was successfully tackled by applying a practical design modification. The product would not have been effective, without a solution found to the issue of seams.	While stitching the hoodie I realised that there would be joints and hence seams are unavoidable in certain key places. I was however able to find a smart hack, by pasting a lightweight cushion on these stitches to ensure irritation free experience
Prints on the hoodie to make it more 	I had planned to do a screen printing done on the final hoodie with contrast colours like dark blue, red of white. The idea was to do machine printing and not embroidery. This would help the hoodie look more aesthetically pleasing	As part of product development I realised that the hoodie is already too crowded with a large centre pocket, weights on the shoulder, elastic bands on arms and adjustable nylon straps around the waist. Adding a print on top of these would have made the product cluttered and become overwhelming for ADHD child

Changes made	Initial plan	Justification for changes made
Pocket 	In the original design there were no pockets present in the hoodie, this was done as making pockets would not only be more time consuming with me having to learn another skill but also there was no space for pockets in the original design due to nylon bands needed for support of compressive therapy. Pockets also didn't seem necessary at the time of making the drawings.	After starting to make it, I realised that a pocket could easily fit in the center of the hoodie if all therapeutic accessories were arranged in a proper manner. Additionally while making pockets would be more time consuming they wouldn't take too much time and are fairly easy to make. According to my clients adding a pocket would also be beneficial as not only would it look aesthetically pleasing and help normalise the experience of wearing therapeutic apparel but also be highly functional.
Collar 	In the original design there was an ordinary collar for the hoodie with there being no special extensions or attachments made. This was done because at the time of planning the therapeutic apparel this seemed unnecessary as the hoodie could be easily worn despite the buckle. Having a normal collar would also help normalize the experience of wearing therapeutic apparel and the product would feel more like a normal hoodie.	After making the hoodie while asking the client to wear it they often complained they weren't able to wear the hoodie properly with some clients not even being able to wear the hoodie at all due to a tight collar with there being no space for their heads to go through. To change this as a last minute plan a velcro collar was added to the hoodie, this allowed the clients to be able to easily wear the hoodie without severely denormalizing the process of wearing a therapeutic apparel. In addition many clients said this velcro collar was highly functional and very easy to use.

CRITERION D: EVALUATING

Photos of final product

Front Design	Back Design	Side Design
		

D1 (Testing Methods): Design detailed and relevant testing methods, which generate data, to measure the success of the solution

I wanted to have a diverse group of participants that evaluate and test the product and hence choose a cohort of target audience peers, experts, and teachers. Constructive feedback is the only way to understand the product's strengths and areas for improvement. A combination of different testing methods was used to assess the final product as compared with design considerations identified in criteria B

Technique	Approach	Consideration
Feedback from Expert	In this testing approach, testers were provided access to the product drawings, actual product, details of materials used and stitching / pasting technique applied. The tester applied both top-down and bottom-up approaches to critically evaluate product performance against laid-out design criteria. A series of questions would be shared with the tester.	The focus in this technique would be to seek first hand feedback based on the actual product. The expert would be shortlisted based on experience in the garment industry and having exposure to ADHD children. Feedback obtained in an informal set-up on qualitative aspects like application of weights, effectiveness of elastics and straps.
Survey	Video and photos were shown to all respondents. All specifications from B1 were also shared with the before they rated the product. The surveyors had to review product images and provide ratings against each parameter. Google Forms and Interview based on design specifications identified in B1	A survey conducted on my target audience & peers. The questions would be framed keeping in mind the challenge that the feedback provider does not have access to the actual product. The question would be specific in nature and open-ended vague questions would be avoided
Self-evaluation	Real critical feedback is obtained in this method. While there is concern of bias during rating own product, I had tried to look at product from third person perspective involved in product design & development while providing feedback	Honest feedback on both qualitative and quantitative aspects of the final product as compared to identified design specification. Feedback was provided on scale of 1-5 which was then converted into percentage for comparison purposes
Overall	A quantitative score is computed by percentage obtained for each criterion during Survey and Self-evaluation	

D2 (Evaluating the Solution: Critically evaluate the success of the solution against the design specification...

Personalized Interview of an Expert:

I asked an expert who has a degree in textile engineering and also experience of working with ADHD children while being associated with an NGO to analyse my product. Following review qualitative response and rating was obtained

Questions Asked (I asked my client to elaborate on their survey answers):

1. Is the hoodie made of durable and tear resistant material?
2. Are there any tags or seams?
3. Are there any metal or plastic parts including zips, buttons, belts that could be uncomfortable or irritate ADHD children?
4. Comment on material used, colour scheme, fabric design and fabric feel?
5. Is hoodie machine-washable or dryer safe?
6. Is the hoodie loose-fitting and comfortable making it easy to wear?
7. Does the hoodie have the ability to be tightened either automatically using elastic or manually using straps?
8. Is the placement and quantum of weights used in hoodies appropriate?
9. Are there electronics in the form of vibrators or sensors used?
10. What is your most favourite and least favourite aspect of this product design? Why?
11. Elaborate on the benefit provided by using this form of clothing instead of standard t-shirts?
12. Comment on the intricacy of the design and how it caters to the targeted audience?
13. General feedback, if any?

Responses:

1. The product meets all the aesthetics related requirement including material used, color scheme, lack of overwhelming prints or flashy colour
2. Care has been taken to avoid usage of buttons. Velcro is used for front opening. Similarly adjustable straps are used instead of belts in the waist area

3. Due to my background in the garment industry and experience on working with ADHD children, I was able to easily use the hoodie without any issues. I would suggest included a simple operational handbook and making YouTube video of Dos & Don't for parent and caregiver to explain aspects around weight management, straps to adjust compression pressure and best way to maintain / wash the hoodie
4. I quite like how space has been used to fit in various elements, it is not too overwhelming. There are two aspects to be considered from a maintenance/operations perspective viz (a) detachable and adjustable weights; (b) Use of electronics. The weights are uniformly distributed on the shoulders which are strong body parts and best way provide a compressed feeling.
5. Due to my technical knowledge, I can appreciate why electronics were not fitted in the final product. It is important to not use them rather than including them without (a) testing and addressing safety issues associated with batteries and current flowing through the clothing; (b) find practical way to make the clothing washable despite presence of electronics
6. The best aspect of product design was is simplicity while addressing most of the key design considerations around aesthetics, use of weights, smartly placed elastic on the arms and adjustable strap
7. The product looks like a normal hoodie from outside without attracting any unwanted attention. The weights placement on shoulder looks are part of muscular style for hoodie and use of white colour straps adds to visual appeal. The elastic bands on the arm may be placed on the inner side instead of outside to reduce distraction.
8. There is an increased demand for similar product from all age group to tackle issues of neck & back pain emerging from constant desk job
9. I am very impressed by the overall design, though I understand that this could be subjective.
10. Overall: The tester gave a 4.5/5

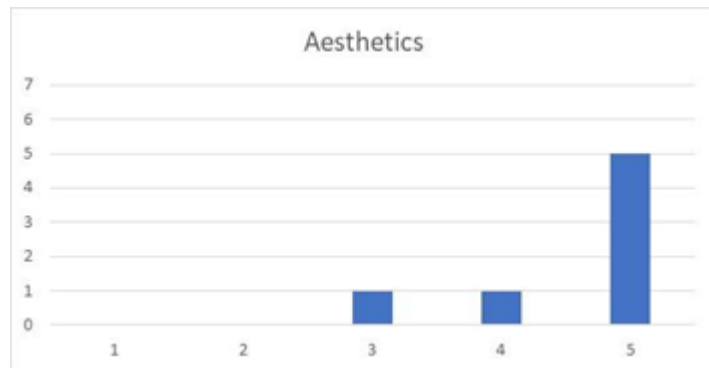
Third Party Survey

Methodology: Survey form designed covering all design considerations. Participants, which included target audience and peers, request to rate each strand / question out of 5. Feedback received from seven participants. To collect more unbiased data, I should have collected information from more people but wasn't able to because of time constraints.

Summary (Specification, Question; Overall Response; Specific Response)

Aesthetics:

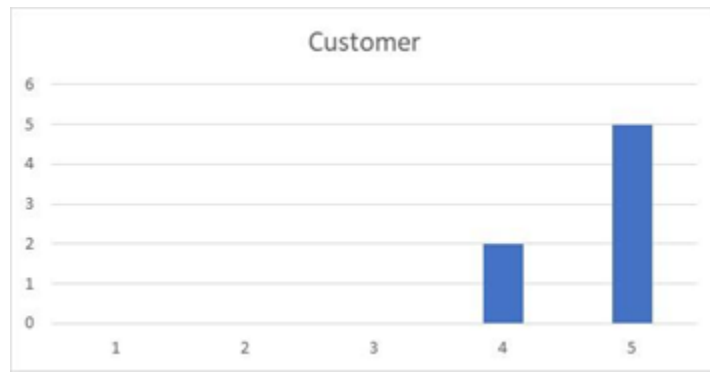
- Does the product have a simple design free of any distraction and not have any decorative features buttons, unwanted pockets, or meta/leather straps? Is the colour selected soothing that stimulates brain? Is the pattern gentle and not visually overwhelming?
- **32/35 91% Success**
- The Hoodie addresses three primary requirement of ADHD clothing effectively being (a) Soothing colour without overwhelming prints; (b) ease of wear, with presence of Velcro & straps instead of buttons, zips, etc; (c) compressed feeling on account of adjustable straps around waist, elastic in arms and weights on the shoulders. The designer has ensured focus on simplicity and curbed the instincts to overdo elements"



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Customer:

- Is minimalistic design principle followed? Are tags & labels avoided? Does the product have seams? Is elastic & Velcro used instead of buttons and zippers?
- **33/35 94% Success**
- “I am really impressed by the modifications done on the inner of the hoodie to cover stitches with cushions and also the added cushion pad from inside on the shoulder area. Use of weights from outside has potential to create friction leading to rashes – cushion padding will prevent this”



side

Size:

- Is the size adjustable i.e. flexible with elastic and made of stretchy fabrics with soft cuffs?
- **35/35 100% Success**
- “Large pocket in the front with friendly inner lining is an innovative design idea, which eliminates the needs of having a separate fidget spinner or toy”
- “This Hoodie is a good choice ADHD children. It is not only comfortable and stylish, but also made from high quality material. The hoodie is overall loose fitting making it easy to wear, with smart use of elastic on arms and multiple adjustable straps that can help create a cosy feeling. The hoodie has a simple classic design that is both stylish and professional.”

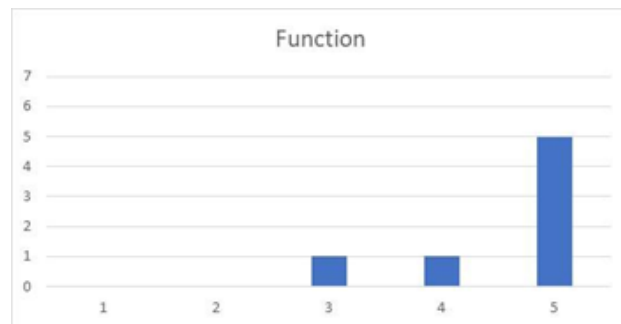


fidget

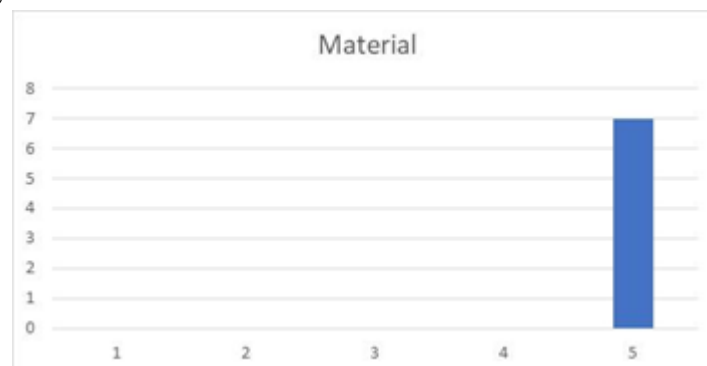
for

Function:

- Does the product perform its function of calming the child by on and simulating certain sensory weights used as per design criteria?
- **32/35 91% Success**
- “While I clearly appreciate quality and design elements, which identified success criteria, I believe scope to further improve the building in flexibility. There was scope to make provision to vary weights by adding pockets rather than attaching them, which would not only enable customisation but also facilitate maintenance”

main
pressuring
nerves? Areoverall
aligns with
there is
product by**Material:**

- Is the material used durable in nature? Is the fabric used soft and natural? Is there use of For pressure compressive bands nylon straps, Velcro?
- **35/35 100% Success**



and

Cost:

- Is the material used and manufacturing technique applied ensures reasonable cost?
- 33/35 **94% Success**
- “I will highly recommend this product to big brands and ADHD medical care providers for immediate deployment”

Safety:

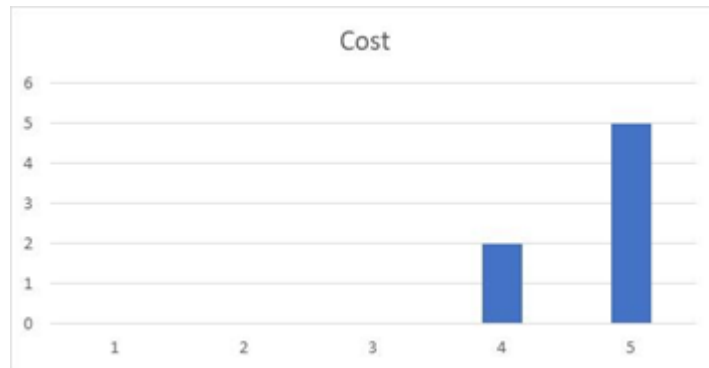
- Are minimum industry standards relating to (i) limitation of use of and other harmful chemicals in clothing; (ii) restrictions and standards for use of drawstring and small parts like buttons, zips; and minimum disclosure requirement followed?
- 35/35 **100% Success**
- “I was eagerly waiting to see the product, after reading about design specifications which included extensive use of vibrators and sensors. Unfortunately, the final product could not include these aspects and I wished that the designer had spent time on researching and planning about this aspect. This key product differentiator was missing and product looked like ones already available in market”

Sustainability:

- Does the product meet sustainability objectives? Is the product made of sustainable material?
- Overall Response: 33/35 **94% Success**

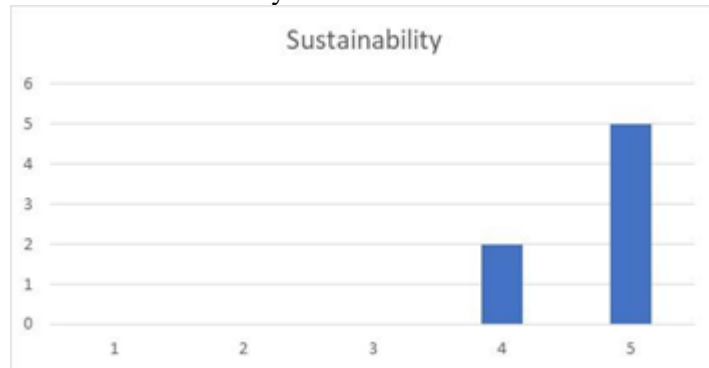
Analysis of third-party survey responses

- Survey collected responses from seven participants, including peers and target audience. Despite limited sample size, insights were gained on different criteria. Notably, feedback on the lack of flexibility to alter weights, from care provider’s experience in real life situations was considered more reliable.
- Satisfactory feedback was received on overall stitching and finishing, with suggestion to consider some form of stitch on the end, as the same were not closed. The product was considered to encourage mobility with easy removal and overall comfort. Feedback on Aesthetics was very high. The product looks simple despite extensive usage of elastic, belts, velcro and weights. The respondents were particularly excited about usage of weights, which is of the most critical design aspects
- Sizing: I could only create one size prototype of the product. Feedback was positive on effective use of elastic, however could not create / seek feedback on having 4 different sizes
- Maintenance was identified as a clear area of improvement primarily to weight being attached rather than detachable. I think a minor design tweak can help address this issue
- Sustainability: I could not source bamboo-based fabric and had to work with cotton. This was reflected in the feedback received with regards environmental aspects of final product



lead

(iii)

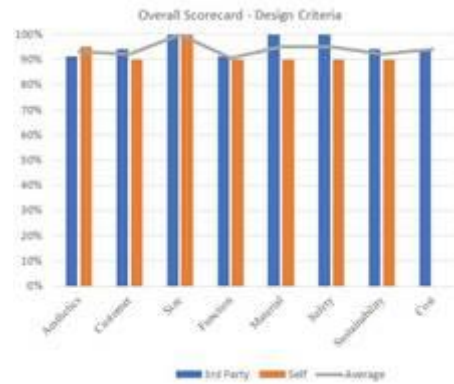
**Self-evaluation of Final Product**

Design Specification	Evaluation						
Aesthetics - Dark Blue Color was used for the hoodie. Colour “Blue” due its calming effects on the mind has emerged as the most popular ADHD-friendly colour - No pattern or print that is visually overwhelming for ADHD children - Texture of the product should be smooth <table border="1"> <tr> <td>SR</td><td>4.75/5(95%)</td></tr> <tr> <td>TPR</td><td>91%</td></tr> <tr> <td>AVG</td><td>93%</td></tr> </table>	SR	4.75/5(95%)	TPR	91%	AVG	93%	- The criteria got near a perfect rating from both third-party and self. The stitches are not visible from outside and there are no lose or moving parts - The product looks simplistic yet stylish. It was ensured that there are no decorative features like buttons, unwanted pockets, or meta/leather straps - I have used white colour elastic for arms and waist to ensure colour is visible on dark blue, but without being overwhelming - One part where I could have improved is open end of straps provided to adjust / tighten the hoodie around waist & belly area
SR	4.75/5(95%)						
TPR	91%						
AVG	93%						
Customer - Minimalistic, Simple Designs - Labels and tags may cause an irritating feeling or a feeling of discomfort for ADHD children - Seams, feels scratchy to hypersensitive children which is distracting or uncomfortable. - Elastic or Velcro to be considered instead of buttons, zippers, or decorative belts	- Product design was modified to address seams by using cushioning material from inside - There were no labels or tags used. In case of commercial application of product, safety information would be printed - Velcro was used instead of buttons for front opening. Elastic used in arms to provide compressed feeling <table border="1"> <tr> <td>SR</td><td>4.5/5(90%)</td></tr> <tr> <td>TPR</td><td>94%</td></tr> <tr> <td>AVG</td><td>92%</td></tr> </table>	SR	4.5/5(90%)	TPR	94%	AVG	92%
SR	4.5/5(90%)						
TPR	94%						
AVG	92%						
Size - Not too tight, flexible with elastic, made of stretchy fabrics with soft cuffs 4 different sizes available (all units in inches), these sizes should be X-small which is (L = shoulder to vest length, W = chest) 14L x 24W, Small which is 17L x 30W, Medium which is 20L x 36W and large which is 24L x 42W - Adjustable straps manually allows the user to tighten or loosen the apparel	- The fitting of final product hoodie is not too tight and made of stretchy fabrics with soft cuffs - Being a prototype I was able to only made one size of the hoodie i.e. X-small. - There are two adjustable straps provided – one on waist and other near stomach area which provided flexibility to use to adjust the fitting <table border="1"> <tr> <td>SR</td><td>5/5 (100%)</td></tr> <tr> <td>TPR</td><td>100%</td></tr> <tr> <td>AVG</td><td>100%</td></tr> </table>	SR	5/5 (100%)	TPR	100%	AVG	100%
SR	5/5 (100%)						
TPR	100%						
AVG	100%						
Function - Compression Clothing: - Fidget-Friendly Clothing: - Weighted jackets can provide “Calmness & Reduced Anxiety” <table border="1"> <tr> <td>SR</td><td>4.5/5(90%)</td></tr> <tr> <td>TPR</td><td>91%</td></tr> <tr> <td>AVG</td><td>91%</td></tr> </table>	SR	4.5/5(90%)	TPR	91%	AVG	91%	- Weight placed on both the shoulders would help increase attention span and reduce hyperactivity. - Weights are placed in a manner as they do not stand out and appear to be stylist part - Fabric used for hoodie is smooth, with very minor texture, which acts as in-builds fidget tools - The hoodie has a large pocket in the front, where the hand could be rested. On inner side of these pockets a special fabric is pasted which would help satisfy fidgety need of ADHD children
SR	4.5/5(90%)						
TPR	91%						
AVG	91%						

Material - Fabric should be carefully chosen to ensure that it is soft and natural. - Durability is another important aspect as ADHB children tend to repeat items of clothing that feel comfortable to them - For pressure and compressive bands nylon straps, velcro and spandex blend fabric could be used, these materials are extremely flexible, durable and provide a high lifespan making them perfect.	- Cotton blend material was used for the hoodie as I could not source natural bamboo fabric - The materials used are durable in nature and easy to handle. While lack of flexibility in weights management, impacts regular washing capability, base material used was as per laid out criteria - I have used Velcro for the front opening of the hoodie instead of buttons. Nylon straps and durable elastic is used keeping in mind durability <table border="1"> <tr> <td>SR</td><td>4.5/5(90%)</td></tr> <tr> <td>TPR</td><td>100%</td></tr> <tr> <td>AVG</td><td>95%</td></tr> </table>	SR	4.5/5(90%)	TPR	100%	AVG	95%
SR	4.5/5(90%)						
TPR	100%						
AVG	95%						
Cost - Affordable: such that local businesses and small NGOS in their starting phases can afford - Rupee 2000 to 5000	Not Applicable for prototype [Since the product has not been manufactured at commercial level, and I lack the proper experience to confidently say my research would lead to an accurate price. Also due to lack of time proper fabric material and weights could not be sourced. Therefore, it cannot be properly evaluated] <table border="1"> <tr> <td>SR</td><td>NA</td></tr> <tr> <td>TPR/AVG</td><td>94%</td></tr> </table>	SR	NA	TPR/AVG	94%		
SR	NA						
TPR/AVG	94%						
Safety - Rules of general children's apparels and market practice includes (i) limitation of use of lead and other harmful chemicals in clothing; (ii) restrictions and standards for use of drawstring and small parts like buttons, zips; and (iii) minimum disclosure requirement. - The apparel would not have any loose attachments like buttons and zip and would rather use elastic and Velcro.	- Blend cotton fabric which was coloured using organic colours was used as base fabric - There are no drawstrings or small parts like buttons, zips. There was extensive use of elastic and Velcro. There is no usage of buttons or zips in the final product. Vibrators were not used in final product considering the safety aspect - This being a prototype safety related information was not imprinted. As the product evolves and developed for commercial usage, printing of safety related information needs to be considered <table border="1"> <tr> <td>SR</td><td>4.5/5 (90%)</td></tr> <tr> <td>TPR</td><td>100%</td></tr> <tr> <td>AVG</td><td>95%</td></tr> </table>	SR	4.5/5 (90%)	TPR	100%	AVG	95%
SR	4.5/5 (90%)						
TPR	100%						
AVG	95%						
Sustainability - Product should be made from sustainable material (organic or biodegradable fabrics) - Clear instructions should be provided on disposal of packaging material and the apparel - Ensured that apparel is durable and capable of being repaired	- The product scores well on usage of durable material and is organised in a manner capable of repairs - Due to the prototype nature of the product and lack of time, packaging material was not created at this stage. - Fabric material used was cotton blend – organic bamboo fabric was not available <table border="1"> <tr> <td>SR</td><td>4.5/5(90%)</td></tr> <tr> <td>TPR</td><td>94%</td></tr> <tr> <td>AVG</td><td>92%</td></tr> </table>	SR	4.5/5(90%)	TPR	94%	AVG	92%
SR	4.5/5(90%)						
TPR	94%						
AVG	92%						

Scorecard: Overall

- Product score (simple average)
- “Design Consideration Scores” average of third-party feedback and self-evaluation
 - Third party feedback average:
 - Self-evaluation average:
- Simple average of above “Design Consideration Scores” to arrive at overall product score
- In real world weightage average is usually applied to assess success rate (weight depending on importance/criticality of design consideration as agreed between Customer and Designer)
- Overall score: **94%**



The product achieves the objective and effectively works through design specification, but does have some areas to be considered from enhancement thereby have tremendous scope to future development

Strengths and Weakness: The Hoodie prototype made by me has a few positives sides, but it also has some potential weaknesses or negatives.

Strengths or positives in final product vis-à-vis design	Weakness or negatives in final product vis-à-vis design
Single Colour “Blue” due its calming effects on the mind has emerged as the most popular ADHD-friendly colour	Unable to source organic material like Bamboo in a short time frame. I was able to use a cotton blend which is smooth and lightweight. I could have also selected a fabric which would be warmer.
There are no tags, as they may cause an irritating feeling or a feeling of discomfort.  Elastic bands used in arms in three places to provide a cosy feeling to the user. No decorative features like buttons, unwanted pockets, or metal/leather straps	The straps used to tighten the hoodie from waist and stomach do not look neat. There is an open end of straps near the buckle which could be a source of distraction. I am considering stitching the ends to join both sides to address this issue. This will ensure availability of straps to adjust without open ends 
 250 grams of weight tactically placed near the shoulders in line with design considerations	 As weights are attached to the final product, it will not be convenient from caregiver to use regular washing technique for the hoodie. Special care would need to be taken during washing
It was ensured that there is no use of lead or any other harmful chemical to artificially soften the material	Flexible weights could not be provided. There was need for specialised machines to makes pockets and create a mechanism whereby weights can be replaced by care provider
Effective use of straps to enable adjustable fitting based on preference of individual	To enhance functionality, I am considering a few additional pockets to store personal items, such as eyeglasses, phones which would improve would improve their independence and convenience

D3 (Future Improvements): Explain how the solution could be improved

Changes I could Make	Justification and Connection to D2	How I could change the product
Pressure / compression in specific areas	Pressure / compression aspect of my final product was highly appreciated by the experts and surveyors. It is possible to make customised hoodies for sports persons with pressure on specific parts like shoulders or arms or chest depending on their specific needs	Alternate application of product in modified form could be for athletics which again have specific needs to strengthen specific muscles / body parts. The apparel could be designed to provide passive relief to a sportsperson preparing for an event or help them passively recover after an intense session.
Neck support and lumbar / poster management	While there are standalone neck pillows and posture management belts which are available in the market, it is possible to popularise the hoodie even among non-ADHD children, but including features which could benefit them. As per expert there is an ever-growing demand for such products amongst people of all age groups.	The product can also be modified to address new age issues emerging from excessive use of digital devices by children. There are increased instances of back pain and strained neck occurring due to spending long hours on the screen. An ADHD clothing would be modified to include a posture maintenance belt or sensor and neck support.
Material & Sustainability: The material used was easily available and met other design considerations on durability and colour	It is critical that all new product designs are made considering the future (positive & negative impact) on our environment. Climate change is a reality and products which are not environment friendly might get push back from both governmental agencies and users. At the product development stage, I decided to use natural cotton blend rather than other natural fibre like bamboo based.	I was not able to source bamboo fiber from any reliable vendor that met other criteria. Bamboo fibre material available online was extremely costly, was not durable and available only in vibrant colours. I would have planned the sourcing better and could have explored other natural alternatives to improve the sustainability appeal of the product
Size: I made only x-small size of the prototype with light weights	Size is an important consideration for everyday usable products like clothing. I have tried to build in some flexibility with use of straps that can be adjusted based on individual comfort. While adjustable fits improved product appeal, balance needs to be achieved between making product complicated to use vis-à-vis flexible size and product cost. Most of my clients are generally satisfied with this aspect of the product.	Detachable sleeve options can be considered in future product development. As mentioned earlier I could have made pockets to place weight which would have made the product flexible for different types of customers. I could have also included a strap near the neck area for children who prefer a polo-neck feel. Ability to adjust the size makes the product score high during cost benefit analysis.
Safety: Considering use by children and have non-standardised features of weights and electronics	This was the most important aspect for me while developing the product and I believe a good job was done for this aspect, though it came at the cost of reduced weights and lack of electronics. While some of the surveyed participant felt that without electronics the product novelty was greatly reduced, however I felt that electronics could not have been used without proper testing	This aspect has been analysed in detail while looking at the function's aspect of my final product. There was a possible scope of having some pockets to provide flexibility on usage of weights without seriously compromising on safety aspects. A basic form of detachable vibrator could be inbuilt to help tackle hyperactivity nature of ADHD children

The customised hoodie for ADHD children made by me has a few positive sides, but it has some potential weaknesses and limitations. I believe that by addressing these weaknesses and limitations, I can create a product that is not only functional, easy to maintain but also cost efficient, has significant user flexibility, and add an element of sustainability

Summary of changes which can be made to the product

- Pockets for weights providing flexibility to alter them
- Compact vibrator on the back / near shoulder area
- Using one of the pure natural fibre-based fabric
- A sensor connected to phone that can provide real-time feedback
- A simple stitch on the end to avoid loose threads around
- Detachable sleeve
- Consider using weighted jellies instead of solid metal-based weights

D4 (Impact Analysis): Explain the impact of the solution on the client/target audience

Impact of the Solution on the Target Audience:

The product created is a perfect balance of using technology to solve the increased number of ADHD cases in an effective way. The Hoodie design is visionary and path-breaking, with ability to have meaningful impact on my target audience i.e. ADHD children and their parents / caregivers.

- *ADHD Children:* (a) I had designed the hoodie without any tags, labels and seams which are usually a primary source of sensory irritant. The reduction in sensory load benefits them with reduced anxiety, improved focus in school and personal activities; (b) My product design has weights & elastic which provides proper fitting along with providing compression feeling to stay claim. They then start feeling part of society which promotes inclusivity; (c) I had carefully selected dark blue colour which is associated with calmness and avoided any print on the fabric. Not being distracted by clothing helps to perform their daily tasks efficiently. With regular use of my product, they will see a positive impact in their academic and professional performance. Lack of overstimulation amongst ADHD children helps them focus on their career; (d) I had taken added care to ensure that the product does not stand out and appear like normal clothing. This addresses concerns about being perceived differently; (e) However my product currently lacks weight customisation as per needs to individual children
- *Parent or caregiver:* Perspective of parent or care given is often neglected while evaluating product, but I believe their view on the product is extremely critical. My product help them with (a) Narrowing down there shopping universe, as without specialised clothing being available, they keep trying different product for their children; (b) ADHD children gaining independence over daily activities like clothing due to simple design, use of Velcro vs buttons/zip, thereby freeing up time; (c) reduces stress and frustration in the mornings as the constant struggle for ADHD children to get dressed-up is no longer present. Further the parent or caregiver feels relaxed on account of lower discomfort of children; (d) the anxiety level for parent or caregiver is reduced as they see their ward has closer to normal life.

Evident from above score, the final product was able to incorporate most of the important design considerations. The product can solve critical issues related to hyperactivity associated with ADHD children by combining (a) availability of new age material; (b) creating out-of-the box clothing design focussed on needs of ADHD children; (c) applying principles of physics associated with weights, its distribution, impact of gravity; and (d) advancement in technology to create customised vibrators and sensors. Final product outcome provides a solution to the original design problem and also enriches overall client experience. The impact of my solution extends beyond socio-economic design consideration.

Societal Impact: The product not only achieves laid-out design goals and addresses all critical customer needs; it also helps achieve

- *Social Impact:* A healthy society is one where all the children get equal opportunity to learn, grow and engage socially with people around them. Historically ADHD children were considered abnormal; however, studies have shown that by reducing sensory overload, these children can lead a normal life. My product helps ADHD children achieve sensory balance due to its simple design and addressing needs of this segment, thereby creating a large social impact.
- *Economic Impact:* Long term there would be benefit to the economy as ADHD children feel more comfortable and interact better with mainstream society. As ADHD clothing becomes popular, this would

encourage a larger number of parents or caregivers to buy the clothing and usage. ADHD children will not feel embarrassed. Increasing the population of ADHD children getting involved with larger society, will significantly improve productivity for the economy. The cost aspect of ADHD clothing needs further efforts as the parent or caregiver needs to source multiple sets of clothing and their regular maintenance in the form of washing and repairing is not friendly. In case of use of electronics the cost of clothing will further increase making it prohibitive. Government should identify ADHD clothing as a viable solution and provide grants for research of viable solutions. As ADHD clothing works on sensory levels and not medical level limited medical research & development has happened in this area

- *Environmental Impact:* The product is non-polluting in nature as the same is made from natural fabric without use of lead or other harmful chemicals. Product is made from durable material due to which it has a long useful life. I was unable to source bamboo based organic fibre, but was still able to base the product on natural cotton blend.

How the impact of the design is going to lead to develop a better prospect in/of the future:

The impact on the target audience is meaningful and the product provides a strong starting point to commercially develop the prototype. There are also some areas of improvement in the product, including:

- *Weight customisation:* The original product plan was to have smart pockets for weights which would enable individual customisation as per needs, however this could be incorporated at this stage.
- *Use of electronics:* I also explored incorporating vibrators and sensors in the product which would enable relief or reduce hyperactivity and along with providing regular health updates to parents or care given. Safety is the most important aspect while building this feature as use of batteries increases the risk of heating or other forms of accidents
- *Pressure / compression in specific areas:* Alternate application of product in modified form could be for athletics which again have specific needs to strengthen specific muscles / body parts.
- *Neck support and lumbar / posture management*

Unique Solution: The product is unique in ways that it provides an economic option, which could be further enhanced by building flexibility to customize weights to suit individual needs. The product has the capability to be widely deployed and address some of the concerns raised by the target audience at assessment stage. The product has achieved the right balance between use of technology vs easy & safe to operate vs product cost as compared to alternate products currently available in the market.