

Hwa Chong Institution

Project Work

Category 3 Inventor's Log

Title of Project: Project E.A.T.
Group Number: 3-15
Group Members: 1) Liew Yu Heng (L) 2) Cheng Wei Lih (M) 3) Kurtis Lee Tze Heng (M)

1. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want brainstorm for problems using different approaches eg thematic, survey or general brainstorming etc.

1 A Document a list of problems you have identified. Your documentation should show clearly how your group came up with the problems.

We wanted to solve a problem which was common for the elderly. So, we came up with a few problems, which were Health, Mobility and Lifting. These problems jumped out at us when we tried to empathise with the elderly.

1 B You should have selected a problem based on some considerations. Identify and justify these considerations.

First, as we mentioned, our focus was on problems commonly faced by the elderly. Thus, we had 3 criteria to select the “best” problem. The criteria were Feasibility, Severity and Need For A Solution.

1 C List some problems your group would like to solve. List also the considerations for selection of problem in the evaluation grid below. Score the considerations, against the problems, with points 1 (least significant) to 4 (most significant). Sum up the total points for each problem. Identify that problem you would like to solve.

Problem Evaluation Grid

*add more columns and rows where necessary

Considerations for Selection	Problems			
	Health	Mobility	Lifting	
Feasibility	2	4	4	
Severity	4	3	3	
Need For A Solution	4	2	4	
Total Score	10	9	11	

2. Define the Problem

(This is one...)

Now that the problem has been identified. It is important to gather information on the extent of the problem and/or evaluate the usefulness of existing solutions based on *some criteria*. You may need to conduct surveys and research on existing solutions.

2 A Extent of problem (Research and discuss the problem and write down the problem statement)

Lifting selected items from shelves

1. Do-able
2. Not many existing solutions
3. Most existing solutions do not solve the problem fully
4. May cause health problems such as backache

2 B Compare and contrast the existing or similar solutions.

Existing solution: TROLLevate by NTU

Pros

- Newly-designed Platform
 - Can be elevated to lift heavy groceries
 - No need to bend over
- Pedal
 - Elevate groceries to top of trolley
 - Easy transferring of groceries
- Reduces the risk of back injury and strain
- Lifts heavy items easily when they are in the trolley

Cons

- Does not help the user with inaccessible items on shelves
- Does not provide any aid to the user in picking up the heavy item in the first place

Existing solution: Elderly Friendly Trolley (TP)

Pros

- Extra plank for items
 - Before item retrieval
 - Spring under the board
 - Plank brings items to top of trolley
 - After item retrieval
 - Spring back to original position
 - Items brought back to bottom

- Reduces the risk of back injury and strain
- Lifts heavy items easily when they are in the trolley

Cons

- Does not help the user with inaccessible items on shelves
- Does not provide any aid to the user in picking up the heavy item in the first place

3. Your BIG IDEA[#]

(Developing the idea....)

Write down your proposed invention and why you want to do it. State also how you think your proposed invention is better.

3 A Describe your proposed invention.

Our invention is an elderly assistance trolley, or E.A.T. for short. With a mechanical arm powered by hydraulic pumps, our invention can take items from high and low shelves even if they are heavy, holding and dropping them when controlled by the arm.

3 B Explain the purpose of your proposed invention and the potential benefits to users.

Our invention aims to solve the problem of lifting heavy things and furthermore from high and low shelves in supermarkets, whether for children or the elderly. This means that they can avoid getting health problems such as backache when bending down to pick up items and this problem may become more common if they spend more time stooping to grab heavy items.

3 C In what ways would your proposed invention be different and/or better than existing solutions, if any?

Many of the existing solutions aim to solve just one aspect of lifting items. We aim to create a trolley that solves all of these problems.

3 D What are some problems you expect in the course of your proposed invention?

A possible challenge we might face is the need to get the materials quickly enough to have time to assemble the components and ensure their functionality. As we have less than half a year to gather the materials necessary to build each prototype before the final product, the deadline is quite difficult to meet and thus we must start earlier.

3 E What and when are the major milestone (project timeline) in your invention?

12 June - Completion of Claw

13 June - Completion of Arm

17 June - Attaching Claw to Arm

5 Aug - Arm 2.0 (Rebuilt Arm)

5 Aug - Attached arm to base

5 Aug - Created supporters

6 Aug - Added reinforcement beams and alignment beams

#must be able to be constructed based on current / emerging technologies, must not violate the laws of Science or go against the laws of nature.

4. Construction or Modelling Process*

(This first... then that...)

You are now onto the fabrication of your prototype/ product. You need to select material and understand how to put them together so that your prototype/ product can perform its function.

4 A Explain how and why the materials were chosen for the prototype/ product of your invention

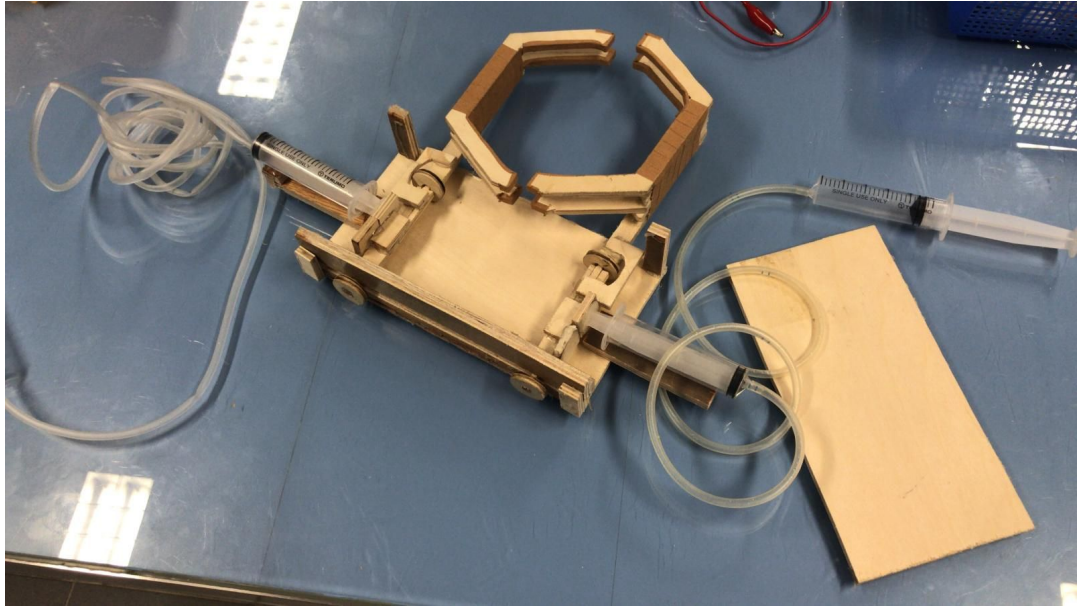
For the first prototype, we decided to use wood as the base for the boards as we decided that building a model with cardboard was unnecessary and would only hinder us from reaching the completion of our final product as it was an extra step. Syringes, tubes and water were used as our propelling system to push the claws together as we are attempting to use a hydraulic pump system instead of wasting electricity. Water was used instead of air because it is not able to be compressed and would thus push the claws more effectively, unlike air which would be compressed and thus less effective. We used glue instead of nails as glue can be applied to specific spots where nails may not be able to fasten, and also because glue is lighter than nails.

4 B Explore these considerations that may guide the construction of your prototype/ product.

As we used wood for the construction of the prototype, we knew that the prototype could not be too bulky, and we took into consideration the weight of the various parts of the prototype, as the syringes may not have enough power to move the pieces if the pieces were too heavy. We also took into consideration that the weight of the wood may cause misalignment in the moving parts, and as such, we designed rails within the prototype for the moving parts to follow, preventing them from being accidentally jostled out of position.

4 C Document the prototype/ product development stages. You may use drawings, photographs or videos.

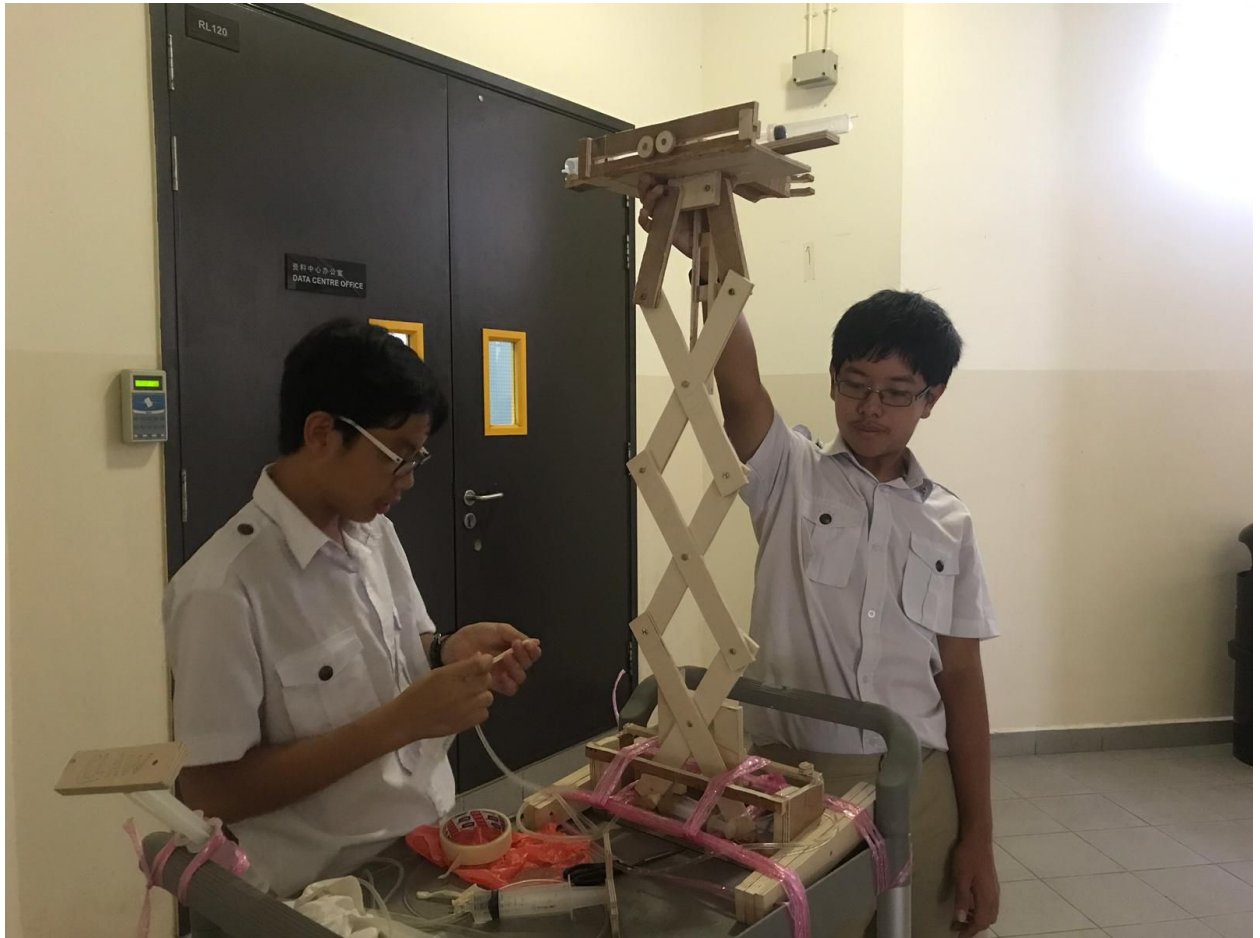
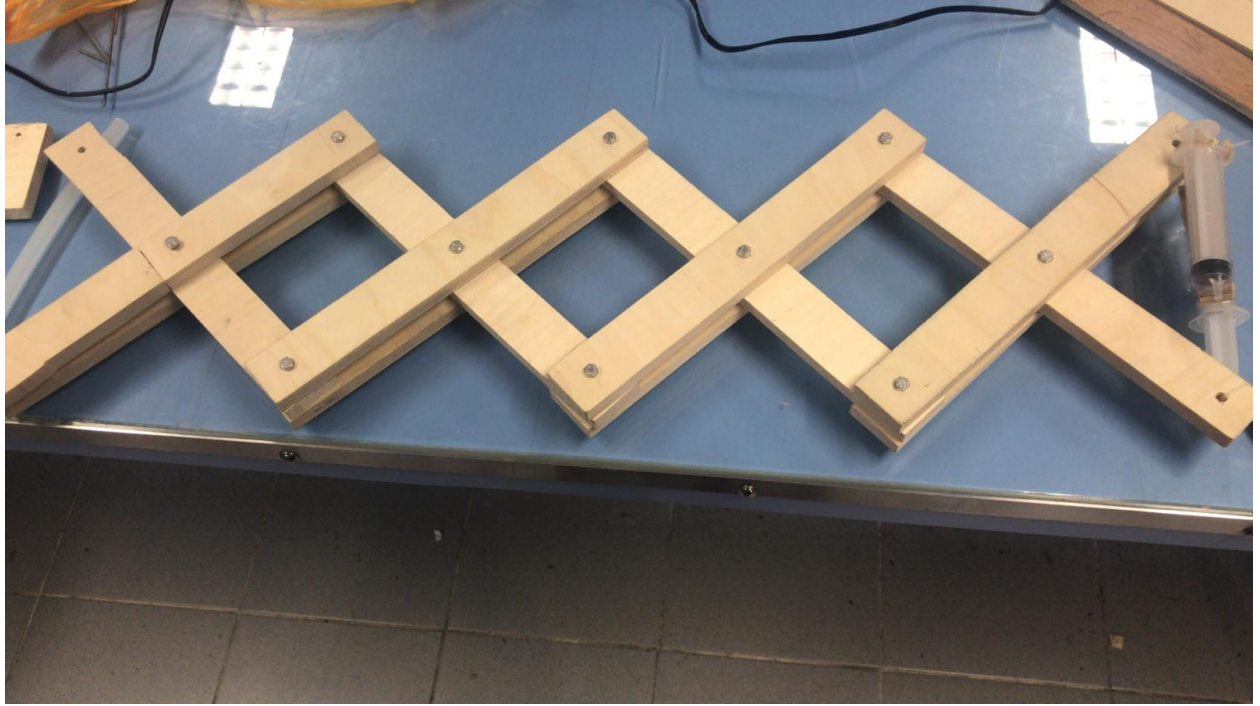
First prototype (claw)



First prototype (arm when closed)



First prototype (arm when open)



Completed version (Attached together)

OR

If construction of the prototype is not possible, then you have to create an animation / as a proof of concept that it can be applied in a bigger scale.

4A Explain why construction of a prototype is not possible and the proof of concept is needed in your case.

NIL

4B Briefly explain how the video / animation can effectively show how your invention will work and the different considerations.

NIL

Warning:

- *Video / animated simulation only if prototyping is absolutely no possible.*
- *Video / animated simulation must be logical and convincing that the invention works.*
- *Constraints must be clearly included in the logbook or the project will be heavily penalized.*

5. Modification and Evaluation

Upon the completion of your prototype/ product, you would need to see if it is working the way you want it to work. Check if your product has met the identified purpose and the user's need; and implement necessary modifications and improvements. This process may take several rounds.

5 A Write down your prototype/ product test criteria and check against it if it works. Identify areas of weakness for modification. Indicate the test iteration and date of test.

Test Iteration: 1(18 June)	Tick			Remarks
	Pass	Fail	Potential Failure	
Test Date:				
Durability			/ √	

				<ul style="list-style-type: none"> Area where syringes are held on the claw can be displaced with sufficient force; slightly fragile
Stability			/ V	<ul style="list-style-type: none"> Arm could tip over when displaced with enough force (v1.0 and v2.0)
Functionality	/ V			

*Add more rows for more criteria

** Repeat table for next test iteration

OR if you are creating an animation / video to show how your invention will work, write down the different possibilities / outcomes (success or failure) if a full-scale prototype is to be constructed.

NIL

6. References

Read <http://www.bibme.org/citation-guide/apa/> on how to cite references.

6 A Cite the references you have used for your project work. Your source of reference should come from different types (eg books, magazine, websites, journal articles, interview, photographs, product brochure, reviews etc.)

- https://eps.ntu.edu.sg/client/en_US/maceid/search/detailnonmodal?rw=264&d=ent%3A%2F%2FSD_ASSET%2F0%2F16712~~0&te=ASSET&isd=true

- <https://www.tp.edu.sg/staticfiles/TP/files/school/eng/achievements/Elderly%20Friendly%20Trolley.doc>
- https://www.cdc.gov/arthritis/data_statistics/arthritis-related-stats.htm#obesity