

Design for elderly : for safer and easier cooking

Design project II

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Coming up

- Introduction
- The brief
- Initial research and user study
- Insights
- Exploration and concepts
- Test rig
- User feedback
- Considerations
- Final concept
- Future scope

Introduction: Elderly in India

- > 60 years of age
- 98 million in 2011
- expected to double by 2030
- likely to reach 320 million by 2050

Project brief

- To design a kitchen for cooking purpose which is safe and easily operable / accessible by the elderly between 60-75 years of age

Deliverables

- Identification of an area in the kitchen for design intervention
- Development of a concept
- 1:1 mock up for user testing

Scope

- User
 - Age : 60-75 years
 - Health: ambulatory, can work without assistance
 - Finances: able to buy or renovate a kitchen
- Environment
 - Food preparation area in the kitchen
- Cuisine
 - Coastal Maharashtrian and Goan

The research

Insights from existing research:

“The results of this study show that the kitchen is the most hazardous place, followed by the bathroom, living room and bedroom.”

Home safety of elderly in rental flats.

– Pauline Ai Leen.Ang

Article

Sept 2014

The research

Insights from existing research:

“objects stored in wall cabinets higher than 600 mm are accessed with difficulty and therefore a version of kitchen furniture with deeper worktops and cabinets positioned on the worktops is recommended if room size enables such a solution”

Ergonomic suitability of kitchen furniture regarding height accessibility

By: J. Hrovatin, P. Silvana, D. Ravnik, L. Oblack

Collegium antropologicum

April 2015

The research

Insights from existing research:

“It is observed that the resulting relational model of the paths between the main work areas of the kitchen describes a triangle between storage, preparation with cleaning and the cooking area. This represents the three points of the kitchen work triangle”

An inclusive approach for home environment design

– M. Mengoni, S. Ceccacci, D. Raponi

Conference paper

Sept 2014

The research

Types of kitchen layouts:

I shaped kitchen

- one wall galley
- one of the cheapest

Pros

- ease of access
- small footprint

Cons

- less storage and countertop space

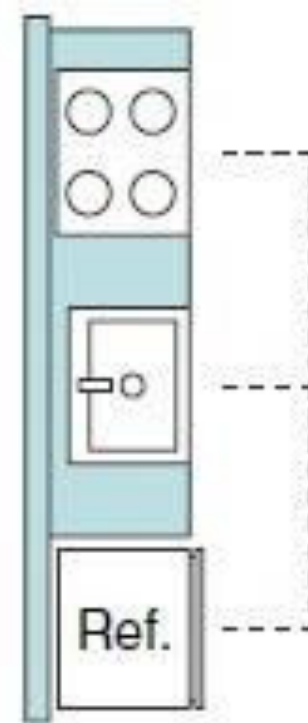


Image source: <http://inspectapedia.com/BestPractices/Figure6-10.jpg>

The research

Types of kitchen layouts:

Galley kitchen

- multiple storage areas on both sides

Pros

- one of the best space savers
- Easy to adapt for multiple work spaces

Cons

- no seating space
- congested when drawers are opened

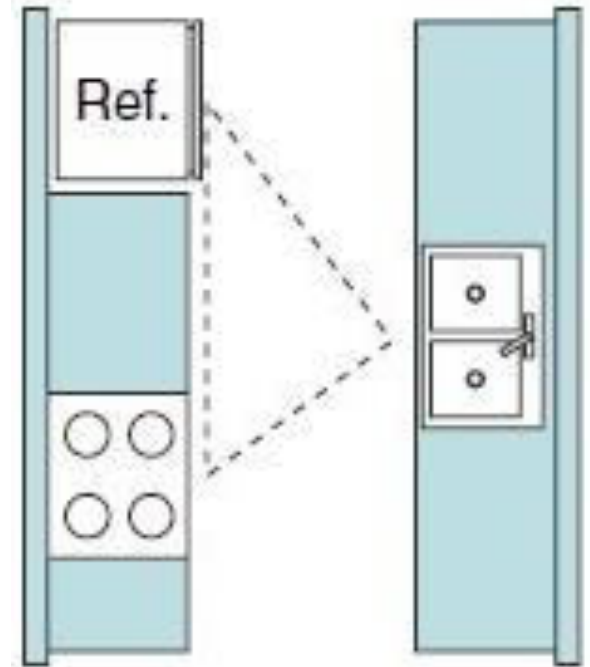


Image source: <http://inspectapedia.com/BestPractices/Figure6-10.jpg>

The research

Types of kitchen layouts:

L shaped kitchen

- one of the most popular layouts
- often paired with an island

Pros

- Allows a tight work triangle
- Easy to adapt for multiple work spaces

Cons

- corner space can be difficult to reach

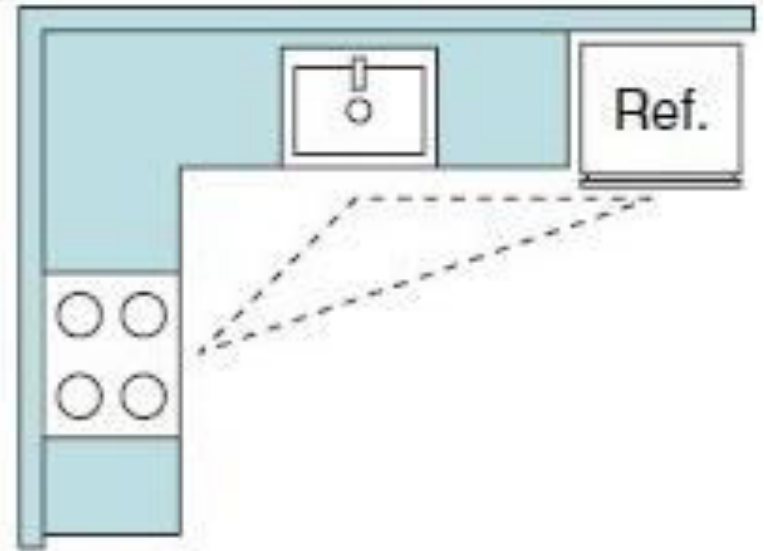


Image source: <http://inspectapedia.com/BestPractices/Figure6-10.jpg>

The research

Types of kitchen layouts:

U shaped kitchen

- maximum space
- often paired with an island

Pros

- enables efficient workflow
- allows easy movement

Cons

- corner space can be difficult to reach

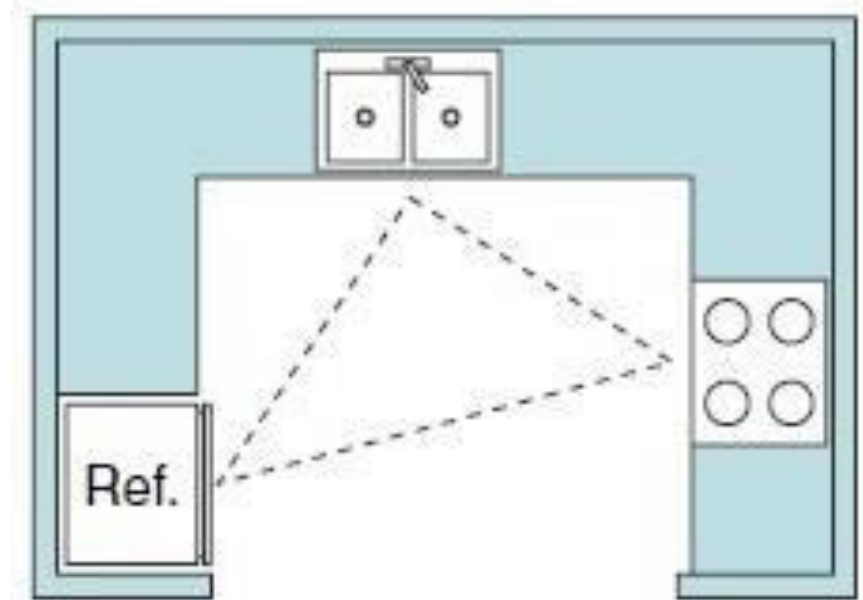


Image source: <http://inspectapedia.com/BestPractices/Figure6-10.jpg>

The research

Existing kitchen concepts for the elderly



Image source: <https://www.pinterest.com>

The research

Existing kitchen concepts for the elderly



Image source: konkanifoodie.blogspot.com



Image source: <http://www.pepperfry.com/>



Image source: <http://www.pankaj-boutique.com>



Image source: <http://www.tradeindia.com>

The research

Changes due to ageing which affect cooking

- Loss of muscle strength and mass
- Bones become weaker and spine changes, resulting in loss of height by 1 to 3 inches
- Ligaments lose flexibility making joints stiff
- Ageing heart is less able to tolerate heavy workloads
- Eyesight is affected, especially depth perception and ability to see well in dimly lit areas
- Hearing high pitched sounds becomes difficult
- Deterioration of memory
- Ability to smell starts diminishing

The research

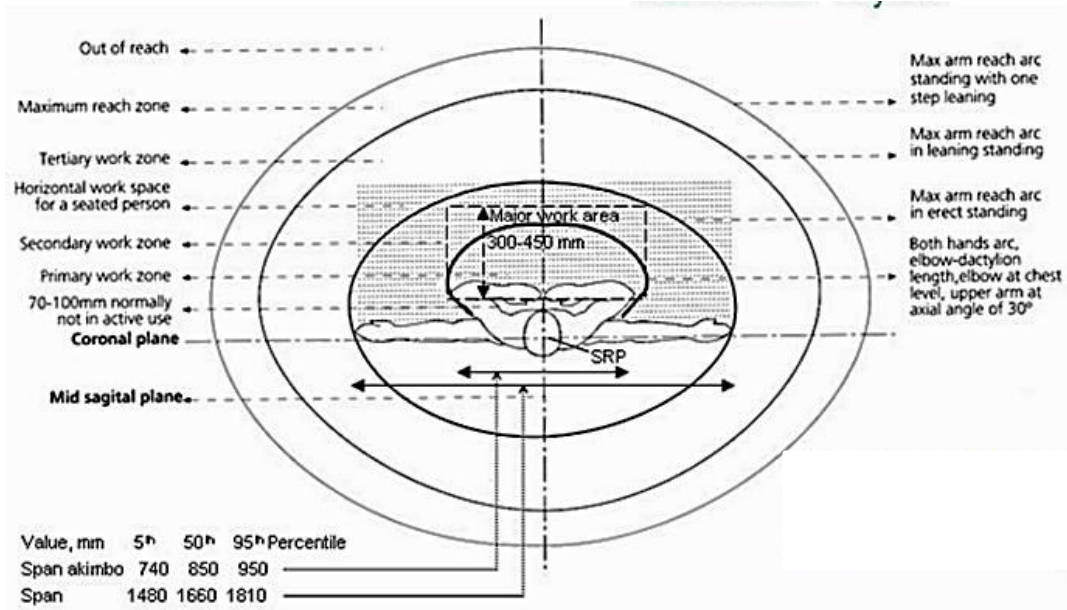
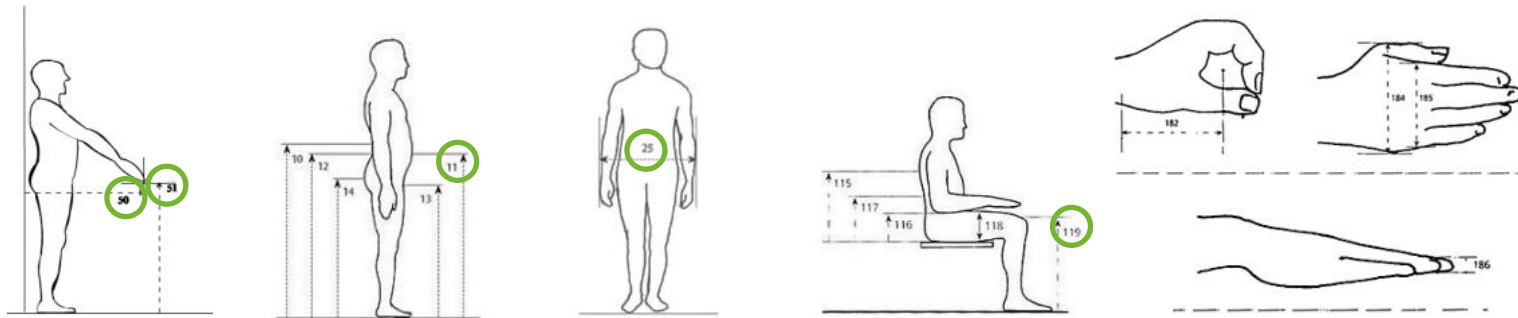


Image source: <http://iitg.vlab.co.in/>

The research

R.No.	Parameters		Min	Percentiles					Max	Mean	±SD	Ratio
				5th	25th	50th	75th	95th				
10	Elbow	Male	791	945	1003	1039	1072	1123	1405	1038	56	0.63
		Female	808	879	923	953	989	1039	1202	956	50	0.63
		Combined	791	908	970	1022	1061	1115	1405	1018	65	0.63
11	Abdominal extension	Male	795	925	977	1015	1050	1110	1345	1016	59	0.62
		Female	813	829	857	900	942	1019	1155	908	62	0.59
		Combined	795	881	965	1009	1047	1109	1345	1005	67	0.61
25	Maximum body breadth (relaxed)	Male	364	415	459	503	549	619	795	509	68	0.31
		Female	371	391	422	469	519	599	700	477	65	0.31
		Combined	364	405	499	494	539	619	795	502	69	0.31
50	Lower position length	Male	340	419	529	599	659	769	1030	597	102	0.36
		Female	495	519	579	659	694	809	850	644	82	0.42
		Combined	340	439	539	609	669	769	1030	607	100	0.38
51	Lower position height	Male	510	659	729	779	839	939	1100	788	89	0.48
		Female	560	619	719	769	819	889	950	765	81	0.5
		Combined	510	649	719	779	839	939	1100	784	88	0.48
119	Knee	Male	438	472	497	519	539	567	612	520	30	0.32
		Female	412	440	462	484	499	520	578	483	28	0.32
		Combined	412	456	489	509	534	563	612	511	33	0.32

Image source: <http://iitg.vlab.co.in/>

The research

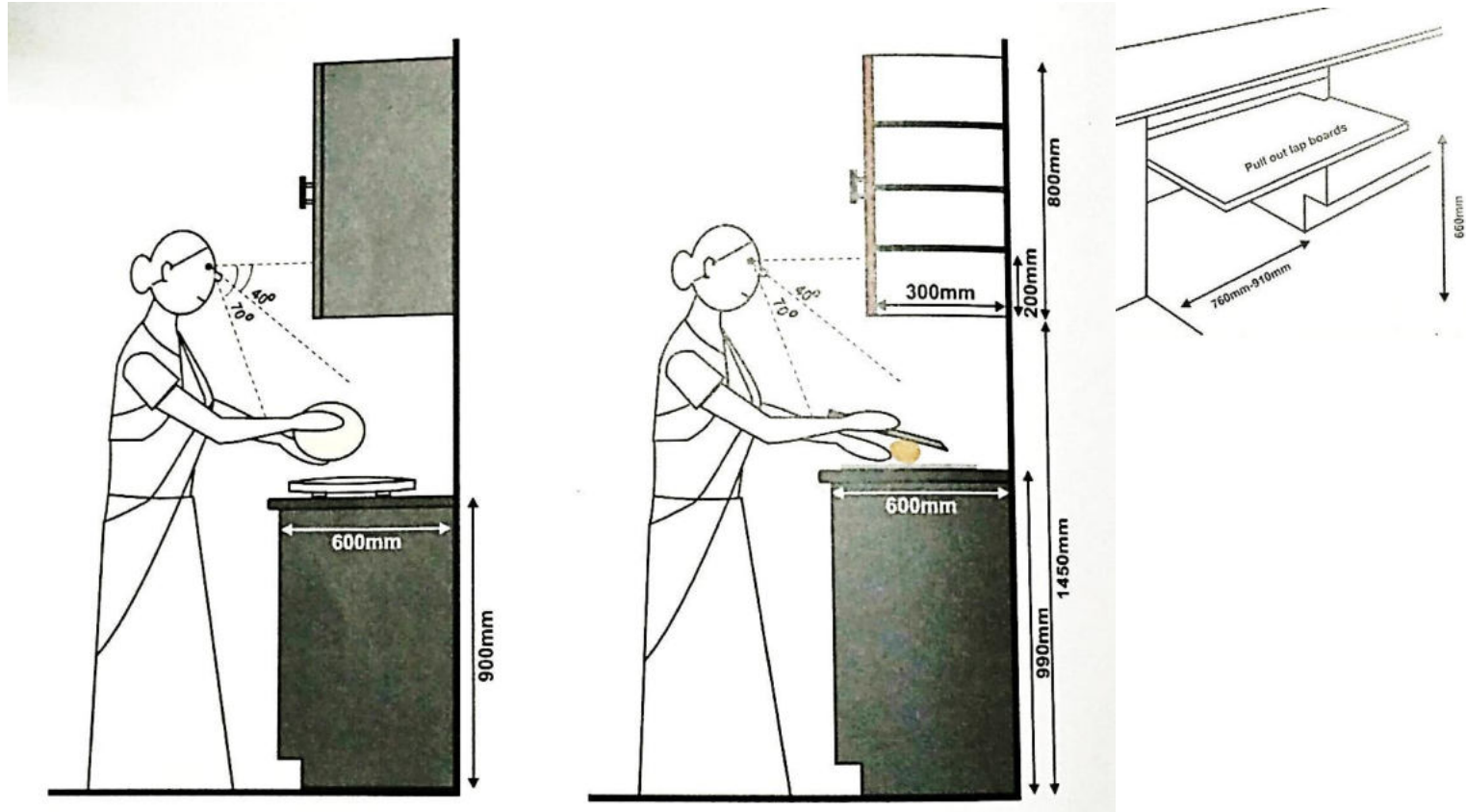


Image source: "Residential Interior Design for the Elderly", By Lavanya Bachwal & Gaur G. Ray, 2010

User study



User study



Insights

- Preferred location for preparation is as close to the stove as possible
 - Mobility issues
 - Lack of dedicated space for these activities
 - Existing counter top space is cluttered



Insights

- Preferred use of traditional blade (aadoli/vili)
 - Used for cutting vegetables, grating coconuts, chopping meat and cleaning of fish
 - Have to sit on the ground to use the tool
 - Sitting or getting up is painful



Issues

- Need for dedicated food preparation space
- Minimising need for frequent change in posture
- Using existing skill set with traditional kitchen tools
- Counters at different heights based on the activity

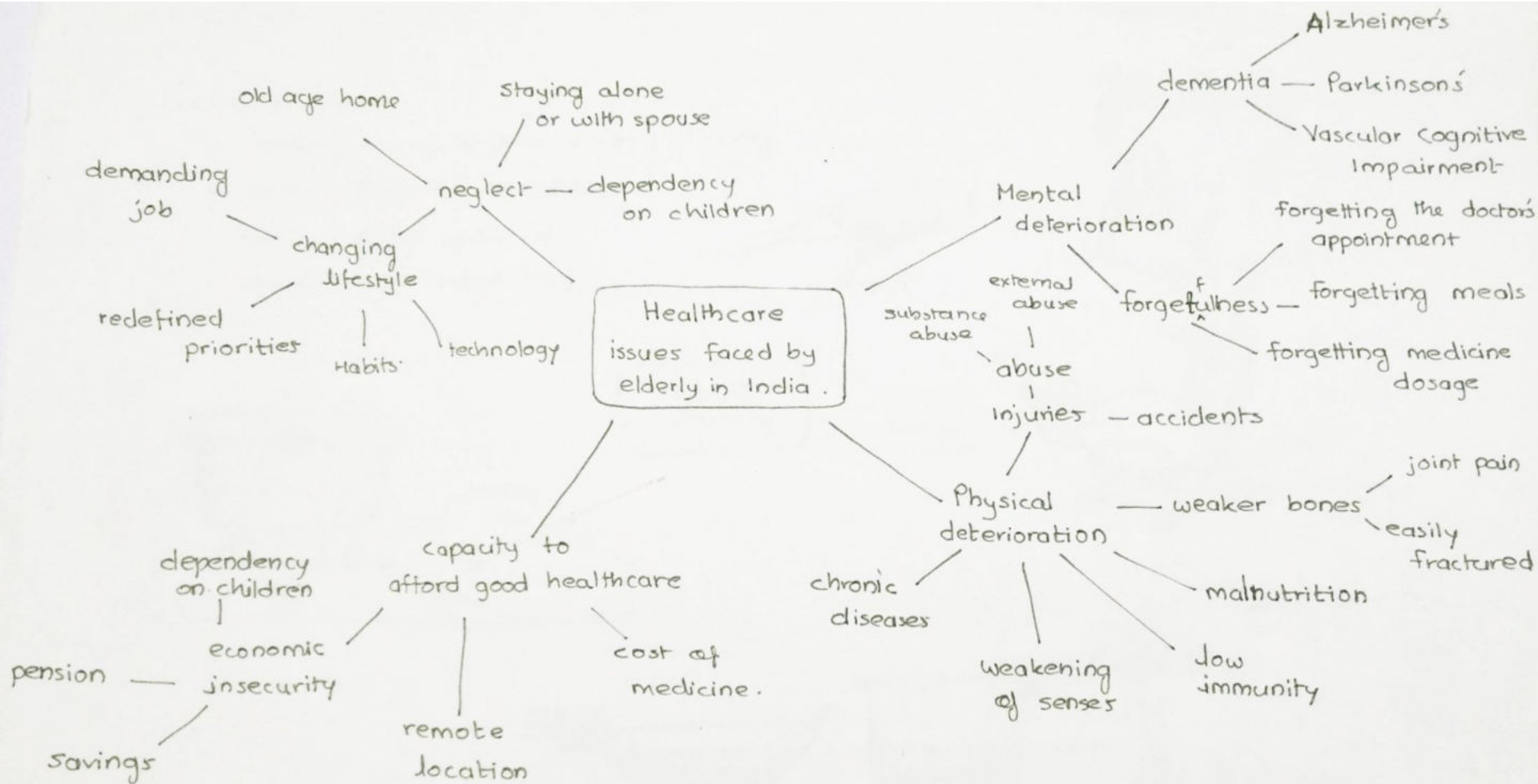
Issues

- Need for a bin near food preparation area
- Need for brighter environment due to poor eyesight
- Frequently needed tools should be within reach
- Need of an independent cutting board

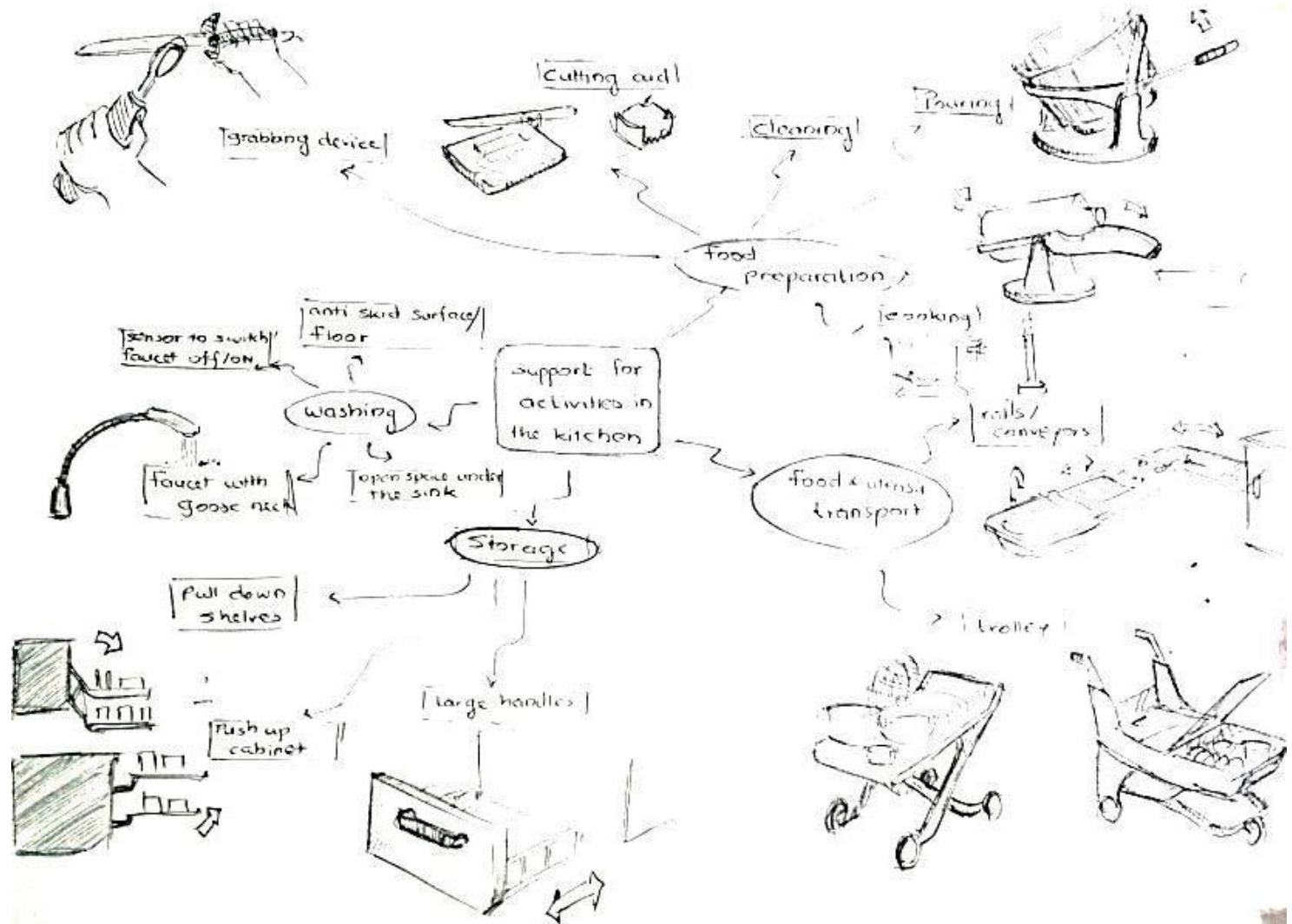
Activities considered

- Grating the coconut
- Cleaning fish
- Cutting meat
- Cutting vegetables
- Kneading dough
- Making rotis

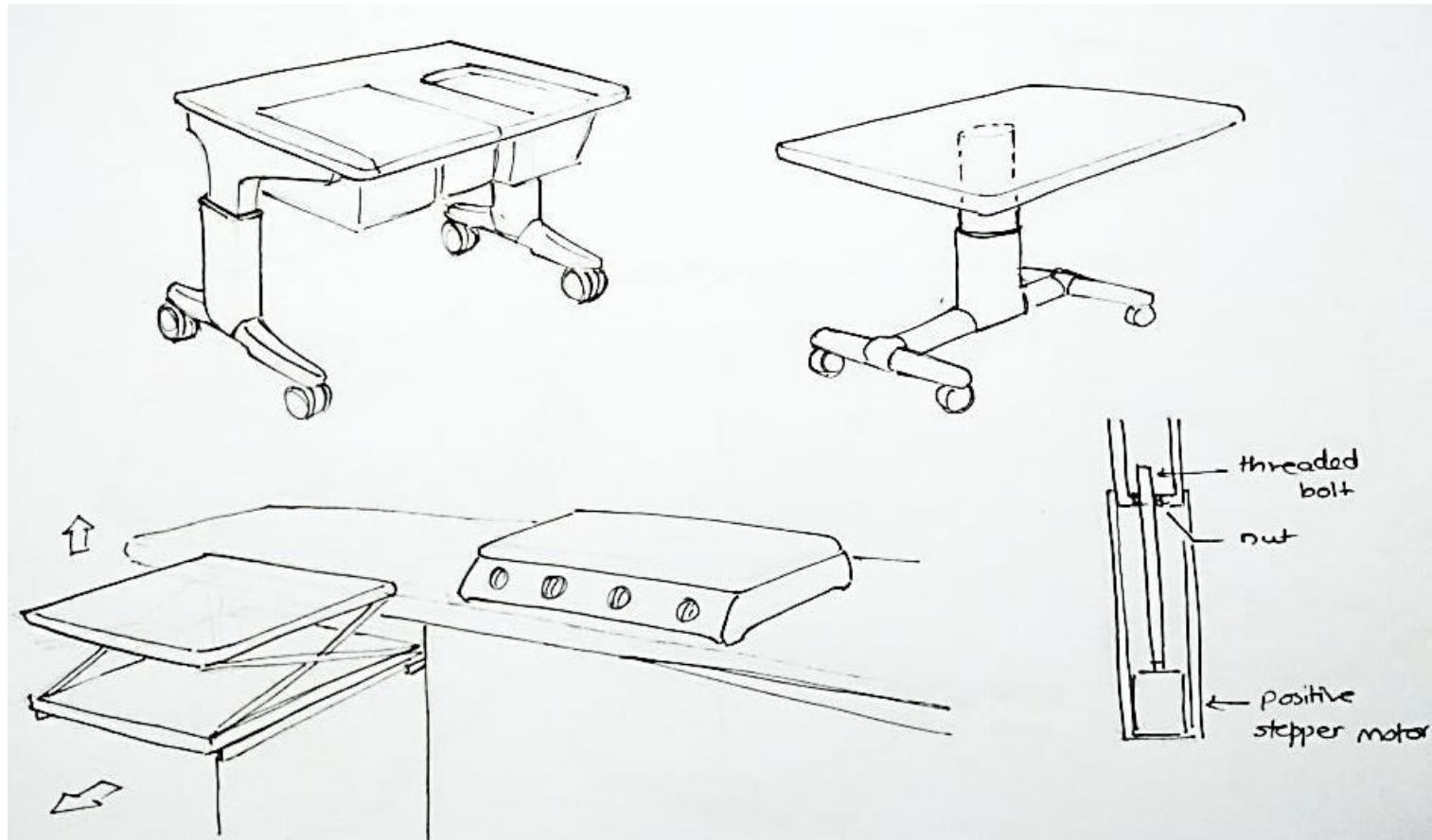
Exploration



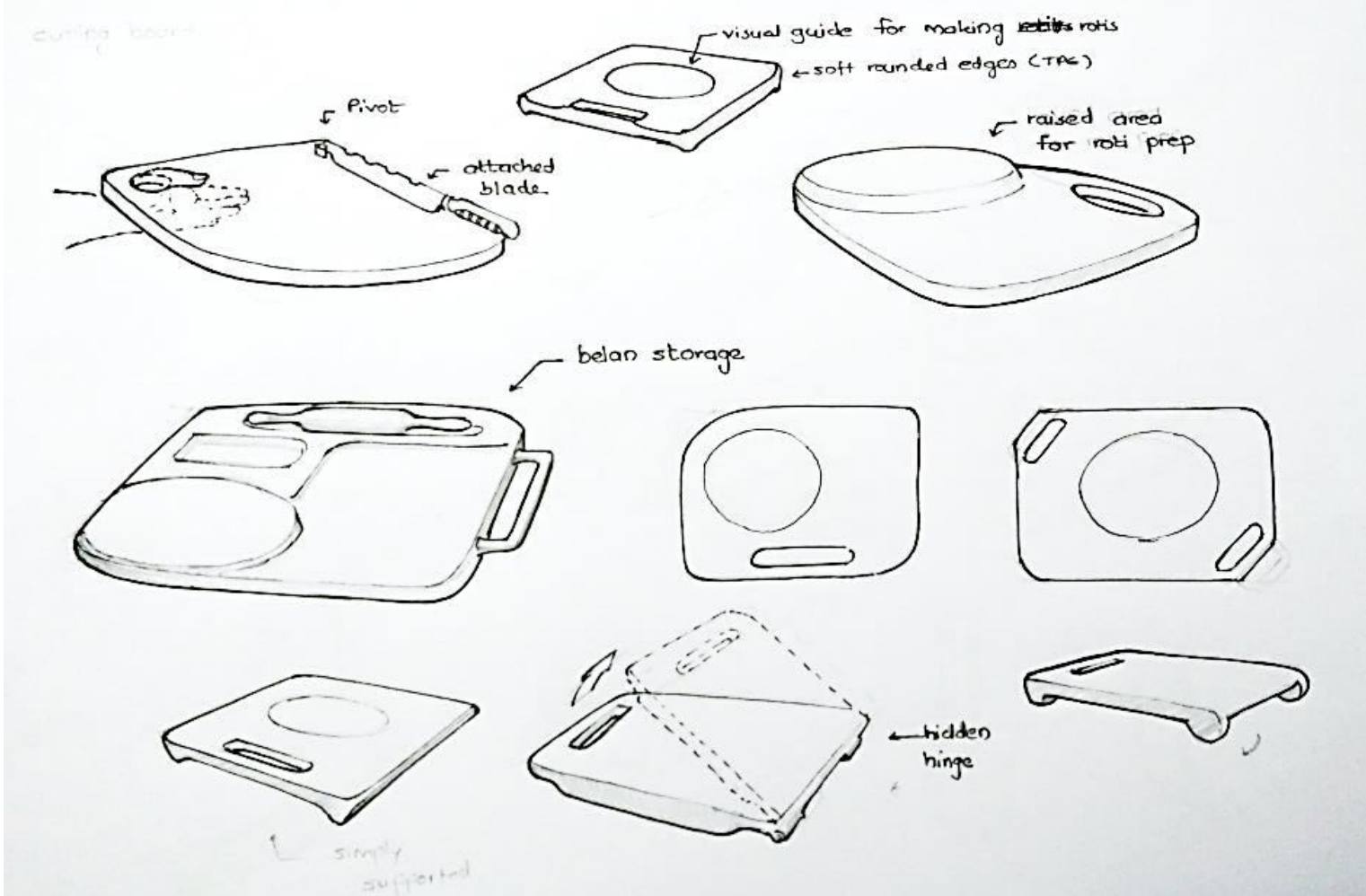
Exploration



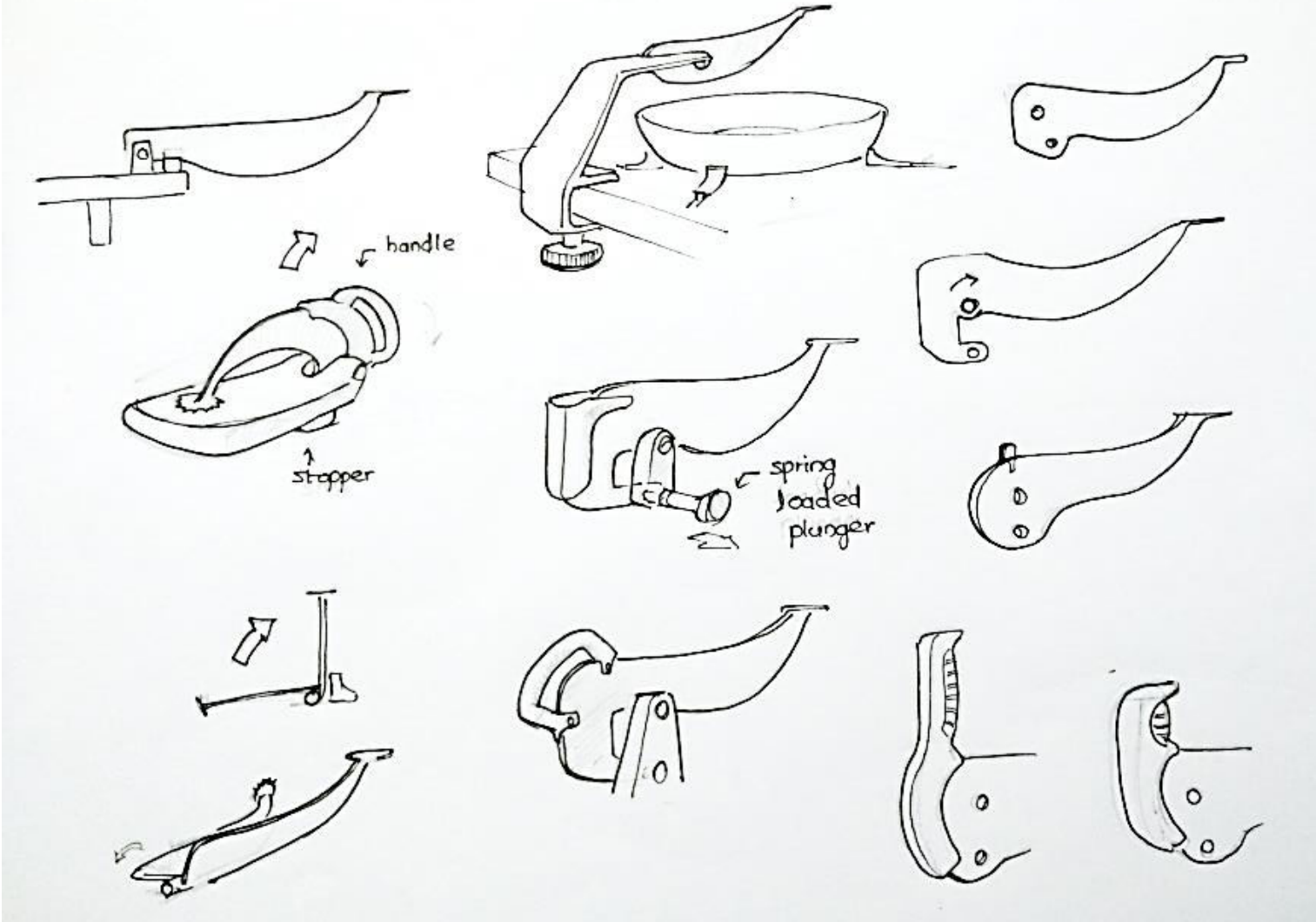
Exploration



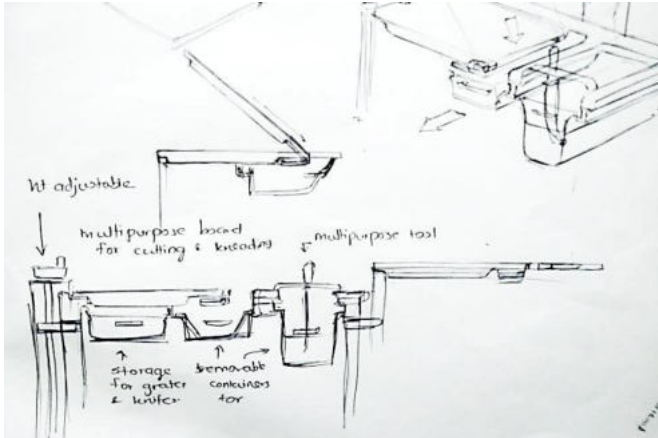
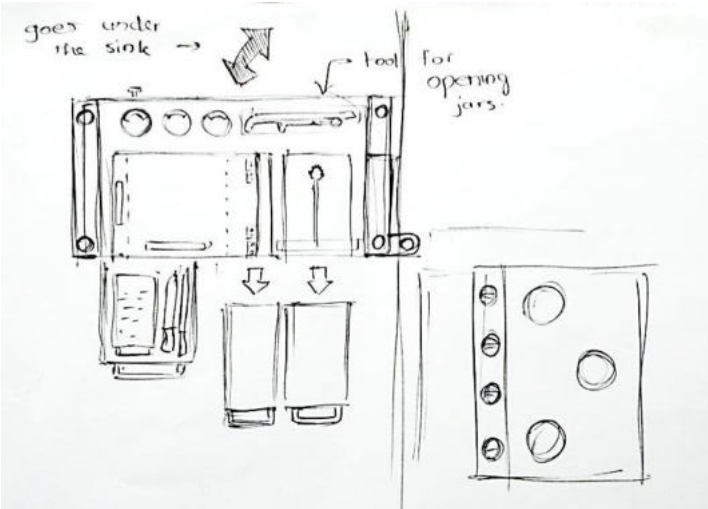
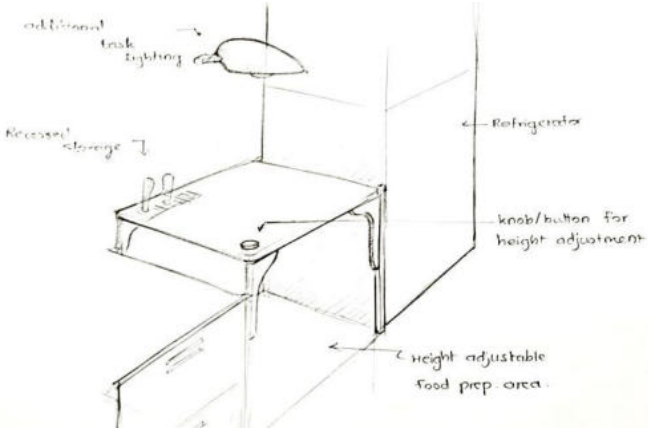
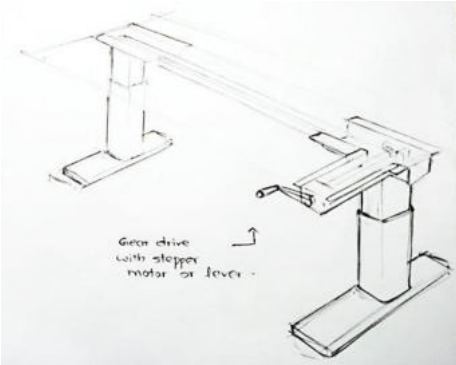
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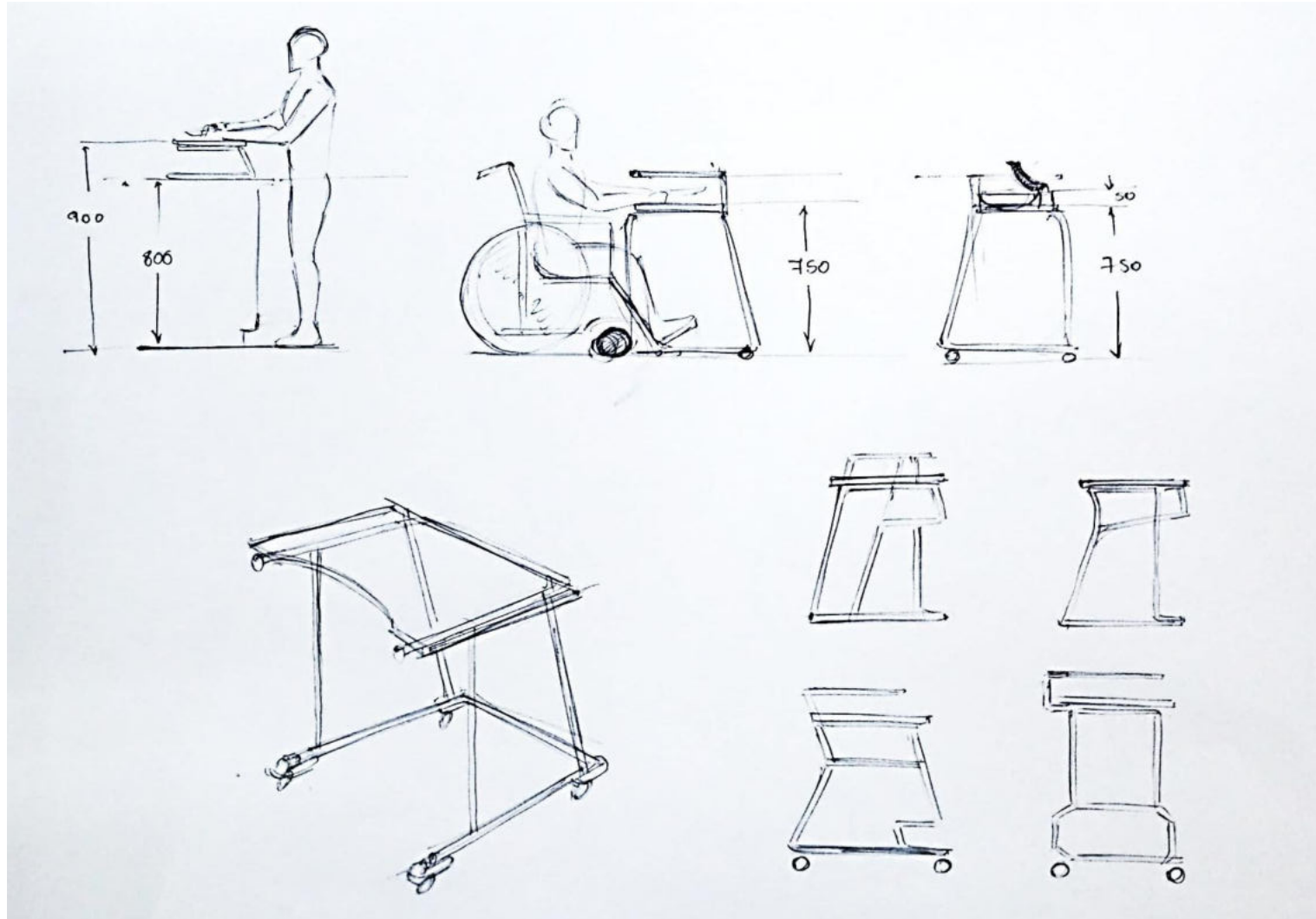
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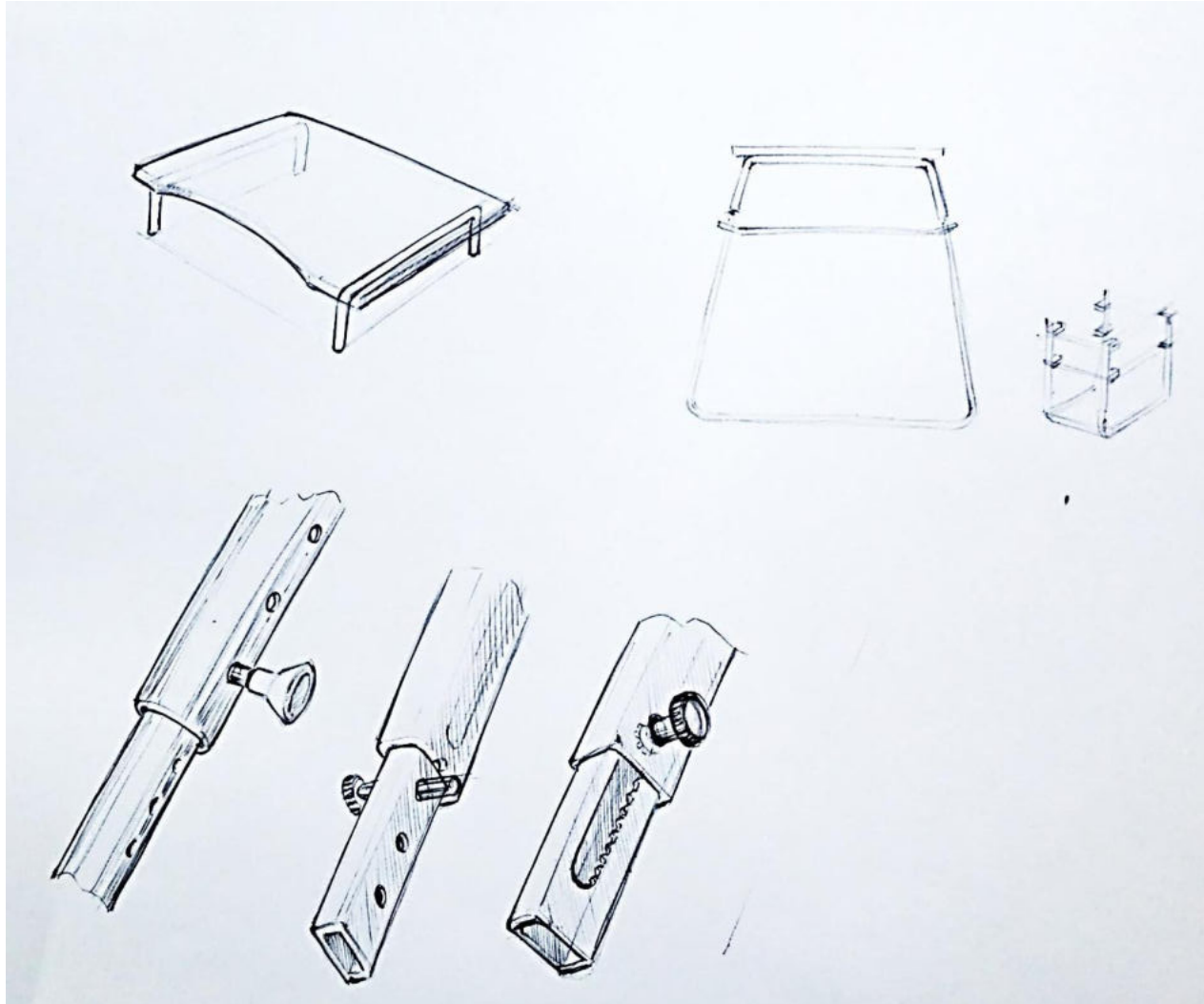
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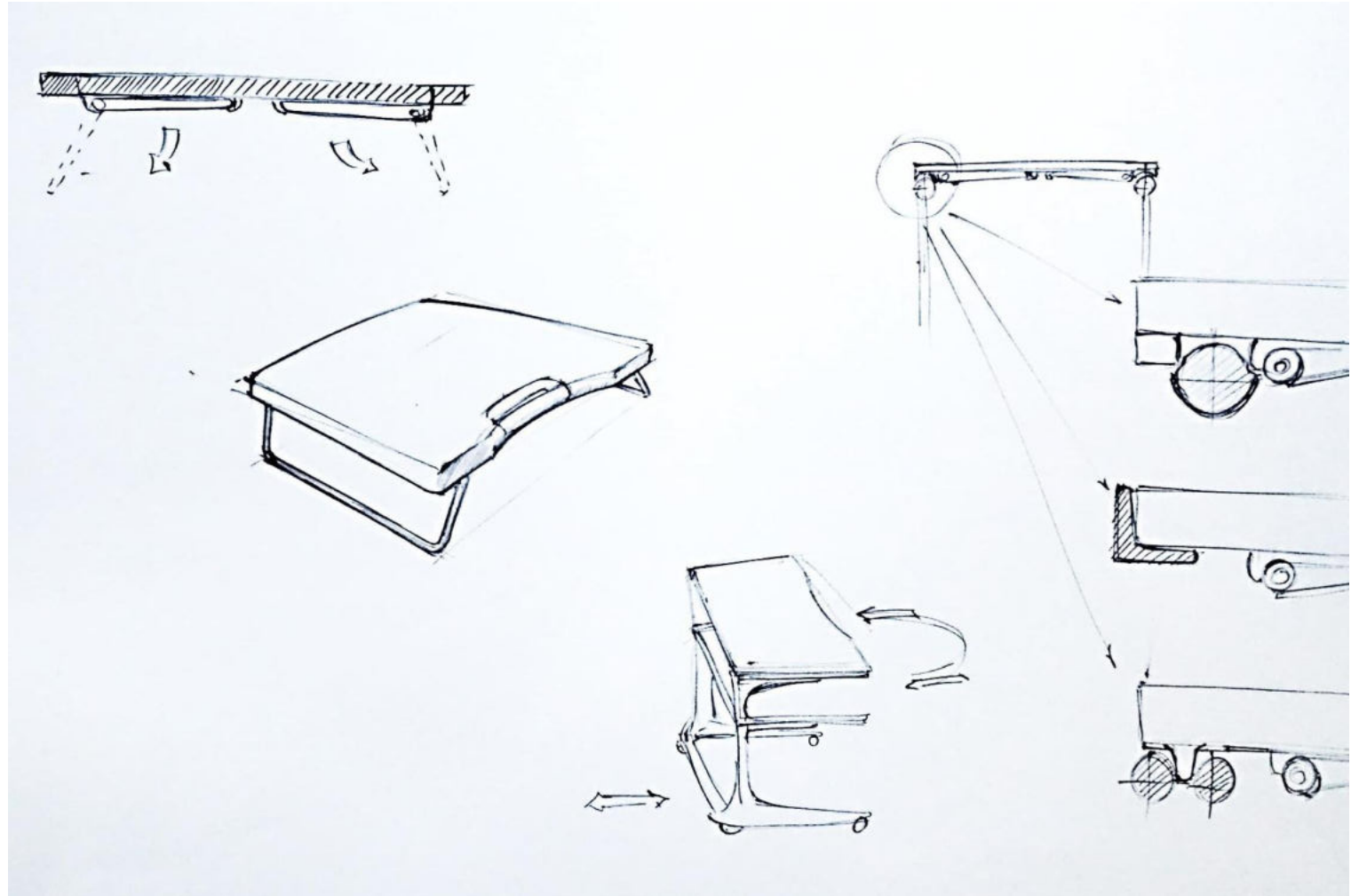
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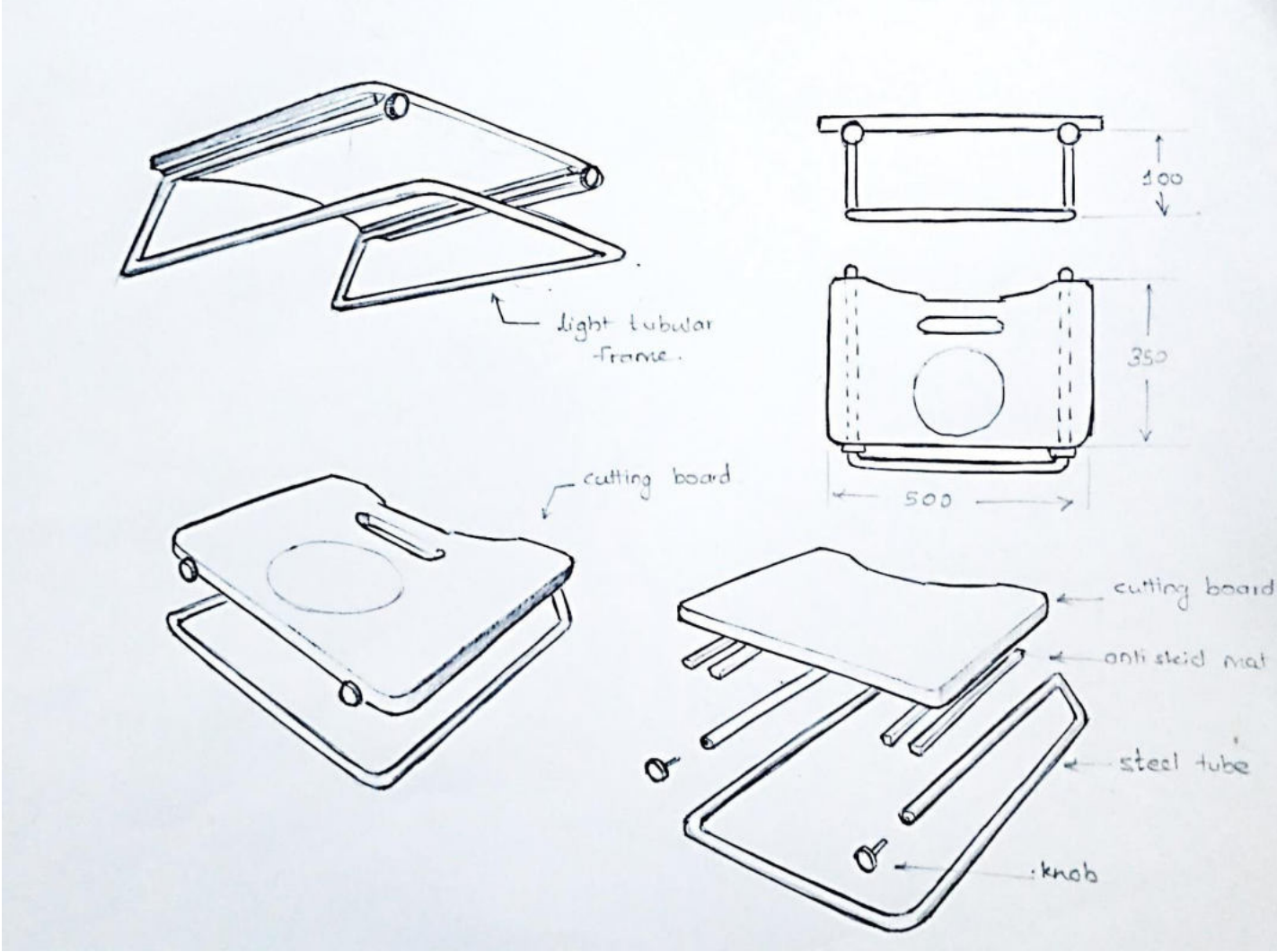
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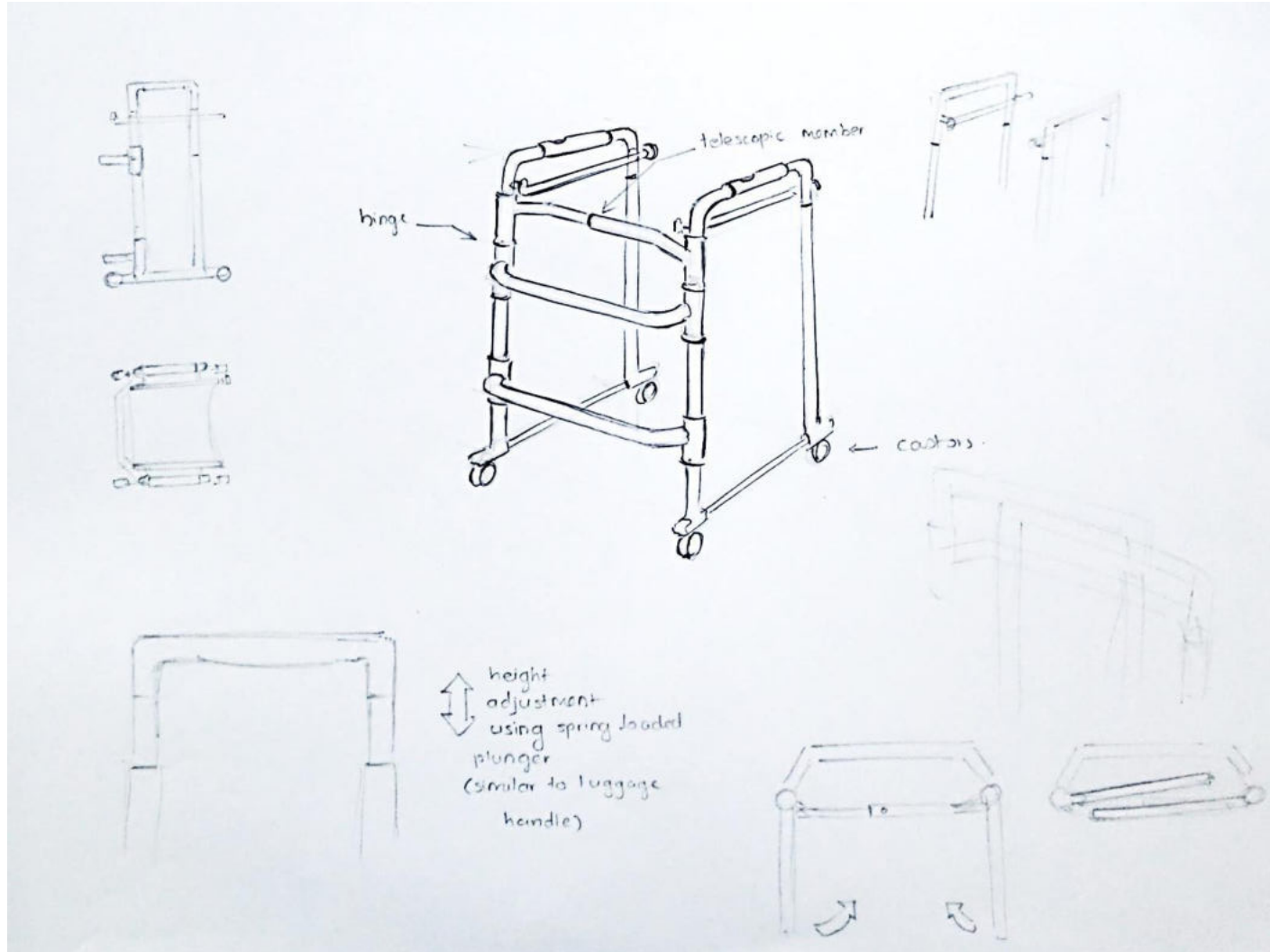
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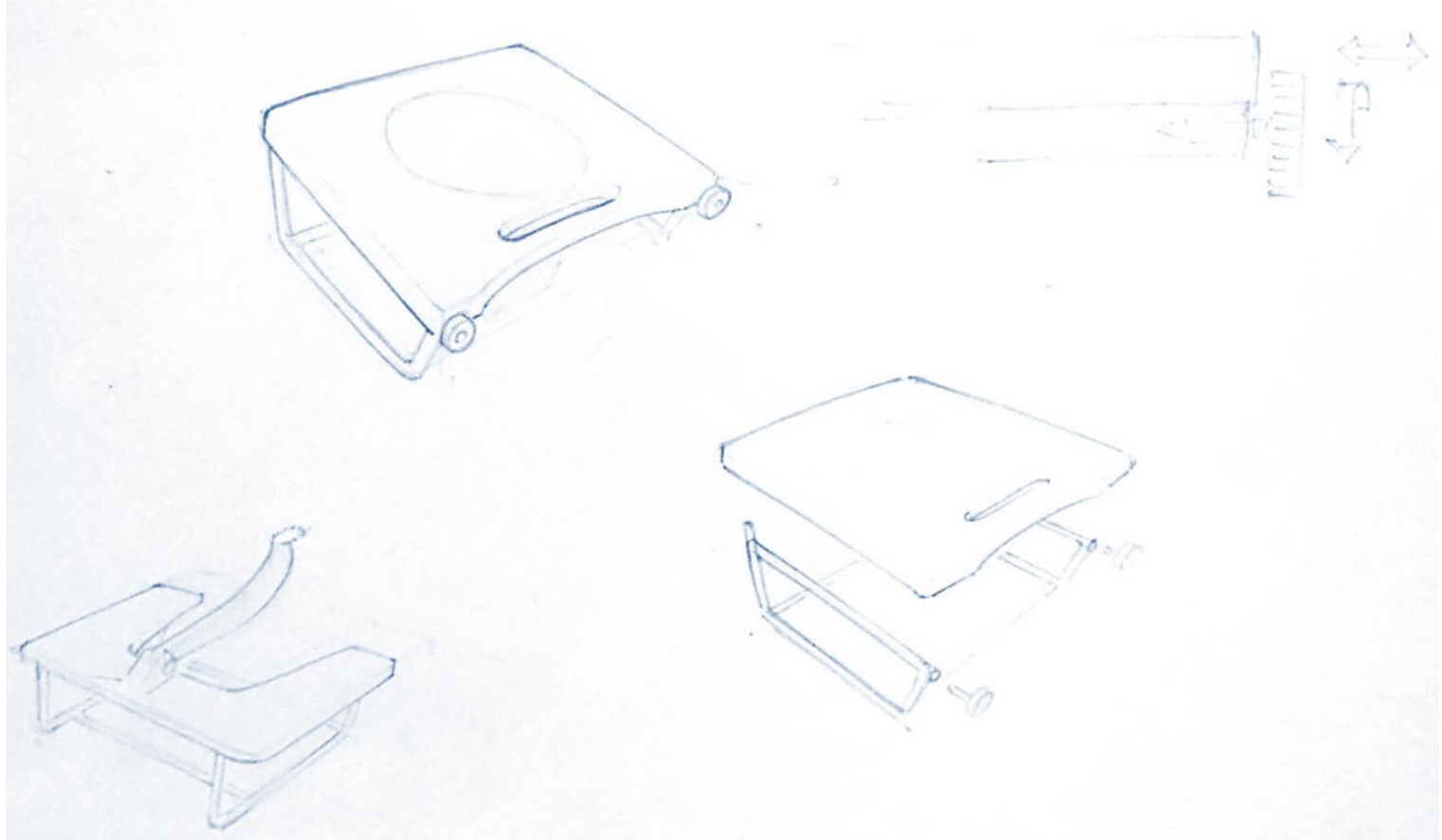
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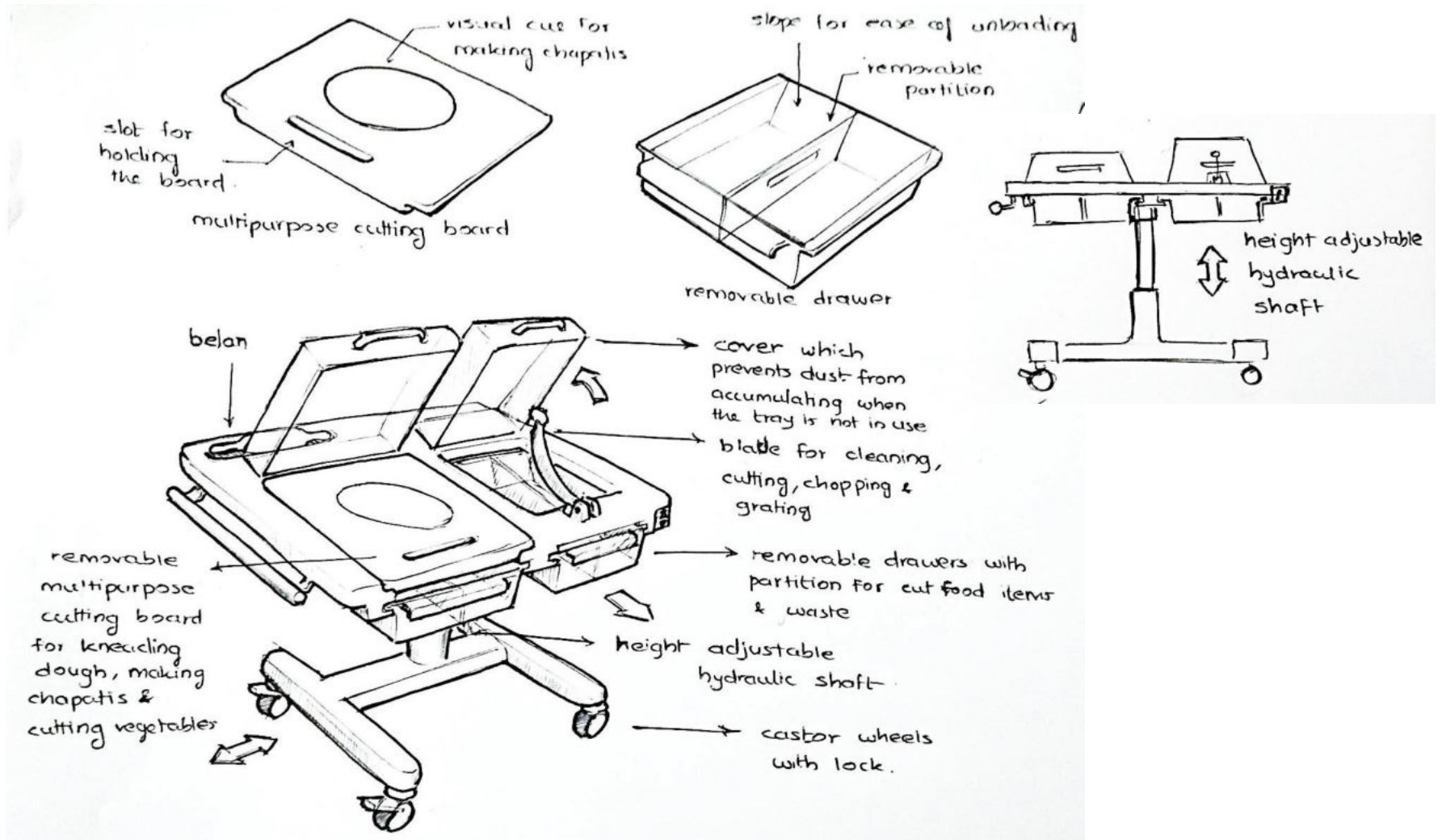
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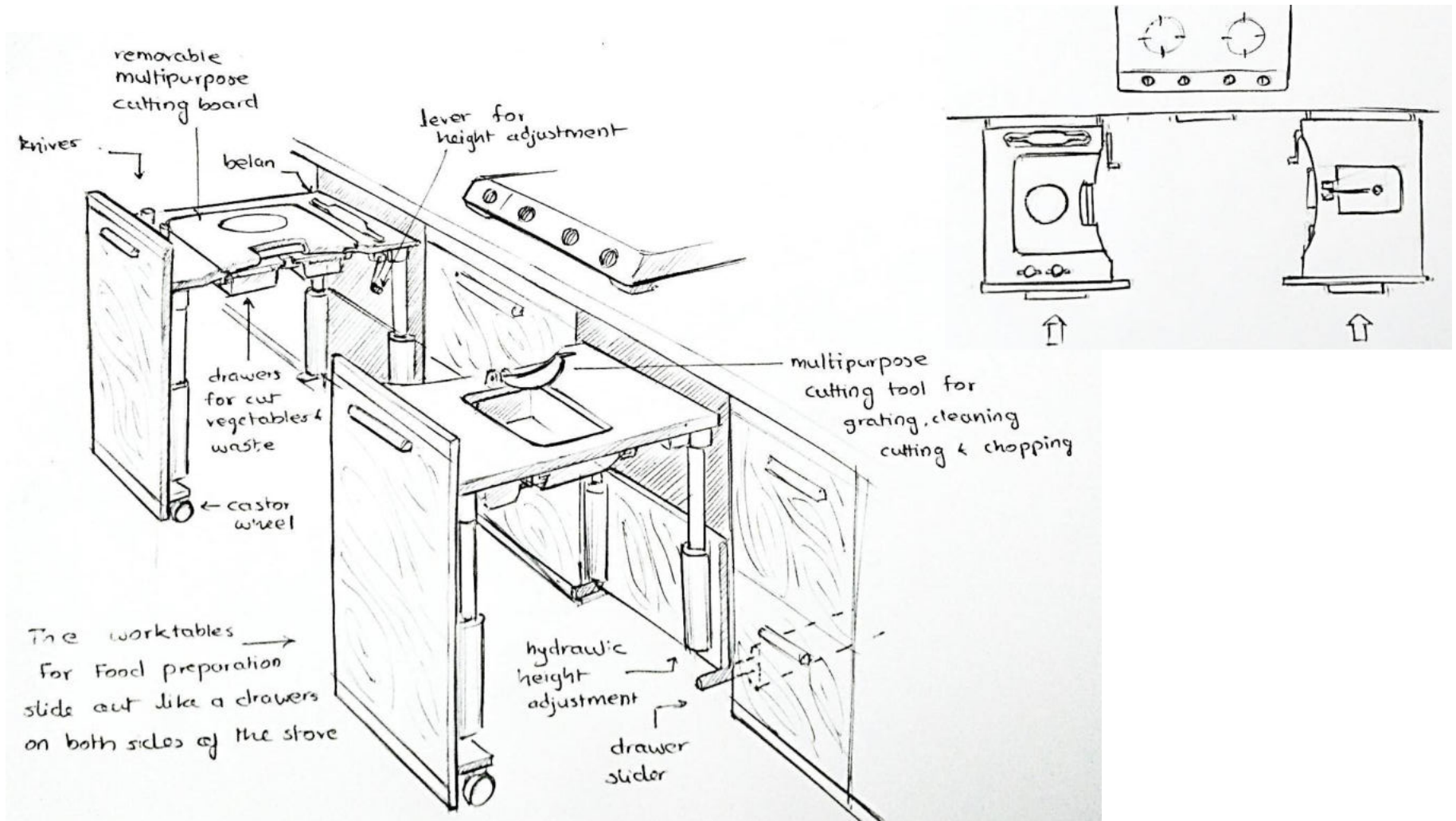
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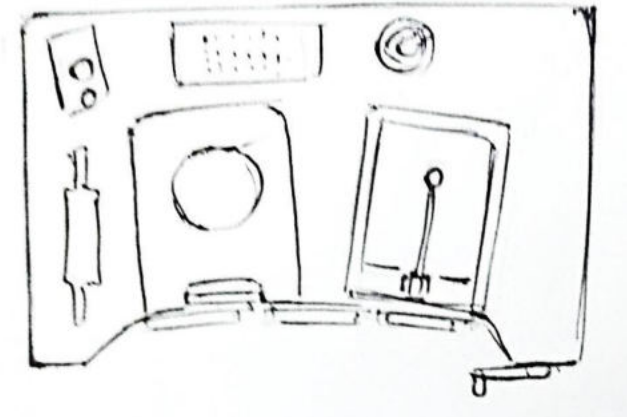
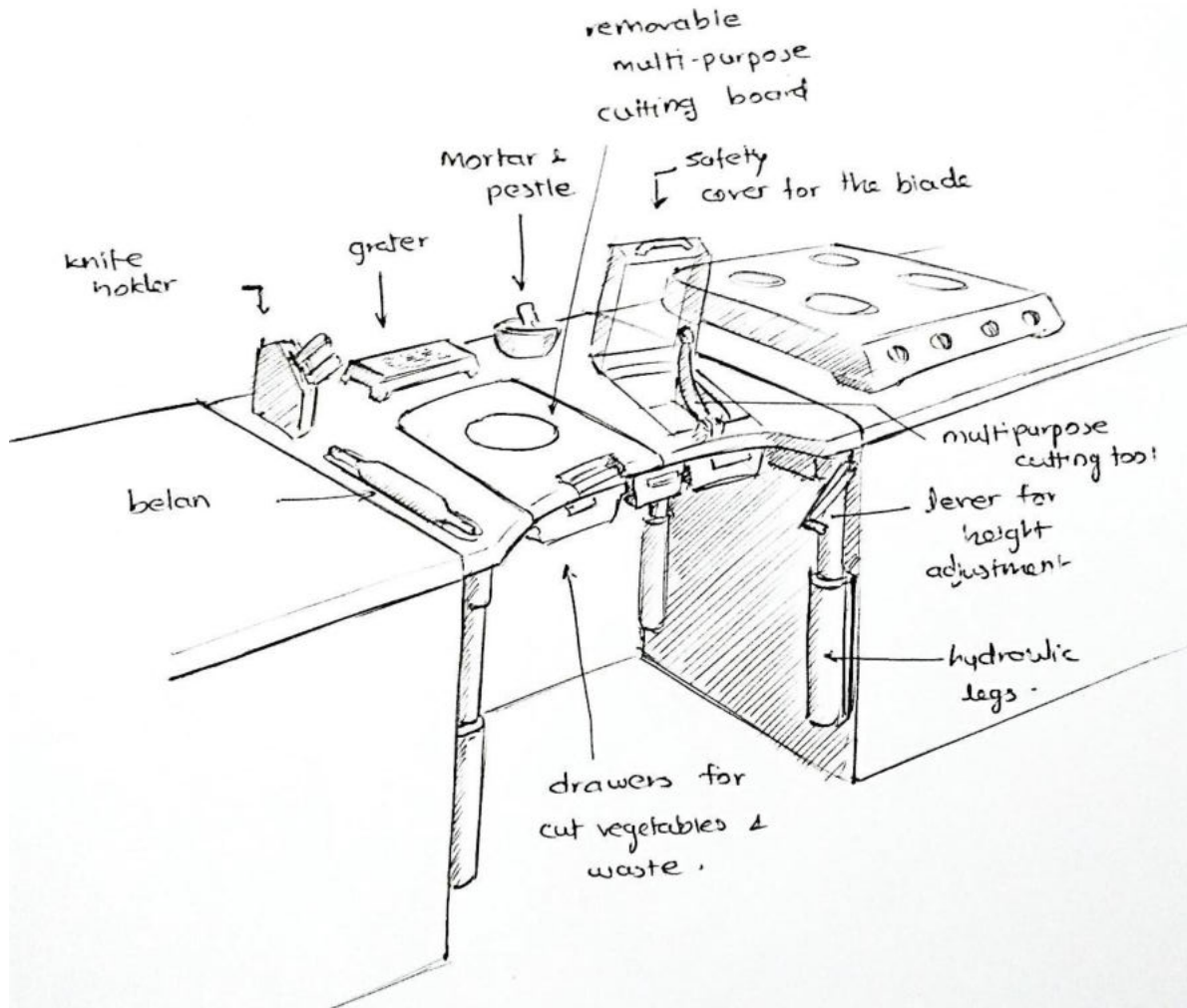
Concept #1



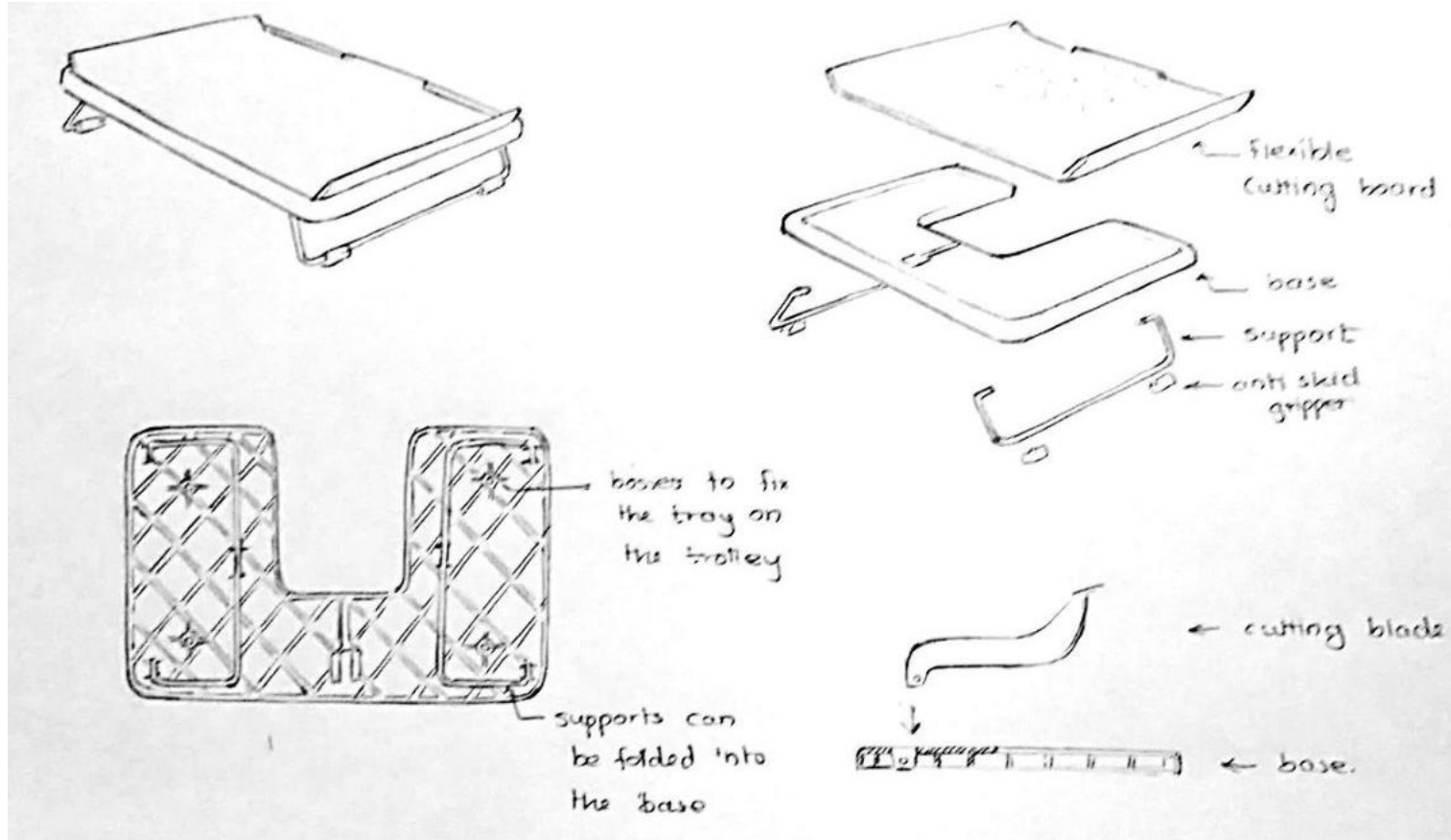
Concept #2



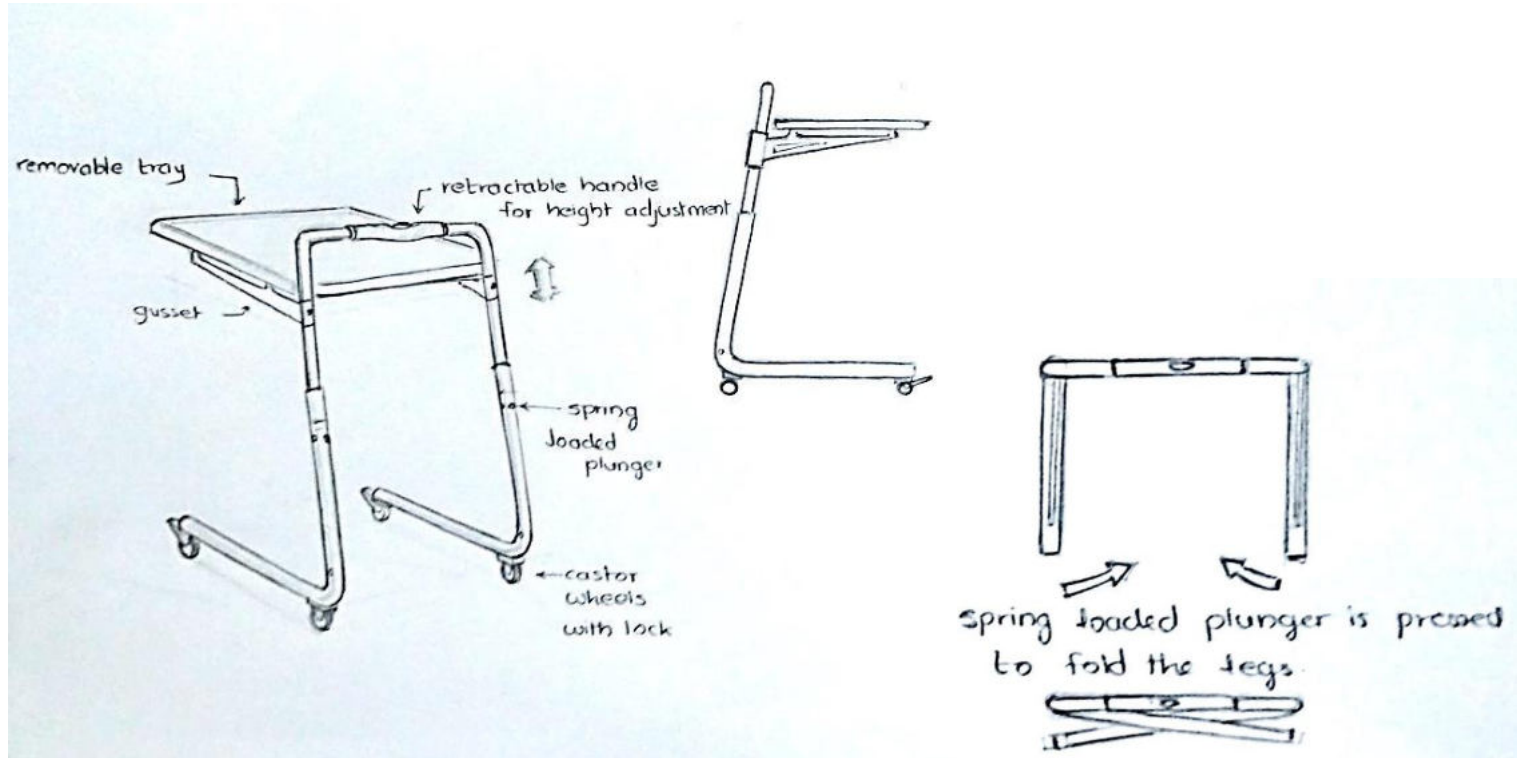
Concept #3



Concept #4



Concept #4



Concept evaluation

Criteria	Concept #1	Concept #2	Concept #3	Concept #4
Least amount of change required to existing layout	3	2	1	3
Unobtrusive	1	3	2	3
Ease of use for wheelchair or walker user	1	3	2	3
Space saving	1	3	2	3
Costing on the basis of technology and components	2	1	3	3
Ease of cleaning and maintenance	3	2	2	3
Reducing mobility need	2	3	1	2
Total	13	17	13	20

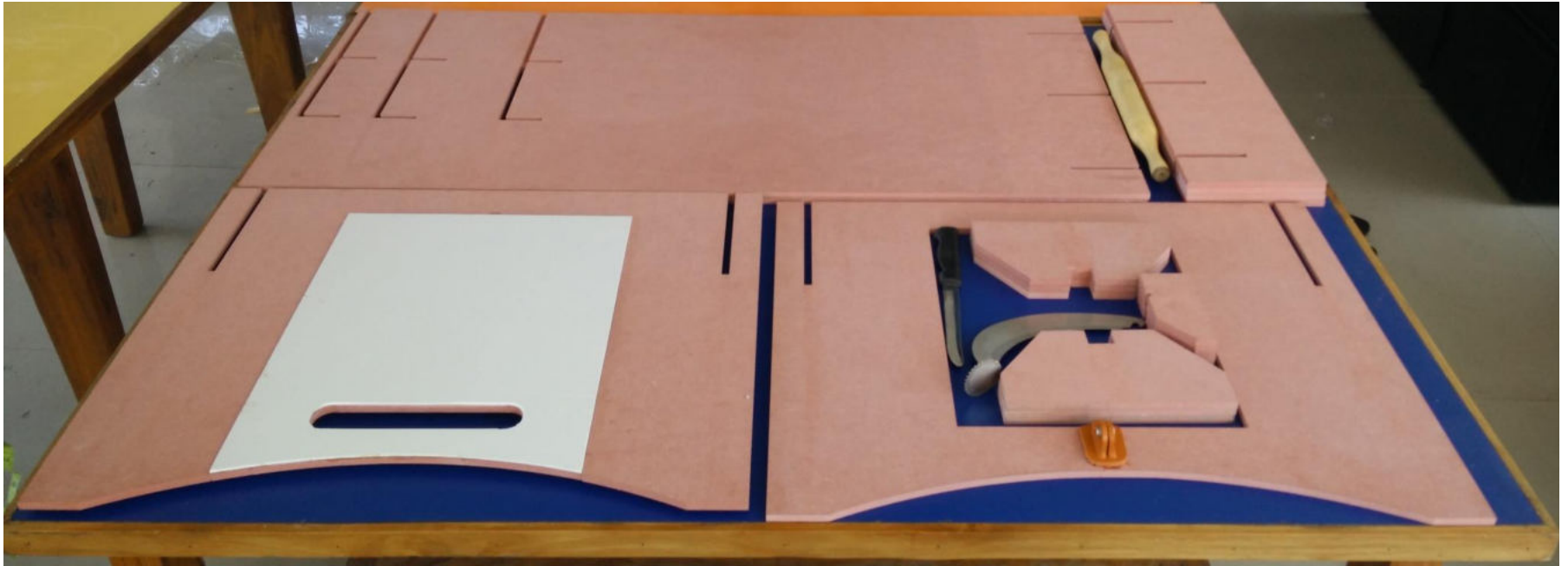
Test rig

- Knock down for ease of transport
- Lightweight yet sturdy
- Quick assembly and disassembly
- Height adjustment facility

Test rig



Test rig



Test rig



Test rig



evaluating

- Heights required for different activities
- Ease of use and comfort
- Size of workspace provided
- Additional feature requirement

User testing



User testing



User testing



User testing



User testing



User feedback

- Height considered for cutting board (900mm) is comfortable for most users. However for people above 6 feet, platform height should be raised to at least 990 mm
- Height considered for cutting tool (750 mm) is low, should be raised by at least 800 mm
- Size of workspace provided is sufficient and comfortable
- Dust bin should be kept away from cut vegetables
- Cutting blade should be easily removable for cleaning
- Projections should be avoided on work surface

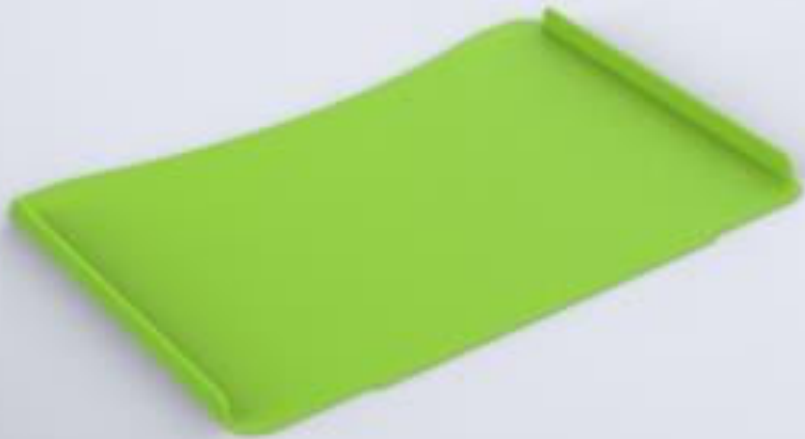
Other considerations

- The cutting tool should be placed close to the sink or between the sink and the stove due to ease of use while cleaning and cutting fish, meat and vegetables, as well as grating a coconut
- The user should be allowed to use the vessel of his/her choice as people have different ways of doing the same task.
- Trolley is used only if the user wants to use the cutting board while sitting or if the board is required to be very close to the stove (example, while making rotis)
- A separate dust bin is not required as the user tends to use a vessel for the use which is kept near the table, sufficient space to be provided on the cutting board to segregate waste and cut vegetables

Final concept

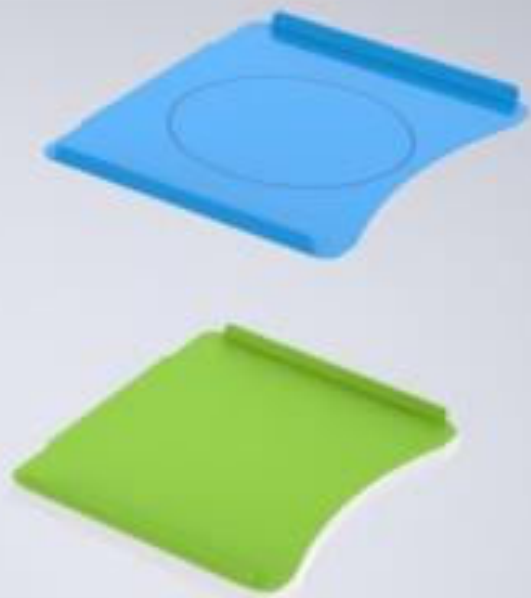


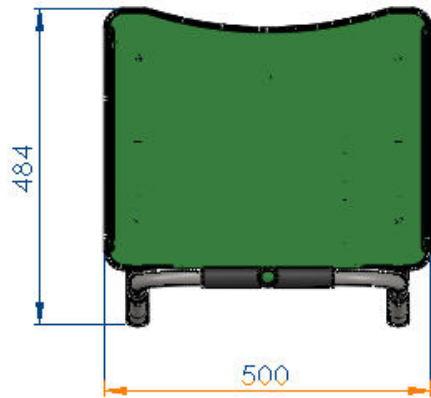
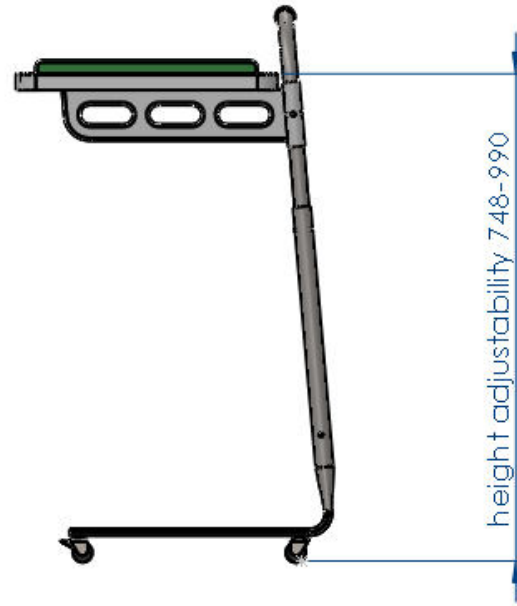
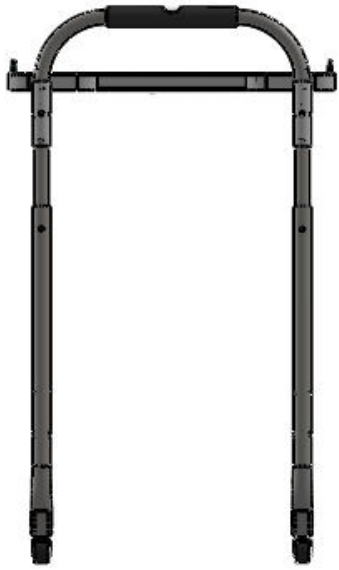


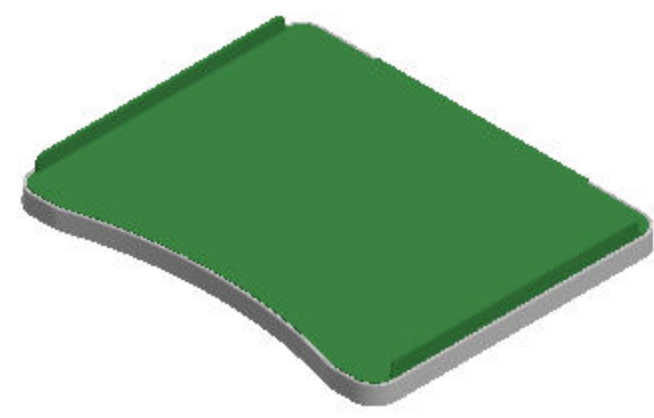
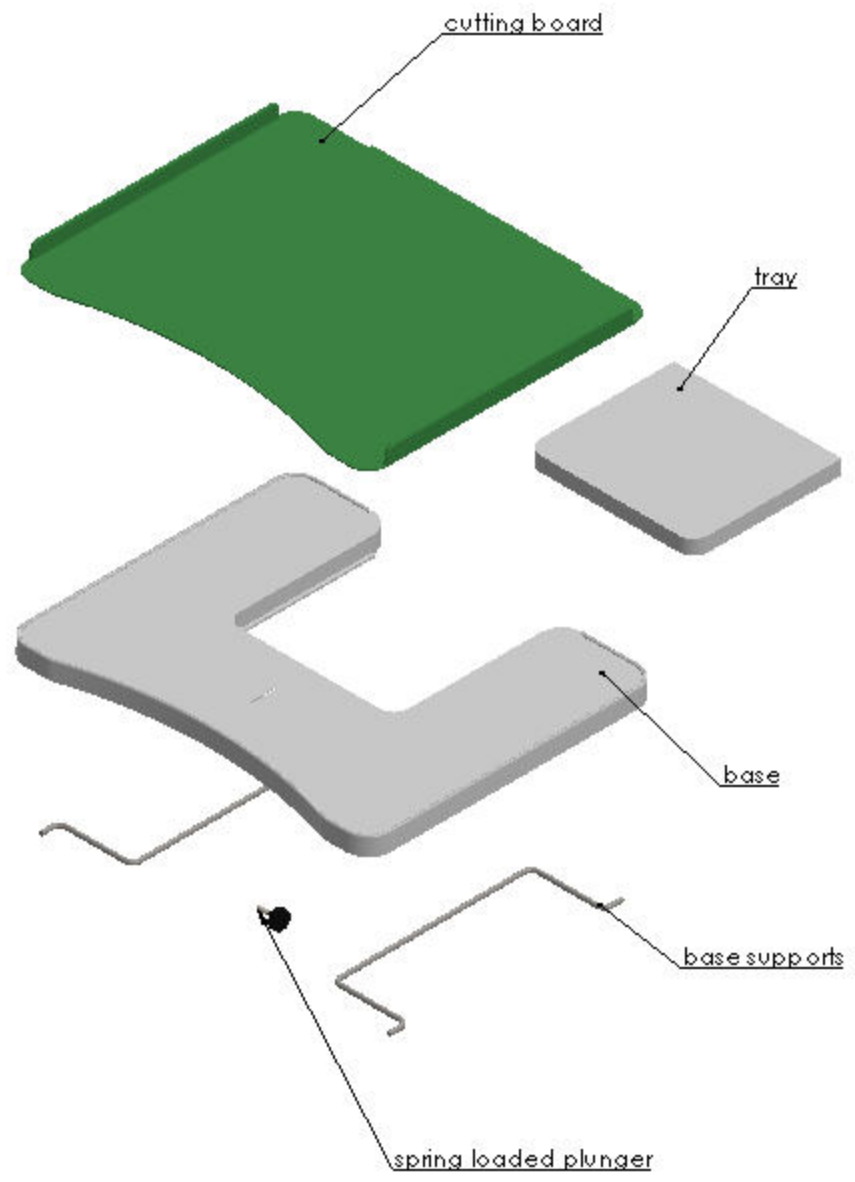


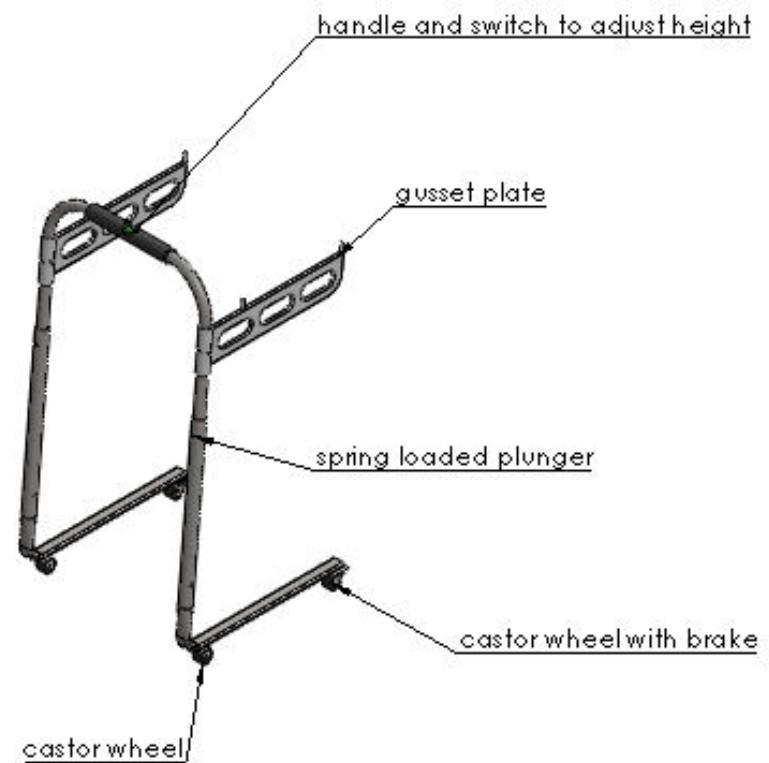
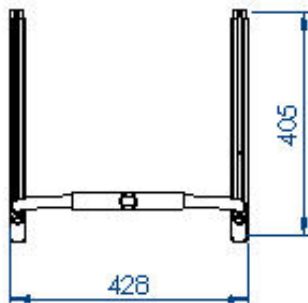
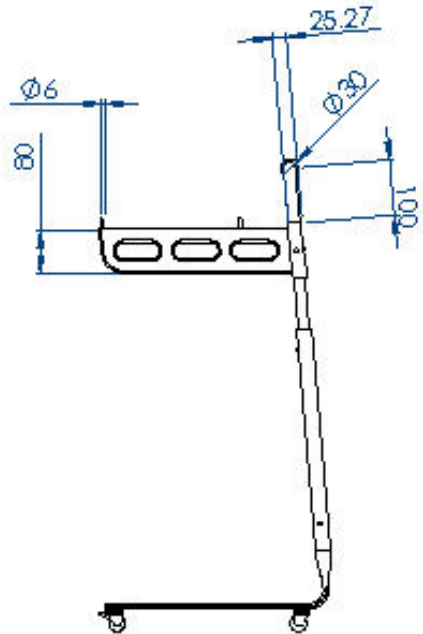
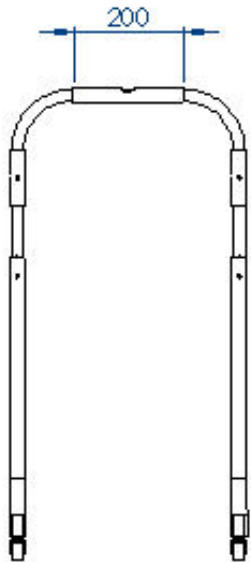


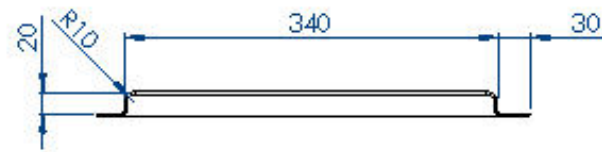




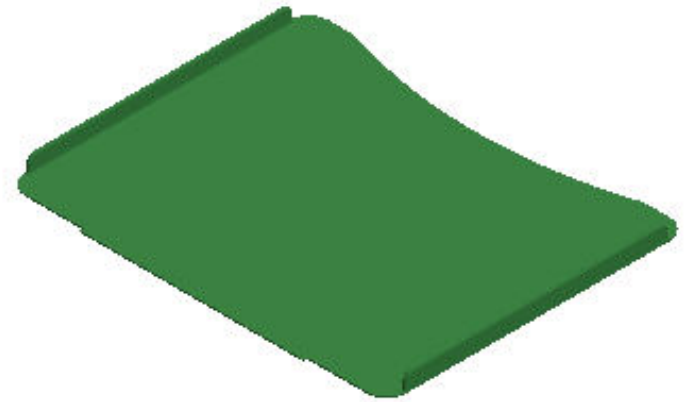
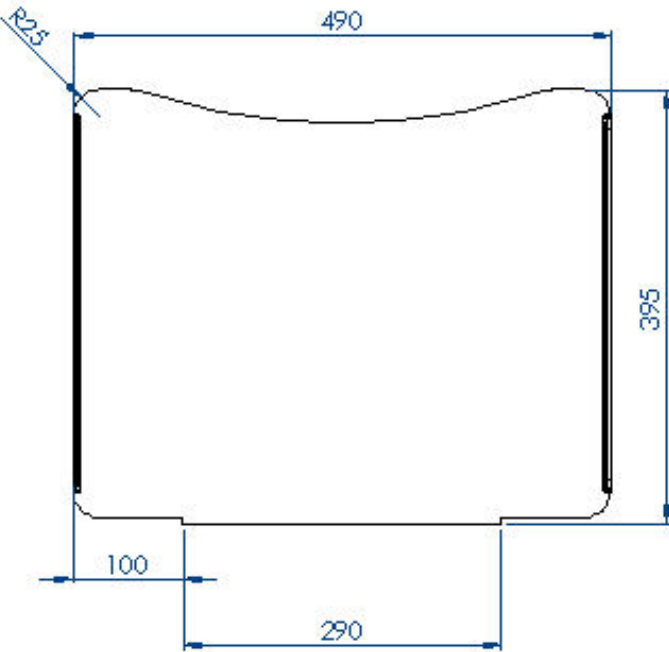


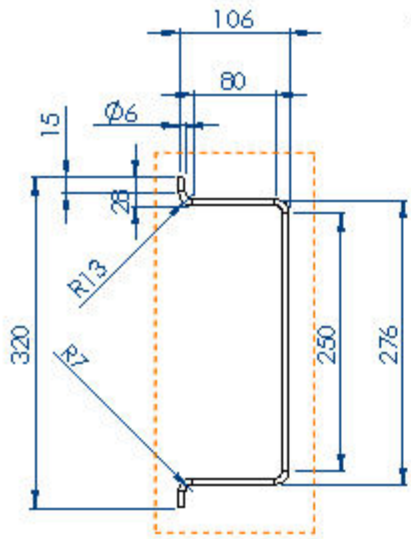






Material : PE
Injection moulded

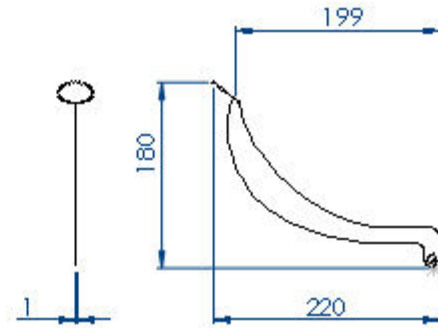




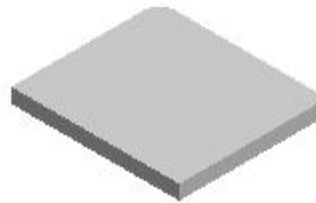
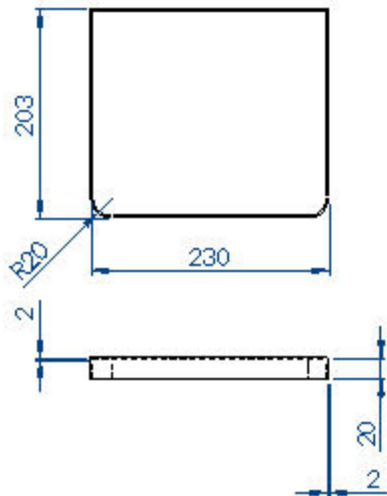
SS304 rod



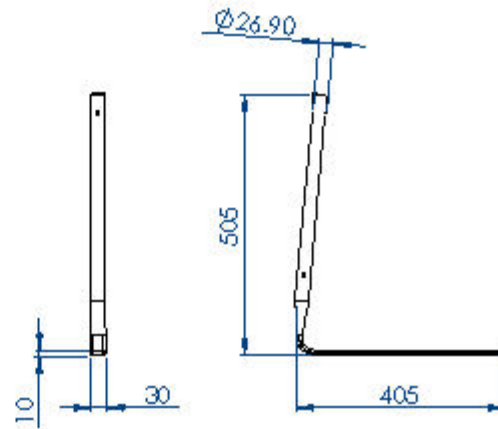
Material: SS 304
laser cut and bent



Material: HDPE
Injection molded



Material: SS 304
hollow tube



What next?...

- Other areas of kitchen to be looked into...
- Set of guidelines for kitchen design
- Design of add on products
- Collaborating with elderly housing communities

Fin.