

Section 1:

PROJECT CONTEXT

PROJECT GOALS AND CONSTRAINTS

Minji is a compact disposable cardboard furniture system designed for use in micro-apartments (~450 sq ft) that includes a desk, a table with seating for up to 5 people, an expandable armchair/couch, book shelves and a coffee table. The Minji is a system designed specifically for micro apartments, and to be affordable for the demographic who currently needs it most..

USER GROUP: THE URBAN NOMAD

Minji is designed for a user group we have termed “the urban nomad”. The urban nomad is 20-30 years of age, a low-income students moving an average of once per year, if not more. For the urban nomad, onstant moving is a defining factor in their furniture situation. The furniture they can afford to purchase if often impossible to disassemble, and breaks when moved from place to place (IKEA being the most glaring and often-cited example of this). In addition to this, furniture that contains textiles, such as couches and chairs cannot be re-sold for fear of bedbug infestation. As a result, the furniture being used by this demographic often ends up in landfills prematurely. This is a clear sign that this style of furniture does not work for this demographic. If the furniture being used by this demographic is already inadvertently turning into disposable furniture, why not take that as far as it can go?

CARDBOARD

The solution we present is cardboard furniture, a significantly healthier choice for disposable, recyclable, and biodegradable furniture. While the carbon footprint of the fabrication and recycling processes of corrugated cardboard make it a far cry from a perfect cradle-to-cradle system, we present it as an alternative to our current broken system, as well as a way of generating discourse on the larger issue of our disposable material culture.

MICRO-APARTMENTS

"Micro Apartments" are very small (300 - 450 sq ft) bachelor-style apartments that, while the norm in super dense cities like Tokyo and Hong Kong, are new to the context of North America. The first 450 sq ft micro apartments in Vancouver were recently opened in Vancouver in the Gastown neighbourhood as a way of creating affordable housing in the rapidly densifying area; they rent at \$800 /month in an area where regular bachelor apartments rarely cost less than \$1200 /month. They are currently the smallest apartments in Canada. This is a sign of the paradigm shift that North American cities must inevitably go through as their largest cities continue to densify. At this point in their North American development, these micro apartments are best suited to transient, young and low-income occupants such as students. Because of the volume of our user group that have begun to occupy these housing sites, this is the space that our project will be designed for.

Some work has been done in the realm of designing furniture for this style of apartment, everything from an entire room full of furniture that can be folded out of a small box, to nesting chairs and tables, and even entire walls that move to reveal different rooms depending on the needs of the user, but all of these solutions are far out of the price range of the user group that needs them most. We are interested in designing a system specifically for micro apartments that is affordable for the demographic who currently needs it most.

PROJECT CONSTRAINTS

The system includes all necessary furniture items for common areas (living/dining/office.)

All items must avoid glues, resins and non-cardboard hardware for easy assembly and disassembly.

The system consists finished pieces that serve/ can transform to fill multiple functions, and fit together in multiple combinations according to the needs of the user.

The system can't damage the apartment (ex - no wall-anchored shelves).

As much as possible, items must be able to be flat-packed for shipping..

As many pieces as possible serve as storage.

The total cost for each item is as follows:

As much of the material used as possible is recyclable or biodegradable.

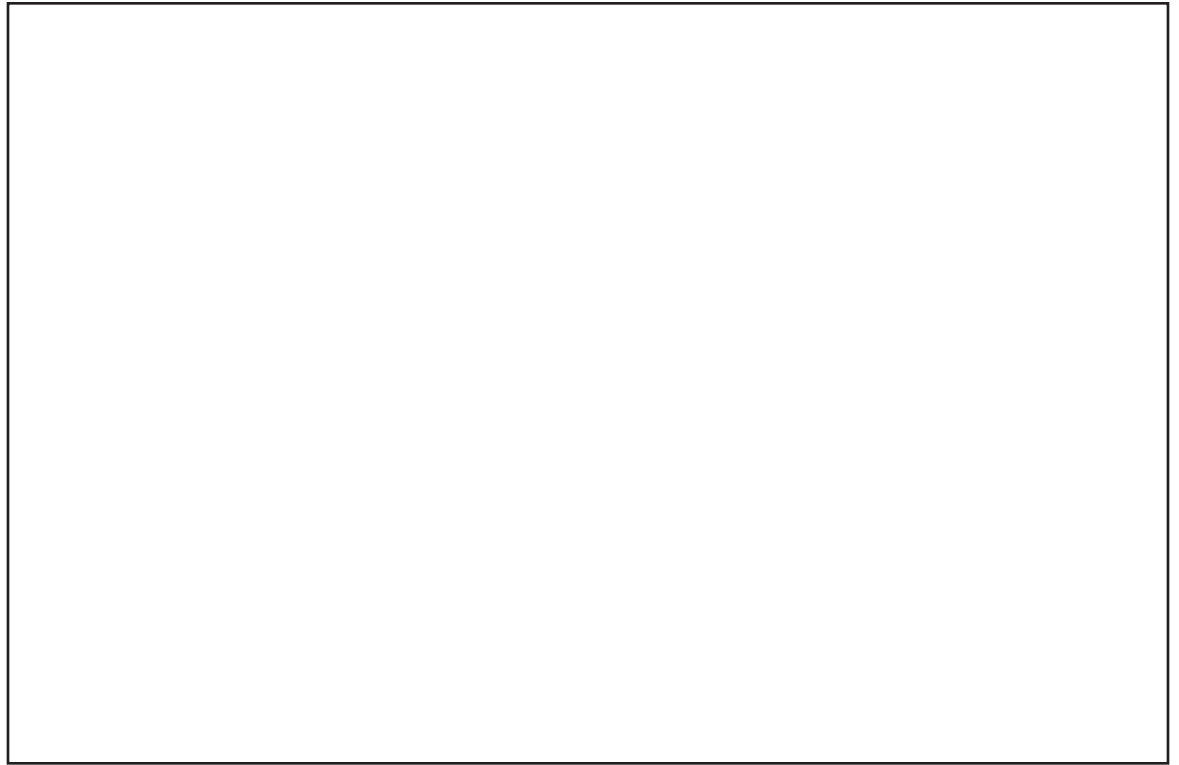
Stool - \$20

Shelf - \$15

Table/ Desk - \$70

Couch - \$100

The system needs to be as cheap as possible, using die-cutting and other methods of mass manufacture when possible.



Section 2:

DESCRIPTION OF PROJECT FUNCTIONALITY

STOOL

The stool has two separated parts, the lid as the sitting surface and the body as the standing support. Within the set, there will be four stools that can be stacked up vertically and also be stored under the table.

The main objective is as sitting furniture, which can be expanded as a side table, where some books or other light-weighted items are placed. Based on each occasions, the sitting furniture has different types of sitting functions, such as a dining chair - meal time, a stool and feet rest - gathering, meeting, and family time, a work chair - working and studying time. Another functionality is the task's board on the bottom of the lid. With covering the bottom with the chalkboard surface, the lid can be used to write down things like to-do lists.

In addition, since the stool also acts as storage, users can place their belongings inside and save space. Finally, the stools are designed to be flat-packed and effortlessly self-assembled.

SHELVES

Similar to the stool, the shelves are also stackable using the same interlocking mechanism. With this consistency between the two pieces, users are able to stack both stools and shelves interchangeably, and create different configurations of the items in the system. Unlike the stool, however, the shelves do not come with a lid.

The shelves are mainly used for storing books and other items, and are constructed of the same materials as the stool. Unlike the stool, the shelves are connected by velcro, and are visually unified with the stool's connectors by repeating the use of bright orange.

TABLE

The table is designed to allow for easy assembly and disassembly, with pieces slotting into place. The table can be used as either a desk or a dining table. The legs can also be replaced easily with shorter versions to create a comfortable coffee table. The top of the table is covered in a thick layer of clear varnish which protects the cardboard from spilled liquids and allows for easy cleanup. It also creates a nice, smooth texture that is velvety to the touch and provides a hint of luxury and easy cleanup.

The cardboard manufacturer's stamp has been left in clear site under the varnish as a celebration of our material's origins. The leg's x shape is both functional and stylistic, creating greater stability through increased contact surface area both between the legs and the floor surface and in the slot connection with the table-top. The shape braces both pieces of the leg from wobbling, but it also creates an interesting display of the innermost pattern of the cardboard through the joint that protrudes through the surface of the table.

COUCH

The couch is designed to operate as an armchair in order to save space and to extend into a love-seat when extra seating is needed. a flexible honeycomb structure was used to create the extendible seating platform and the back of the couch uses a telescoping system. For added comfort, large removable cushions have been added to the seating and back surface. The honeycomb corrugate internal structure has been revealed in strategic points along the seams, and the front of the seating platform is revealed as well as a celebration of material and structure.

WEBSITE

The website is designed as a portal containing the project's overall concept, as well as a means for people to buy into the project. The website has four main functions:

a) Purchase of Minji furniture

The main focus of the site is on purchasing Minji furniture, as well as (limited) customization of Minji pieces. As the inventory of furniture we have produced for Capstone is small, this portion of the site is designed with a strong focus on simplicity. No extra search functionality, sub-sections or other filtering functionality is present. On each furniture piece's page, users will have the option to refine the look and feel of the furniture. For Capstone, this section will mostly pertain to finishes on the cardboard. In future, this customization could extend to materials (plastic corrugate, or even wood), or dimensions for some objects.

b) Recycling of presently-owned furniture

The main way in which we hope to attract users with the proposition of allowing them to fully and sustainably recycle pieces of furniture they currently own that they cannot find new buyers for - broken shelves, for instance, or a stained couch. Through this section of the website users can arrange a pickup for larger items, or find a drop-off location for the items. When possible recycled materials will be salvaged and sold for art and design project purposes.

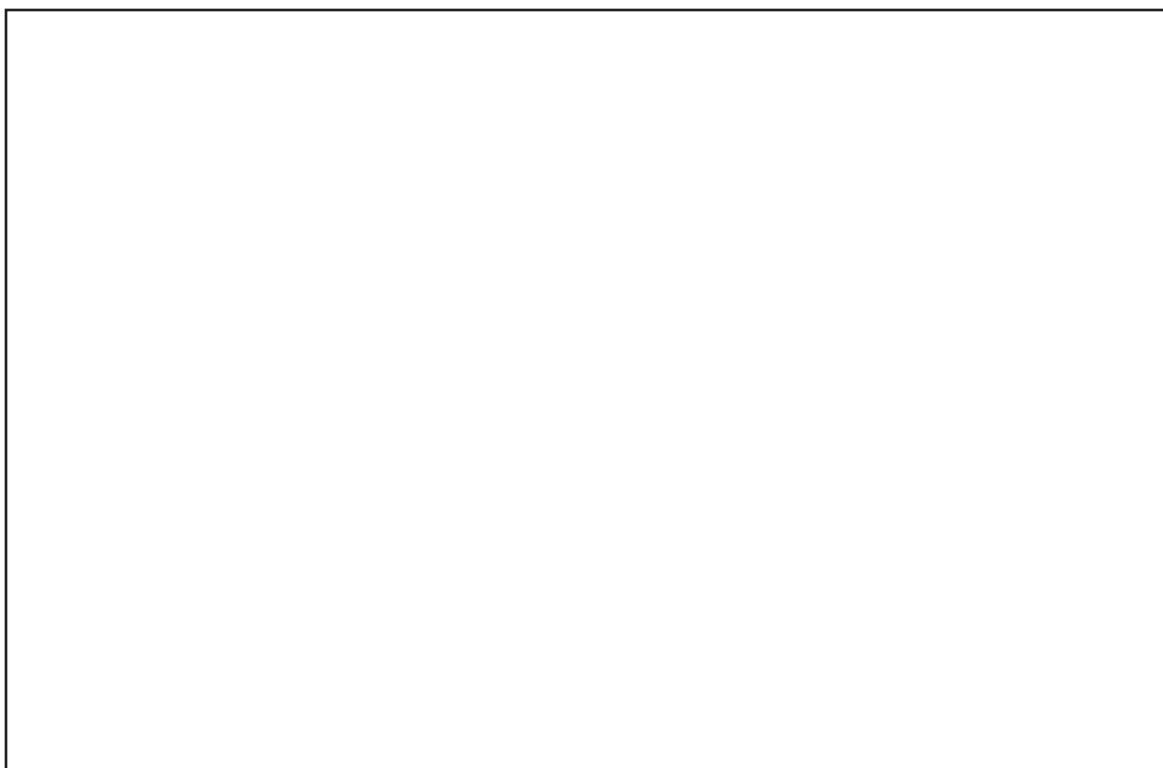
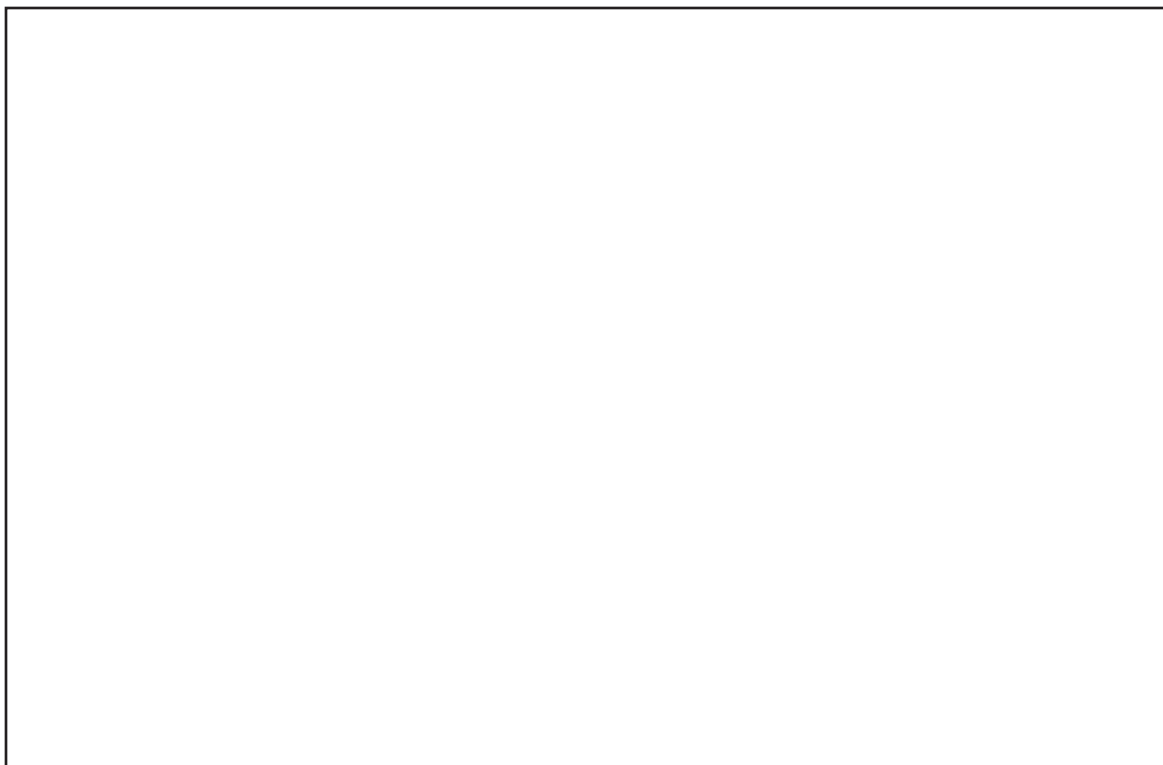
c) Purchase of recycled materials

Materials from recycled furniture will be categorized by size, shape, and type of material, and presented through a simple faceted interface to users looking to purchase recycled and reclaimed materials. In the interests of time (and the fact that we aren't computer scientists) the search functionality will not be fully implemented in this section of the site for Capstone.

d) Purchase and account information

Users will be able to access data on items they have recycled, as well as items they've purchased. Items that have been recycled, salvaged, and had their materials sold will be tracked through the system. Items that users have been purchased will be tracked as well - for easy re-ordering if needed, and also to track configuration information.





Section 3:

USER STUDY RESULTS & PROTOTYPE ITERATIONS

USER STUDY RESULTS: STOOL

We found, through the user study, that users felt that the stools looked unstable and were hesitant to sit on them. We also found that they enjoyed the ease of use of the zipper, and how it made it very clear how the stool was to be put together from its flat-packed state. For the final iteration we kept the colourful zipper to make it clear how to assemble, but we made the stability less dependant on it. We made the whole inside of the piece out of the hexacomb cardboard for added stability but also for a continuous style throughout all the pieces. We added slots for the side pieces to slot together, as well as a thick base that slots into all side, this added extra stability and strength for the entire piece. In order to demonstrate this to users, joints that reveal the inner structure of the cardboard were used along with stronger geometric lines in it's design.

USER STUDY RESULTS: SHELVES

For the user study, the original shelf was connected by using velcro. This decision was made in regards of the material's exploration, the strength, and the stability key point. We found that there was no significant preference between the velcro and zipper connection systems, but we found that because of the smaller connection surface the shelves benefited from the greater connecton strength of the velcro. We sewed neon orange textile as a backing on the velcro to to unify our visual language with the orange neon zipper on the stool (orange being the color use to denote a connection point. As with the stools, replacing the inside with the hexacomb also supports the strength and the rigidness of the form.

USER STUDY RESULTS: WEBSITE

Many users found the sideways orientation of the first version of the website confusing and hard to follow. While this was a choice designed around use on multiple devices - touch screen ones in particular - it was too far a departure from the idea of a "website" for most users. The final version of the website represents a more traditional website look-and-feel, and is vertically oriented.

Section 3:

POST-CAPSTONE PROJECT DEVELOPMENT

WHAT WORKS?

In general, the use of the honeycomb cardboard has advanced both our aesthetics and the stability of the stool and shelves. By using the honeycomb, with its very strong edge pattern we have been forced to consider how and where that pattern shows through, and exactly what we do in the spots where that does show through. This has allowed us to move forward from the purely practical aesthetic that both of these pieces had in their first iterations. Through the use of the honeycomb, we have been forced to learn about, and celebrate its aesthetics, which has strengthened the process on the whole. Because of the use of honeycomb in the stool and shelves, the greater stability afforded makes the zipper viable as an edge connector, as it simply now functions to keep the edges together, not to provide structure to that edge.

In regards to the table, experimenting with resins and other surface coverings was successful, both in terms of practicality (protecting the cardboard surface from things like water and food) and in terms of transforming the homogenous look of the cardboard. In future, this is something we would like to explore with greater depth across all pieces.

Also in regards to the table, this allowed us to explore interest in terms of joints and the grain of honeycomb material. We view the table and its joinery as a tentative first step in our exploration of joints and joinery available to us with this material, and we hope to iterate on the table in future. Another moment of success with the table was in the ease of assembly. Putting together the table is accomplishable without a set of instructions, and the table legs are interchangeable, furthering the modularity we wanted in this project, and easily flat-packable, another of our project goals.

AREAS FOR IMPROVEMENT

Because much of the development of our project occurred in one term, parts of the project are untested and we have not iterated on parts to our satisfaction. The table is still slightly unstable, and we feel that we'd like to iterate on the positioning and form of the table legs, as well as experimenting with different types of finishes and stains. We'd also like to iterate on the types of bracing available to us, and in terms of potential other shapes for the tabletop particularly exploring more non-rectilinear shapes, as well as exploring what other kinds of shape will showcase the grain and pattern of the hexacomb material.

In addition to this, we feel that we need further iterations on the couch in order to fully explore

both the telescoping aspect of the couch, and also to master the production and execution of the honeycomb structure on the bottom of couch. While this honeycomb structure is our first attempt as a solution for this problem, it may not be the final solution and we feel that more exploration is needed to ensure that the solution is as easy to manufacture as possible

We feel that the stool and shelves are at their final form in terms of functionality, but we acknowledge the fact that there is room for further refinement in terms of aesthetics, and in terms of creating more variations on this theme of stacking cube shapes.

POST-CAPSTONE PROJECT DEVELOPMENT

In terms of post-Capstone project development, our main concern is with the creation of more pieces, and the development of the design language of the cardboard across these pieces. In addition to iterating on the couch and the table, we hope to find ways to flat-pack them to a greater degree. In addition, we hope to expand the degree of modularity within the pieces, by having more pieces that stack, or otherwise work with the pieces we have developed during Capstone.

We have yet to explore the entire area of lighting design with this project, even though lighting is an integral part of a person's enjoyment and emotional well-being within a space. We also feel that to further improve pricing for the items, as well as the accuracy of cuts within the items that we need to explore further into manufacturing processes for our furniture.

We initially hoped that we could explore different kinds of furniture coverings and paddings within the scope of Capstone, but unfortunately have not had time to do so. This was something mentioned to us by our instructors and we feel that it would be another way that users could customize and derive joy from the use of our furniture, and we would like to explore different kinds of textile and non-textile solutions for coverings.

