REPORT

Internship at URAVU (NGO)

Project 1 | IDP 601

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IIT, Bombay 2016

DECLARATION

I declare that this written document represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any data, facts or sources in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ACKNOWLEDGEMENT

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I would like to thank all the Industrial Design Faculty at IDC for their valuable inputs during the course of the project.

Thanks to Senior Shashank Gautam for letting me be a part of product Development of his furniture 'The Butterfly Chair'

Thanks to Arjun and Arnab for being with me through out the journey of the internship.

Most importantly, I would like to thank god and my parents, for supporting me during the course of this project and for motivating and believing in me and my work.

Prof A G Rao, Prof. Bapat, Prof Sandesh and rest of

CONTENT

Chapter 1

Introduction

"*Uravu is a non-government organization (located in Thrikkaipetta village in Wayanad district, Kerala state, South India), which works with people, governments and businesses to*
implement programs for sustainable employment and income generation in rural areas. Uravu is a nonprofit trust, established in 1996, registered under the Indian Trusts Act. Uravu promotes social enterprises based on value addition of local, natural resources, especially bamboo, the 'green gold'[1]".

Chapter 2

Objective

The objective of our internship was to be a part of the manufacturing unit. During or internship we had discussion with A G Rao Sir. He suggested that insted of making new products we should be working on the product development of the existing product in the URAVU making us understand the importance of design as a rely race, to which he suggested about the ‘Butterfly chair’ designed by our senior Sahank Gautam.
The aim of the project was product development of Butterfly Chair shown in fig 2 shown in the next page

Fig. No: 2

Fig. No: 2.1a

Fig. No: 2.1b

Fig. No: 2.1c

2.1: Insights

During the discussion we also got various insight which are as follows.

1) The existing chair is the 1st prototype. next step was to make it design for manufacture (DIY feature) and ease in transportation.

2) Opportunity to increase aesthetic appeal by using form manipulation techniques on the base and the back rest which can emphasis the cross grain texture of bamboo laminates and also .

3) Emphasis on the joinery can be increased reducing the base dimension to make the joinery more visible.

4) Cushioning on the back rest, which makes it comfortable to sit for longer duration of time.

5) Opportunity of Butterfly family (range of furniture - table, stool etc.

fig no 2.1a, b and c showing various views of

Chapter 3

Product Development

The product development of butterfly chair was consisted several parallels process side by side which are explained in this chapter.

The process started by improvising the aesthetic details and comfortable backrest suggested by Professor Lance Rake and Professor A G Rao , along with it working on design for manufacturing and transportation aspects of the chair.

The aspects are explained as individual topics which starts from the next pages.

3.1: Aesthetics appeal

the existing chair has bamboo slats mounted on a ply wood base to which the screws are connected to the legs.
The following are the changes made for increasing aesthetic apple of the chair
Fig no. 3.1a showing the exposing the cross grain texture of bamboo using form transition techniques which makes the base visually lighter and smooth edges.
Fig no. 3.1b showing the application of bamboo strip to edges of the base to hide the plywood.
Fig no. 3.1c reducing the corners to expose the bamboo joinery

Fig. No: 3.1a

Fig. No: 3.1b

Fig. No: 3.1c

Fig. No: 3.2a

Fig. No: 3.2b

Fig. No: 3.2c

Fig. No: 3.2d

3.2: Backrest Cushioning

One of the suggestions was to give a comfortable back rest support.
The following are the trials and changes made on the chair
Fig no. 3.2a showing the trial of jute cushioning which was difficult to go with the cha
Fig no 3.2 b showing the slot making in the backrest of the chair.
Fig no 3.2 c showing the visual appeal of backrest - need of flexible element to increase comfort.
Fig no 3.2 d showing the final details of the chair backrest have 3 layer of bamboo strips glued together with outer layer of leather (we have used Rexine) which increased in flexibility aesthetics and goes well with the form of the chair

With this the major aesthetic and form development process was done, now the next part is design for manufacturing

3.3: Backrest Joinery

Along with the development of the aesthetics of the butterfly chair we also worked with manufacturing part of the chair
The following pages will get you through details.
Fig no 3.3a showing the trial of backrest joinery. To make DIY and easy for transportation which was one of the major considerations for the chair.
Fig no. 3.3b showing the development of the bend profile in the bamboo slats which accommodate another bamboo slats in vertical direction(chair back legs) shown in fig no 3.3c.
Fig no 3.3d successful prototype of the final joinery. There is a need of a covering on the top of back rest joinery required to complete the design.

Next part considers the assembly of the legs on the sitting base.

Fig. No: 3.3a

Fig. No: 3.3b

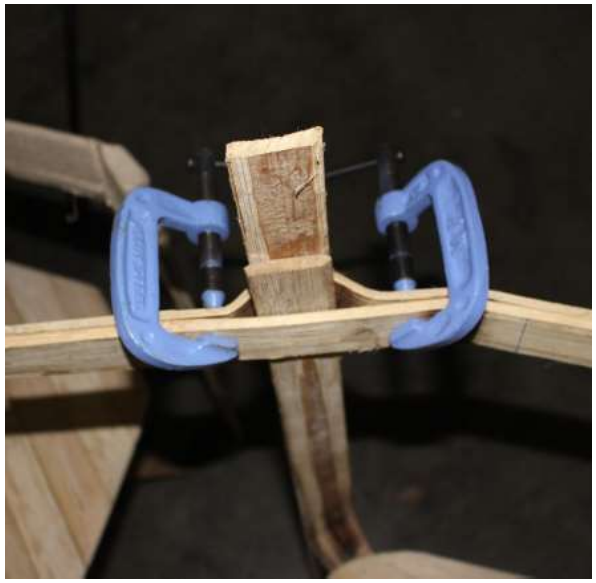

Fig. No: 3.3c

Fig. No: 3.3d

3.4: Stability

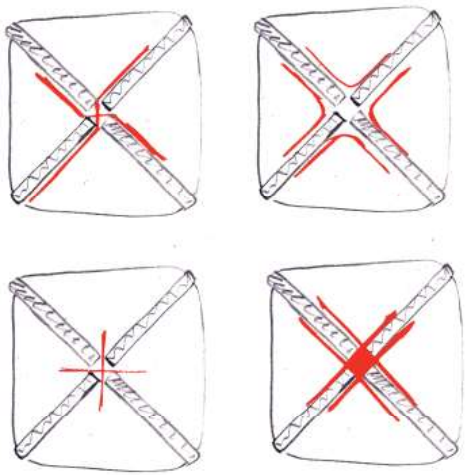

Fig. No: 3.4a

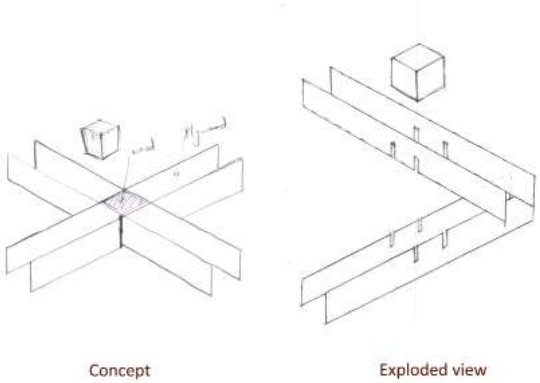

Fig. No: 3.4b

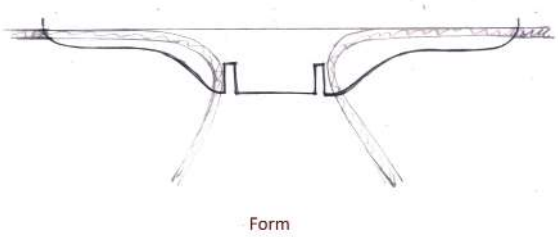

Fig. No: 3.4c

Fig. No: 3.4d

During dismantling and reassembling of the chair the leg were shaking. So the following steps were taken for the stability of the chair.
Fig no. 3.4a showing the ideations for stability
Fig no. 3.4b showing the exploded view of the selected joinery.
Fig no. 3.4c showing the form manipulation of the joinery.
Fig no. 3.4d showing the implementation of joinery. Which arises the need of a slots in the plywood base for placing the whole joinery.

The next consideration was regarding strengthening the chair legs

3.5: Bending Process

The legs of the chair were still flexible which was due to use of single bamboo strip. Because of which the structure nogood for longer use. So use of two strips was suggested. The following are the details of the leg bending process.

Fig no 3.5a showing single strip bending which is not sufficient for the structure.
Fig no 3.5b showing the cross section of how the two strips will be bend to get the desired leg
Fig no 3.5c steps for the bending process.

During the process of manufacturing the chair some mould fixtures were produced which is explained in the next page

Fig. No: 3.5a

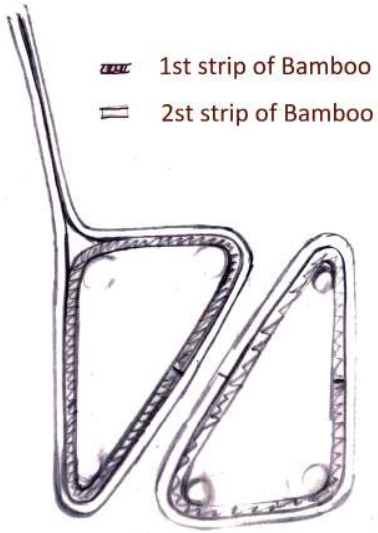

Fig. No: 3.5b

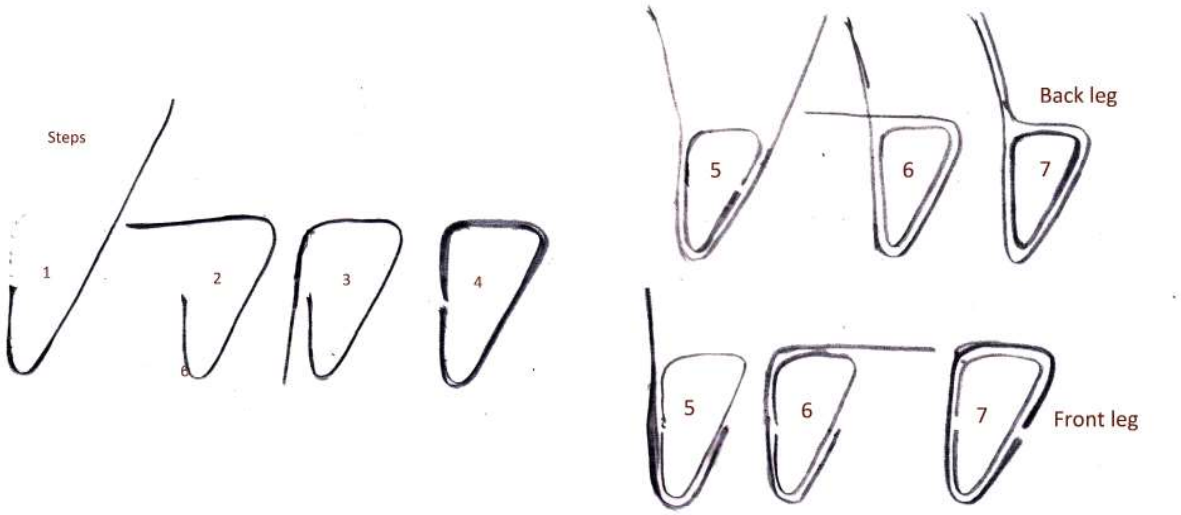

Fig. No: 3.5c

Fig. No: 3.6a

3.6: Manufacturing Tools

The following jigs and fixtures are used for the manufacturing of the chair.

Fig no.3.6a showing the mould used for bending the strips for the legs

Fig no. 3.6b showing the mould used bending the backrest to back leg joinery

Fig no. 3.6c showing the templet used for manufacturing the base of the chair.

Fig. No: 3.6b

Fig. No: 3.6c

3.7: Stool

Along with the chair, a stool was also developed as the part of its family using the same moulds used for the legs.
The following are the design considerations for the manufacturing the stool.
Fig no. 3.7a showing the ideations for base pattern
Fig no. 3.7b showing the tool used for the making the base and also showing the implementation of the base pattern
Fig no. 3.7c showing the 1st version were a problem of dangling or twist was affecting the stool stability.
Fig no. 3.7d showing the final concept of the stool were the legs are drawn closer and joined in a single point to stabilize the stool.

Next page showing the butterfly family.

Fig no. 3.7e showing the modification done to Shashank's chair
Fig no. 3.7f showing the development of stool

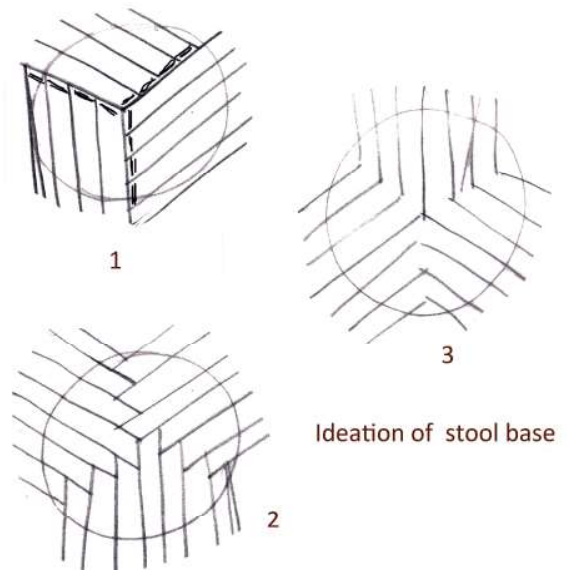

Fig. No: 3.7a

Fig. No: 3.7b

Fig. No: 3.7c

Fig. No: 3.7d

Butterfly family

Fig. No: 3.7e

Fig. No: 3.7f

Fig. No: 3.7g

Chapter 4

Coiling Explorations

Along with the development of butterfly chair a set coiling exploration was also done using the bamboo weaving strips.

Fig. No: 4a

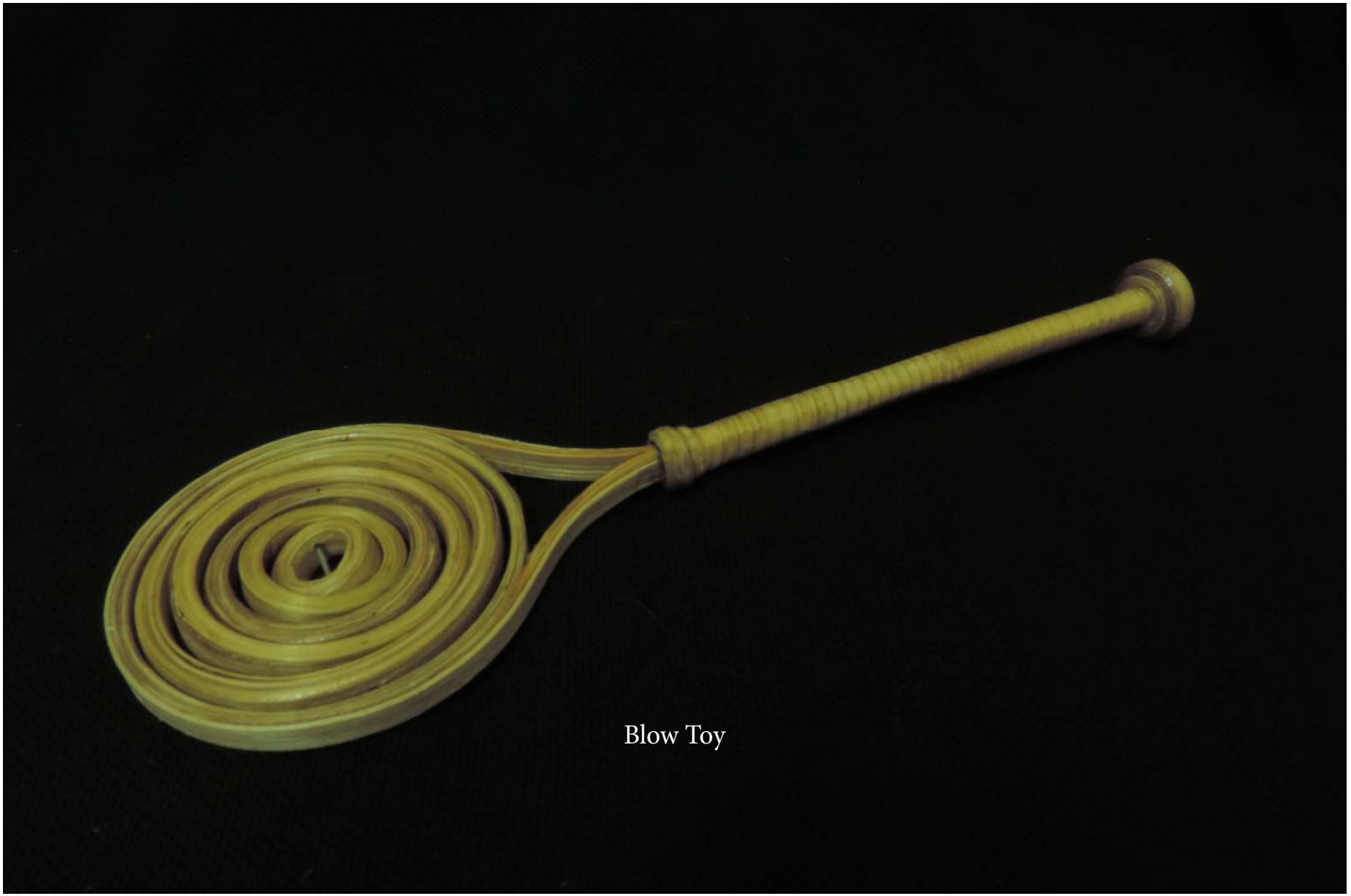

Fig. No: 4b

Fig. No: 4a

Fig. No: 4a

Chapter 5

Reference

Text
1 - http://uravu.net/

Images
Fig no. 2,2.1a,2.1b and 2.1c- P1 report
'Shashank Gautam' IDC PD 2014-16.
Other images - auther