



Project 1 Report : Summer Internship At

# URAVU

Indigeneous Science & Technology Centre

Thrikkaipetta, Wayanad, Kerala

SUBMITTED BY

**DATTARAM CHARI**  
146130003



### DECLARATION:

I declare that this written submission represents my work & experience at **URAVU Indigenous Science & Technology Centre**, Wayanad Kerala during my summer . All the work represents my ideas in my own words and where others ideas and words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all the principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data / fact /source in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature:

Name of the student: Dattaram Gajanan Chari  
Roll No: 146130003

Date:



## APPROVAL FORM:

The project titled “ Summer Internship at URAVU Indigenous Science and Technology Centre , Wayanad, Kerala” is approved for the partial fulfillment of the requirement for the degree of Master of Design in Product Design.

Internal Examiner:

Date:

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## ABSTRACT:

Indian design has always been indebted to its traditional design sector for identity within as well as outside India. The traditional design sector contributes significantly to the national income & accounts for 15 to 20% of country's manufacturing workforce. A lack of technological and design up gradation, the changing preferences of consumers and sometimes unethical policy level decisions have hit this creative and accomplished sector severely.

The internship at URAVU Bamboo Training Center & URAVU Eco Links has helped me to understand traditional design sector and Bamboo as a new scope for sustainable design approach. It helped me to understand the material at depth & inspired me to go very close to nature & eco friendly design.

It was a decent & happy approach to understand material from the local art & tradition inspired artists in the lush , green Wayanad district. Initial motive to work in Bamboo eventually blossomed into understanding the traditions , culture & rich heritage of the place which itself resembles heaven in the God's Own Country.



## ACKNOWLEDGEMENTS:

My work during the internship would not have been possible without the kind assistance and contributions from the many people to whom I am deeply indebted.

I thank Mr. M.Baburaj , President of Uravu Training Centre, Mr. Surendranath, Chief coordinator, Mrs. Corrinne Karalaganis, Project Management, Uravu Eco Links, Mrs. Nibha , Creative Head, Mr. Vicente Weill, Mr. Sadique ,Bamboo Constructions coordinator, Mr. Raju , Materials coordinator, Mr. Baletan, Mr.Thomas.

My sincere thanks to Mr. Rakesh, Mr. Lenin C.P. , Mr. Arun ( Main Artists & trainers at Uravu ) & other Staff at Uravu, Uravu Eco Links & Urvara bag unit for their time, patience & support to help me making the things possible.

My Special thanks to my colleagues, Sony Priyadarshini, Hirom Ulemba, Nikhil Kunnath, Ashrita Shetty & Shashank Gautam for their whole hearted support..

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Not forgetting Mrs. Andrea Noronha , Design expert in Bamboo furniture for her support.

To Industrial Design Centre for giving this opportunity to intern.



## OVERVIEW OF URAVU BAMBOO RESEARCH CENTRE & URAVU ECO LINKS



### 1.1 INTRODUCTION

#### LOCATION

#### WAYANAD

Wayanad is located in the North-Eastern part of Kerala. It is a land locked district bordered by Coorg, Malappuram, Kozhikode and Kannur districts. Wayanad is at a distance of about 67 km from Kozhikode. It is connected only by road. The name wayanad literally translates into the land of forest and even today, it has large tracts of virgin forests, wild life and blissful nature trails that enlighten your senses. Wayanad witnesses the relics of New Stone Age civilizations in the forms of engravings & pictures in the caves of Edakkal and Ampukuthimala. The best time to visit Wayanad is between August and March.

#### THRIKKAIPETTA

Thrikkaietta is a pretty charming village nestled in the Wayanad district of North Kerala. It is blessed with rice paddies and plantations of banana, coconut, coffee & rubber, surrounded by the picturesque backdrop of Western Ghats. Besides farming, the residents have mastered the art of beautiful handicrafts, earning it the nickname, Bamboo Village. Living in the bamboo village feels like discovering a whole new world. You can walk for hours in the luscious green surroundings in the village. The village eminently exhibits the modest farming lives. Have a hot cup of tea at a village stall or enjoying the delicious food gives you a new sense of enjoyment. One can hike into the surrounding hills, volunteer with household chores, interact with the gifted bamboo craftmen, participate in local musical & cultural festivities & dive into the ecstasy of simplicity of life in this beautiful village.



## 1.2 URAVU OVERVIEW

In Malayalam, URAVU means a spring,source of water, source of life , creativity.

**URAVU** is a non -governmental organization registered under the Indian Trusts Act who work with people, governments and private businesses as a development partner Establishing sustainable rural micro enterprises based on the processing and value addition of local, natural resources is the major challenge taken up by Uravu. URAVU mainly works with Bamboo and implements end - to end programs in the bamboo sector. The core team of URAVU consists of URAVU Eco links, IN:CH architects and planners & PMC which is based in the city of Bengaluru.

**URAVU Eco Links** operates in three main areas: Development of the Bamboo Grove tourism project, construction with bamboo and sustainable materials, and bamboo trading. The main objective of carrying out the business of manufacturing and trading in eco friendly agricultural/ horticultural products and handicraft products made of bamboo, reed , cane and other such natural materials. It operates as the marketing and implementation agency for URAVU's bamboo products and activities.

An important goal is to promote, develop and encourage eco- tourism ventures.

IN:CH architects and planners,Bangalore is a transcultural and inter disciplinary organization which aims to bring positive changes through design & innovation to all strata of the society by bringing together Indian & Swiss cultures.



### 1.3 KEY OBJECTIVE

Improving socio- economic status of women and marginalized social groups through sustainable enterprises. Access to natural resources is the key to the well being of rural people , particularly tribal communities. URAVU has developed around 20 Micro enterprises for bamboo craft, bags, jewellery, bamboo blinds, kitchenware, bamboo shoot pickles and other food products.

URAVU encourages eco friendly Community based tourism along with the provision for adapt knowledge & training in the Bamboo Craft & Art to the local artists. Special training programmes are conducted by the research centre . Bamboo planting was initiated by URAVU to maintain & enhance the natural resources in the Bamboo Village. This has helped to nurture & develop the local cultural heritage among the people from the Bamboo Village .



Ever since its inception, URAVU has excelled in the field of Art & Craft in the field of Bamboo. The various products consists of beautiful lamps, file holders, traditional masks, Bamboo mural paintings, Bamboo jewellery.

The local artists work hard & with devotion to come up with some innovative & novel concept every day. Special trainings are conducted to various other macro units & also for disadvantaged people.





URAVU has initiated Community based tourism in order to accelerate the eco friendly approach in conserving the environment. Around 6 home stays have been developed by tie up with some foreign agencies like Adieu, France and Village Ways, UK.

URAVU took a major leap into Bamboo construction since 2006. Bamboo Grove, a major project is being developed under caring hands of URAVU Eco Links & IN:CH Architects & planners. The construction team looks after the innovative use of Bamboo as construction material.

Rain water harvesting, decentralized waste water management, Biogas plant for cooking are the main highlights of the project in this village of Thrikkaietta.

## **UNDERSTANDING BAMBOO MATERIAL AT URAVU**



### 2.1 INTRODUCTION TO DIFFERENT SPECIES OF BAMBOO

#### A VISIT AT URAVU'S BAMBOO NURSERY

Bamboo is a type of grass & belongs to a grass family called as Gramineae Bamusoideae. There are around 1250 variety of species of Bamboo. In China itself there are around 400 species of bamboo. India is the second highest with 136 species. In Kerala, one can find 28 species of Bamboo of 8 genera. It takes around 3 to 5 years for the complete normal growth of a bamboo grass. It has a lifespan ranging from 30 years to 100 years. A normal Bamboo consists of 70 % of seeped in water.

At strength level, bamboo material is strong along the outer skin, as the inner portion mostly consists of watery section.

Different varieties of Species of Bamboo are as follows:

ELEPHANT BAMBOO  
LAATHI BAMBOO  
ORNAMENTAL BAMBOO  
OCHLANDRA TRAVANCORICA  
BUDDHA BAMBOO  
OXYTENANTHERA STOCKSII  
WHITE LEAF  
THYRSOSTACHYS OLIVERI  
BLACK BAMBOO



## 2.2 PROCESSING & PRESERVATION OF BAMBOO

Processing & preservation of Bamboo requires low investment. Chemical preservation (with or without the help of special equipment) ensures long term protection. Depending upon the method of bamboo treatment, chemical preservatives can impart short term or long term protection. With a few exceptions, chemical preservatives to protect bamboo against biological attacks and degradation are toxic. Selection and application has to be done with great care to meet performance environment requirements and safety while making the new products out of Bamboo.

Depending upon the carrier solvents, bamboo preservatives are divided into 2 different categories: Non-fixing and fixing type preservatives. Non-fixing preservatives will leach out the bamboo when exposed to rain. In other words non-fixing type preservatives are NOT suited for outdoor use.

Non-fixing bamboo preservatives mainly consist of boron salts, which are effective against borers, termites and fungi (except soft rot fungi). These boron salts are dissolved in water. After treatment, the water evaporates leaving the salts inside the bamboo. They are not toxic and can be used for treating bamboo products like baskets, dry containers, etc. which come in contact with food products

## MAKING MINIATURE NOVELTY & CRAFT ITEMS



#### 3.1 MAKING OF BAMBOO PEN

URAVU initiated the training in Bamboo pen making to all the macro enterprises spread across the district of Wayanad. These pens are excellent example of the craftsmanship & elegant beauty of nature . These pens are highly in demand .

I happened to learn the art of pen making from the female artisan & trainer at the URAVU Bamboo Training Centre. The pen making process involves the use of Ornamental Bamboo sections by cutting & finishing them to required precise size. The main disadvantage observed was huge amount of material wastage in order to maintain the accuracy level & fits & finish. The nib cap, end cappings & edges are done using the coconut shell as material for strength.

The final finishing is done on sanding machine . One person can produce around 10 number of bamboo pens per day on an average considering the tolerance & accuracy.



The various tools used for making a bamboo pen are as follows:

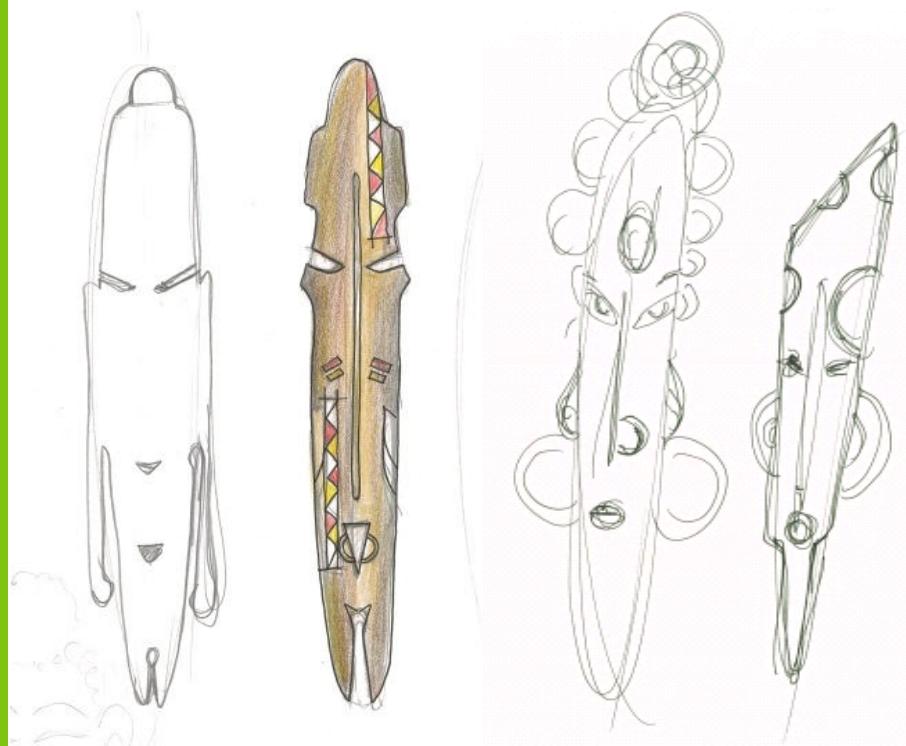
1. Hacksaw - For cutting bamboo sections along length.
2. Drill bits - For obtaining the required inner diameter & for drilling miniature holes.
3. Knives - Knives are used for taking out slivers & finishing the edges & corners.
4. File - Flat & round files are used to finish minute details of the pen during fitting.
5. Scriber - Scriber is used for marking the various dimensions along the length
6. Sand paper - sand papers of different grades are used for final finishing of the pen.



### 3.2 INITIAL TRIAL WITH MATERIAL

In a pursuit to understand the material I initially tried my hand at making small miniature models of toys & novelty items using sections of Bamboo. This helped me to develop a hands on experience of using knives, cutting tools & finishing the edges to get the joinery right.





**SKETCHES & IDEATION**



### 3.3 BAMBOO MASK MAKING

Every mask has a story behind it . The beautiful masks at URAVU mesmerized the artist in me to measure my skill level in this particular form of art. The masks at URAVU look lively and alive and speak mostly about the culture & story behind the making of mask.

I got the initial directions & instructions from Mr. Arun & Mr. Lenin CP , main artists in the URAVU Bamboo Training Centre. The major material used is elephant bamboo. A major portion of elephant bamboo spanning across a length of 2 to 3 feet depending upon the design is cut. The profile is marked on the bamboo piece & it is cut along the profile.

The rest of the pieces are accordingly cut & pasted using adhesive. The mask making involves lot of accuracy in terms of symmetry, fitment & shape. I initially ideated & sketched some ideas. The ideology was to come up with a mask depicting the calmness of Buddha. Thereby adding some kind of tribal & colourful motifs to the mask. Special details of nose & eyes were worked out with the help of machines & finishing processes.

**LEARNING MURAL ART  
&  
MAKING OF  
ERGONOMIC TABLE FOR MURAL ARTISTS**

## 4.0 LEARNING THE ANCIENT ART OF MURAL PAINTING

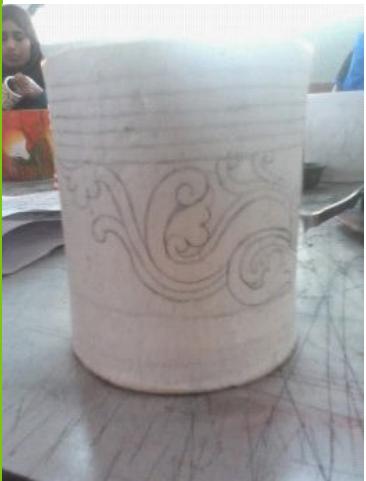
### 4.1 LEARNING THE ART OF MURAL PAINTING

The ancient Temple Art of Kerala has been conserved by some budding artists from various parts of Kerala. I happened to witness some beautiful artwork at BHAVM Murals, at Gudallai junction, Kalpetta , just 16 kms away from Thrikkaiipetta. This art centre was started jointly by Mrs. Deepa Nadarajan & Mr. Sujith. Here the artists are being trained to develop the art of mural painting on various mediums like Bamboo, Canvas, terracotta & wood. Various other techniques are explored to full extent.

I expected to learn the art of making colours with natural dyes, but surprisingly, the normal acrylic colours have taken over the traditional way fo making colours.

The Mural painting process consists of sketching the basic profile. These profiles are then filled with bright colours with gradients. This art consists of basic floral patterns & the motifs represent the Indian mythological figures & events. The the outline is then sharpened using black color. The process of making big pictures requires a lot of time considering the intricacy & details. The texture is developed by fine dot painting It takes around 2 months to complete a 6ft x 4ft Mural painting which involves lot of serious hard work, efforts and pain.I was privileged to learn this ancient temple art .





## 4.2 UNDERSTANDING THE DETAILS OF MURAL PAINTING

The Art of mural painting requires a lot of hands on training with respect to strokes, lines, curves and all other elements of design. I tried to assimilate as much as possible from the artists at BHAVM. The basic understanding of Bhava (emotions), mudras, depicting various expressions is a trick that is to be mastered.

The painting starts with sketching of basic body diagrams. The anatomy is symmetrically divided to showcase various details. The crown, The earrings, necklace has a unique style. I was impressed by the way the face & the eyes were drawn to tight accuracy level.

### OBSERVATIONS

- The mural painting follows a certain protocol with respect to drawing anatomy, for eg. the fingers, hands, eyes, eyebrows.
- The postures, movement & structure of body has a unique flow.
- There is a lot of strain in the eyes and hands while working on the murals. One requires continuous attention & tremendous amount of patience & concentration to deal with the details in this trade.
- Eventually, they hardly get paid for this amount of skill & talent exhibition as people tend to bargain with this form of art. So, some method needs to be devised for the up gradation & survival of stature of this art.



#### 4.3 PROBLEM IDENTIFICATION

It was observed that the mural artists were continuously sitting in the same posture from morning till evening. After a certain amount of time this will induce some strain in various parts & muscles of their body which may result into severe deformity & health deterioration. The process of mural painting requires abundant amount of attention & concentration which exerts the pressure on the cervical & the spine lumbar area.

I tried to analyze the process of painting by doing, Activity Analysis, observing the method of holding the miniature workpiece , brush color palette & sitting posture.

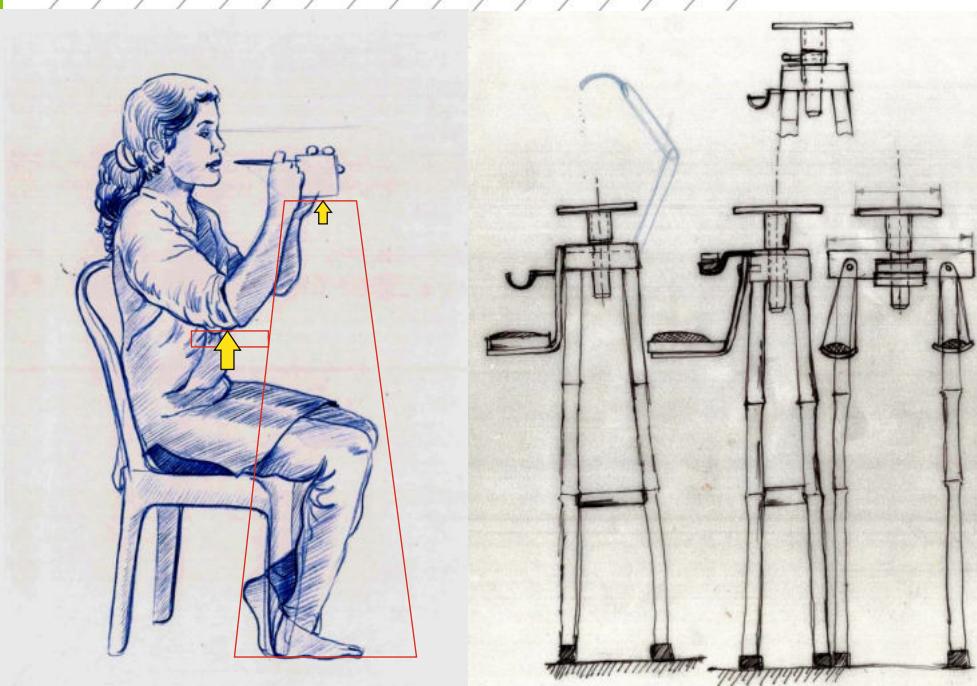
#### 4.4 DESIGN OBJECTIVE

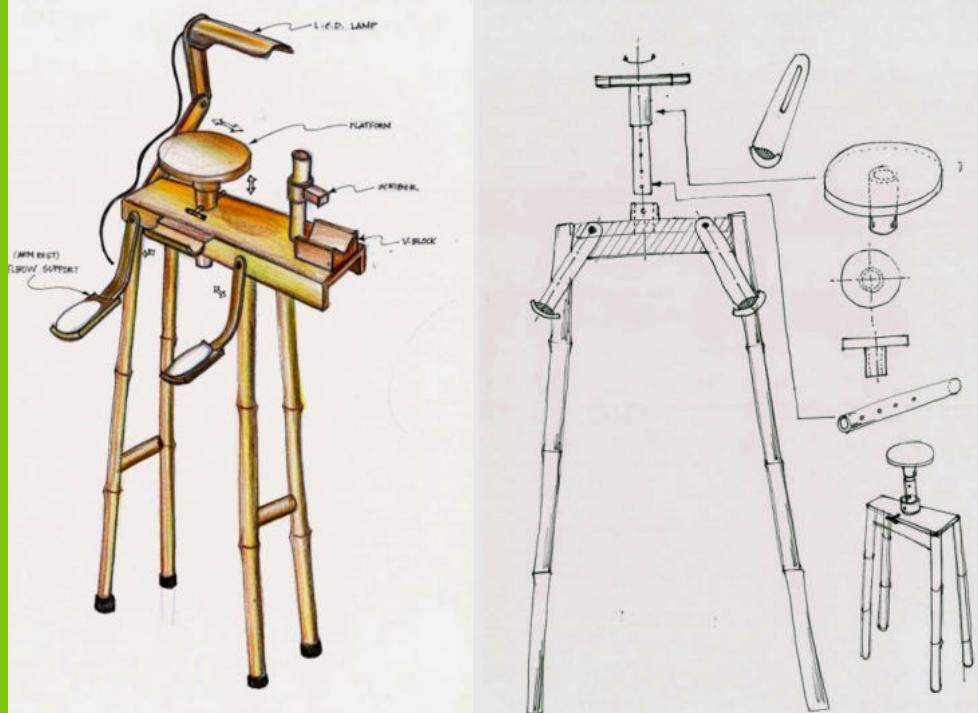
To design an ergonomic work table for the mural artist.

#### DESIGN BRIEF

To design an ergonomic work table for the mural artist which addresses to solve the following major problems:

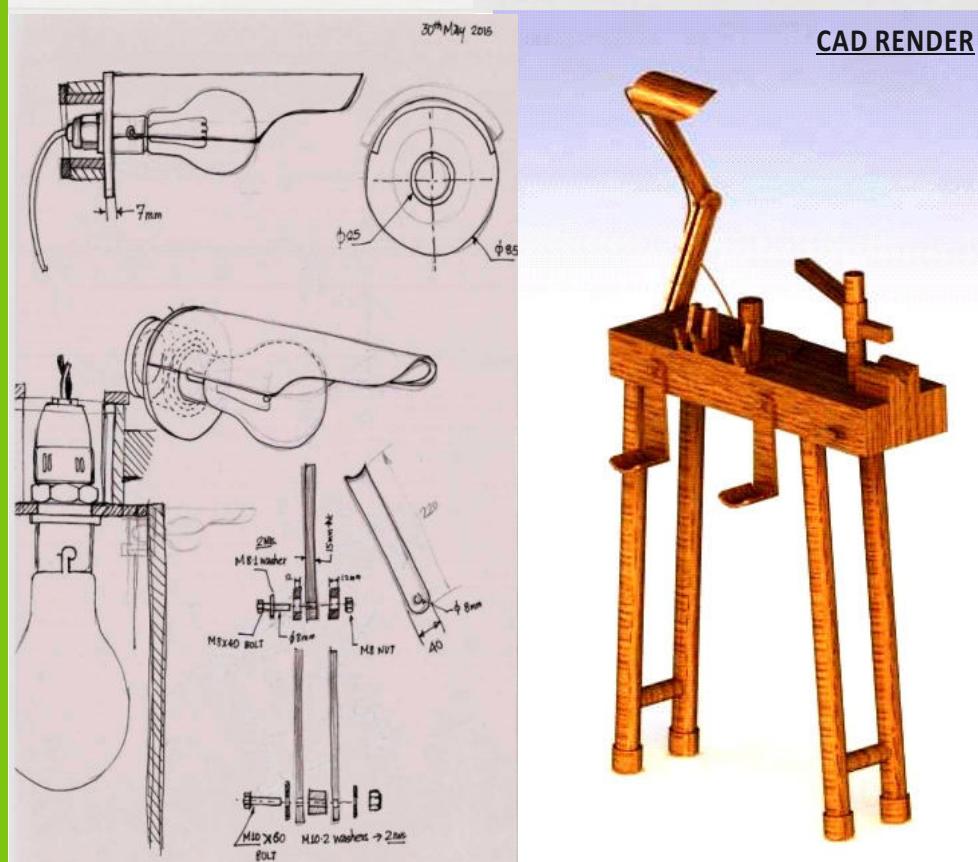
- To reduce the strain in body joints, specially the cervical & lumbar area.
- To improve the accuracy & concentration of the artist.
- To improve the lifestyle of the mural artist.
- To eliminate the stress induced in the arms.



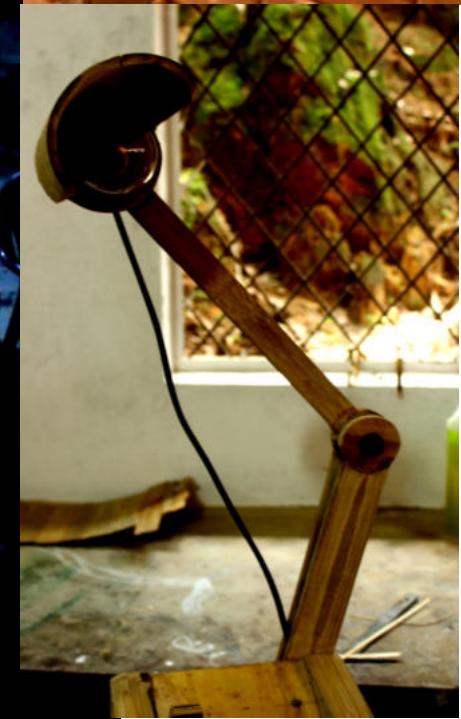


#### 4.5 CONCEPT IDEATION

The basic concept of a workbench was ideated considering all the aspects & considerations. Finally a CAD model was presented before getting the approval for making 1st phase prototype for user testing feedback. Modelling with CAD helped to envision the amount of material involved & how efficiently one can vary with the proportion & form of the structure.



#### 4.6 FINAL PROTOTYPING FIRST PHASE





#### 4.7 MAKING OF FIXTURE FOR MURAL PAINTING

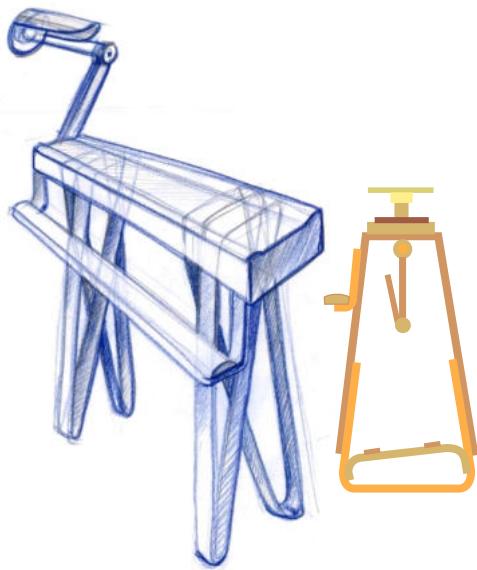
The murals are painted on a slender piece of Bamboo. This involves lot of accuracy & detailing. The artist has to hold the bamboo piece in one hand & then sketch & paint the murals on the piece. Here I tried to understand the eye to hand coordination & actions of the mural artists.

Main stress was induced on to how to eliminate the effort to hold the bamboo piece , so that the artist can comfortably paint. So, a fixture was developed which will enable the artist to adjust the workpiece, orient it at any required position so as to get some comfortable strokes.

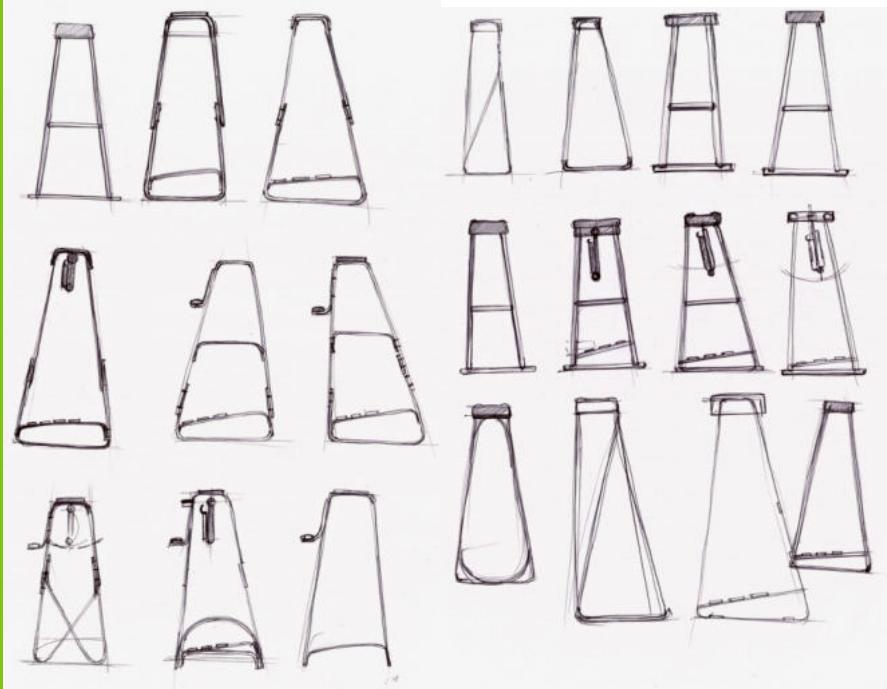


#### 4.8 USER TESTING OF THE PROTOTYPE

The first phase prototype of the workbench was tested by different users. Even the Mural painting professionals were called for the prototype testing. They used it & the results were found to be overwhelming. They appreciated the concept & mentioned some more improvements in the prototype. This prototype was also appreciated by URAVU staff and they have assured to take up this workbench for further improvement & distribute such workbenches to different mural painting artist for their welfare.



NEW FORM EXPLORATIONS FOR STRUCTURAL STABILITY



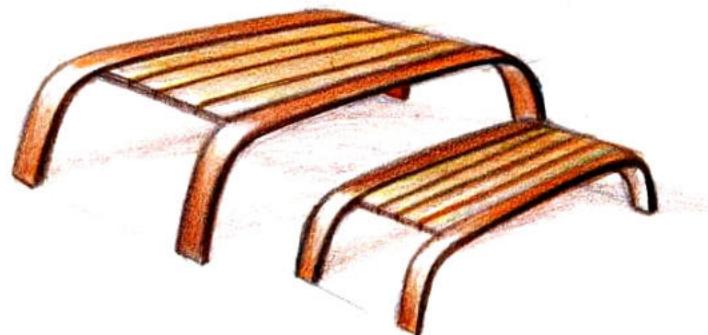
#### 4.9 FINAL OUTCOME & WAY AHEAD

The following insights & suggestions were compiled after in depth interviews with Senior faculties and experts:

1. The prototype of course needs to be balanced with more structural members . There is need to increase & widen the angle for the side members for better spread & stability.
2. There is need to work on the final form evolution & simplify the structure.
3. More options needs to be explored for utilities & accessories handling.
4. Working on the ergonomical data & aspects on the workbench to be explored.
5. Developing of strong , stable leg support at the bottom.
6. To develop an ergonomic chair as a supplementary aid for the workbench.

**DESIGNING MULTI UTILITY  
FURNITURE  
FOR  
URAVU BAMBOO GROOVE**

### IDEATION SKETCHES



stackability

### 5.1 CONCEPT GENERATION

This was my first stint to work with & understand the Bamboo as a material. So the basic idea was to come up with a simple furniture design for the URAVU Bamboo Grove Resort. The main intention was to develop a low sitting furniture which can be used for multiple tasks. The user can sit & can have food by sitting in a traditional cross legged posture.

Even a minimalistic approach was involved during the ideation to make it as simple as possible yet elegant & easy to make.

### 5.2 DESIGN OBJECTIVE

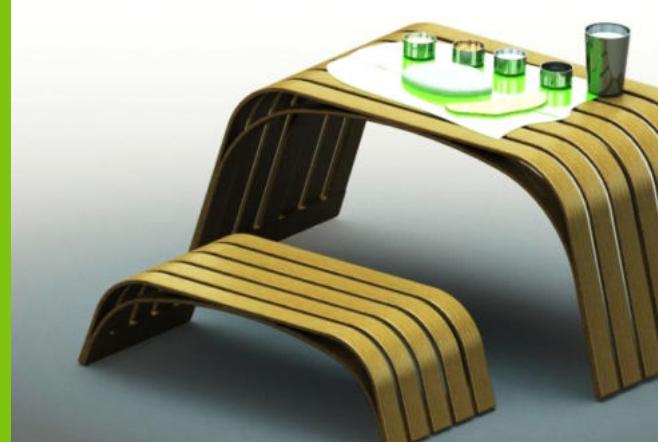
To understand the Bamboo material & design a multi utility furniture for URAVU Bamboo Resort.

It should fulfill the following criterias:

- It should be easily stackable (Space Management).
- It should be light weight & easy to carry.
- Less amount of wastage of material.
- Minimal design.
- It should be easy for mass production.

### 5.3 CONCEPT IDEATION

Concept ideation was done based on the minimalism involved in making the stool & the table. Many ideas were sketched & explored. There were a lot of discussions with the senior experts & local craftsmen.



MULTI UTILITY

Can be used for dining

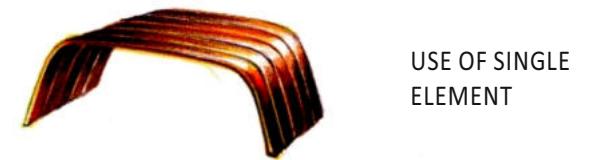


Can be used as a  
Laptop Table

## IDEATION SKETCHES & RENDERS



PROVISION OF  
BACK SUPPORT



USE OF SINGLE  
ELEMENT



Can be used to  
play games





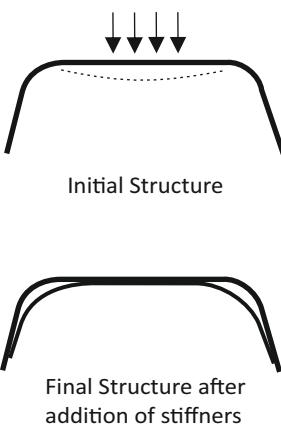
The bent profile member of the stool. The bamboo is bent using Hot Blower Gun.



Fixture for holding & maintaining the uniform gap between the members



Pre finished first prototype



Final prototype after lacquering & polishing



## 5.4 PROCESS

- First the initial basic dimensions of the stool & table were worked out .
- The bamboo slivers were cut at required width & length from the elephant Bamboo on the cutting & slicing machine.
- The maximum thickness was retained during cutting so as to reduce it during finishing.
- The bending profile was marked on a flat board & fixture was done.
- The slivers were bent as per required profile using a hot blow gun. The process involves bending of bamboo sliver at the required portion by continuous application of heat & force to obtain the profile . This involves a lot of trial & error & is time consuming. I wasted a lot of material in order to obtain & match all the profile members.
- The bent profile members were held on the fixture to maintain a uniform gap between them & were joined together using cross members on both the bottom edges. This was done by drilling holes & filling the joints using adhesive & Reed Bamboo inserts. The protruded Reed inserts are then cut using cutter & flushed to the surface.

## 5.5 OBSERVATIONS

Bamboo as a material springs back to original shape after removal of heat. So one has to be very careful while bending the bamboo along the required profile. There were differences of 5 to 7 mm the next day of bending the profile members.

The structure of stool got buckled on the application of load.

Additional profile stiffeners were added on both the sides which made the structure strong & stable.



PRODUCT DESIGN  
FOR  
**URAVU BAMBOO GROOVE**  
BAMBOO CHESS SET CONCEPT

## 6.0 DESIGNING A CHESS SET CONCEPT FROM BAMBOO

### 6.1 CONCEPT GENERATION

The initial idea of making Chess set out of Bamboo was conceived when I was playing chess with my colleague at home stay in Wayanad. If one can make beautiful pens out of Bamboo sections, why not chess pawns. Eventually the Bamboo Chess set will go handy with the furniture which was designed for the resort. The Bamboo Chess set can be even gifted to the tourists as a marketing policy. Even the Chess Set can be marketed along with the furniture set.

The basic body of the chess pawns can be done from the rounded sections of the ornamental Bamboo. Initially, a design form & language was to be developed to make all the chess pawns a family of forms.

Simultaneously easy methods had to be devised to make it easy for mass production. This may require any unskilled labour to make the sections & assembly of the chess pawns. Even the local craftsmen in the micro enterprises can be trained to make Chess Set.

### 6.2 DESIGN OBJECTIVE

To design a Chess set in Bamboo for the URAVU Bamboo Grove & for sale in the craft sector.

It should fulfill the following criterias:

- It should be easy to be produced by any unskilled labour.
- It should be easy for mass production.

### 6.3 CONCEPT IDEATION

Concept ideation was done based on the process of making pens like cutting the Bamboo sections & joining before final finishing. There was an initial need to decide upon the form factor for each pawn design.

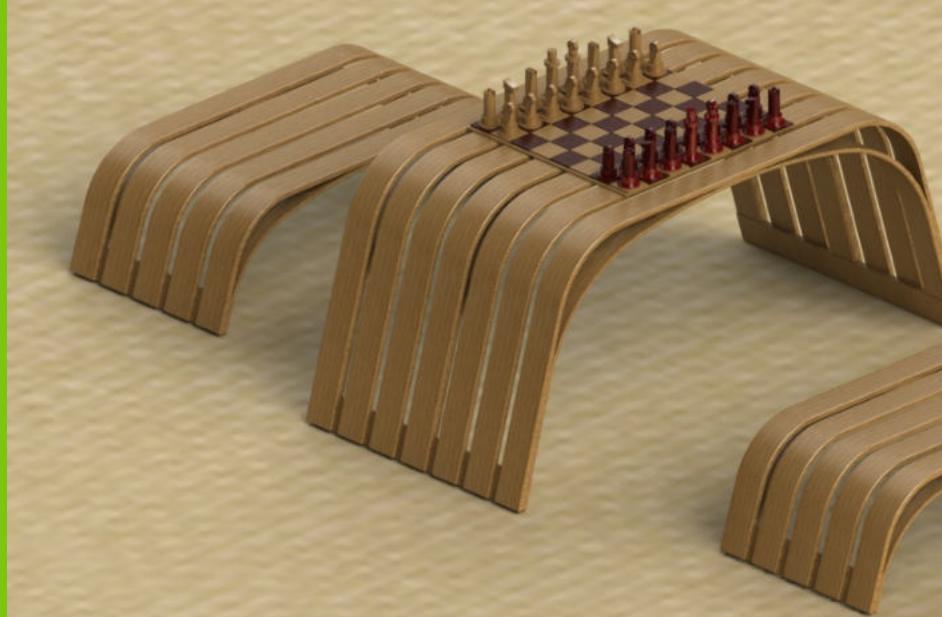
### 6.4 PROCESS

#### TO MAKE A COMMON BASE FOR ALL THE PAWNS

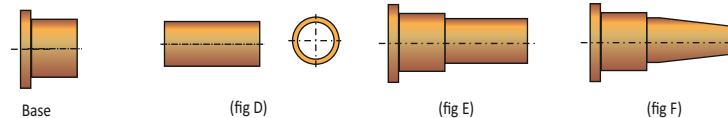
CUT THE BASE USING THICK SECTION OF LAATHI BAMBOO (fig A)

CUT THE HOLLOW SECTION OF THE ORNAMENTAL BAMBOO (fig B)

JOIN THE TWO PIECES (fig C)



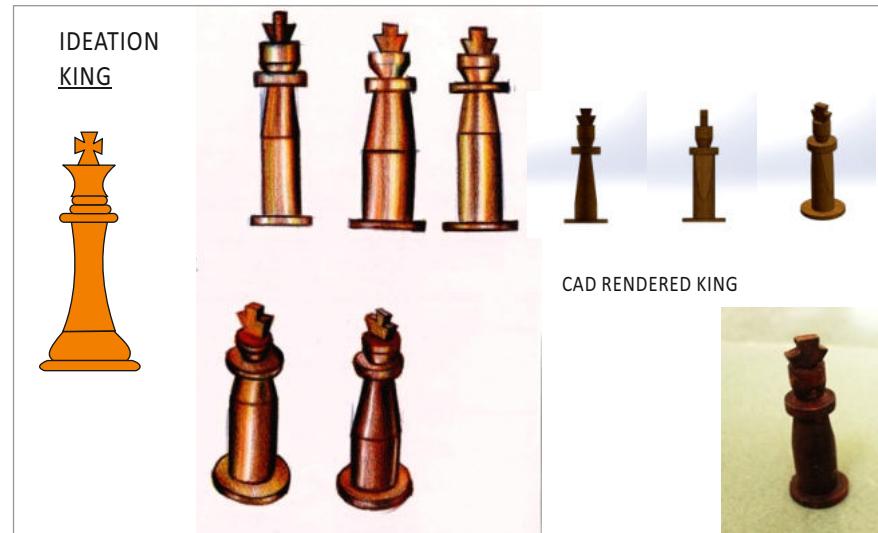
## PROCESS



AFTER DOING THE BASE CUT SMALLER HOLLOW SECTION OF ORNAMENTAL BAMBOO TO MAKE THE BODY (fig D)

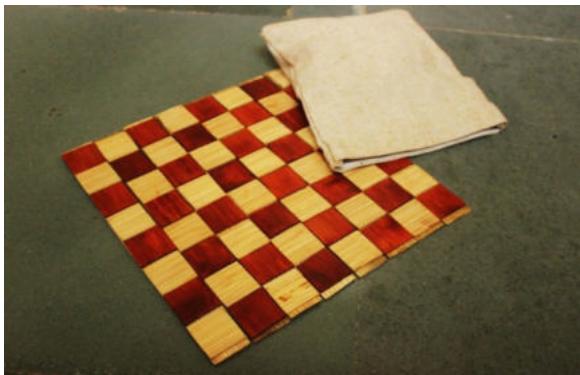
JOIN THE BODY WITH THE BASE (fig E)

WORK ON THE OTHER DESIGN FEATURES BASED ON THE SAME IDEOLOGY (fig F)





OPTION 1  
FOLDED WOVEN CHESS  
BOARD



OPTION 2  
FOLDED PLATES CHESS  
BOARD



## 6.5 DESIGN OF CHESS BOARD

The next task was to design a Chess board for the pawns. All together 2 options were worked out. First option involved weaving the chess board using thin strips of Bamboo slivers. The board can be folded in the middle when not in use.

The second option was to make a foldable chess board which will consist of chequered strips. These strips will be adhered & held together by cloth & the chess board will fold like an Accordion. This will help to reduce the space while packaging.

## 6.6 PACKAGING DESIGN

Once the Chess Board & Chess pawns are finalized, the packaging design needs to be worked out in the next phase. Mostly the packaging should be made up of natural material. Materials like jute, Bamboo, hand made paper, printed cloth can be explored for getting the elegant, rich look for the Chess Board.



## FINAL OUTCOME & WAY AHEAD

The first prototype of the Chess set with all the pawns & Chess Board was appreciated by the staff at URAVU. It has been decided to take up this project forward & set up a training programme for the unskilled artisans to make the Chess pawns & boards in the near future.

The first prototype was observed by design experts & their valuable opinion was considered. Much work needs to be done on the form & design language of the chess set in the next version of prototype. New ideas are to be explored for innovative & sustainable packaging design for the Chess set.

Even the material testing & paint resistivity on the bamboo chess pieces needs to be checked.

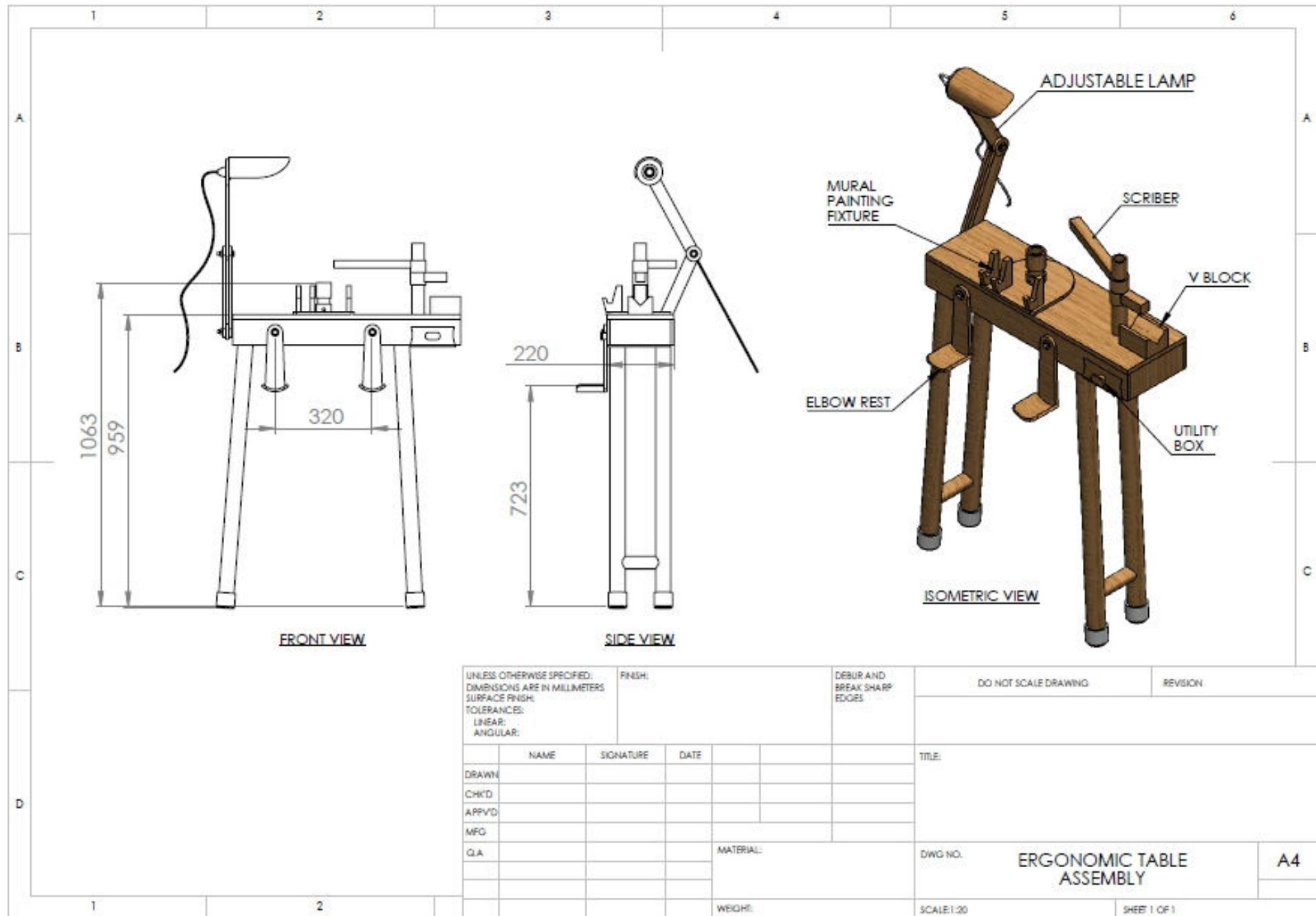


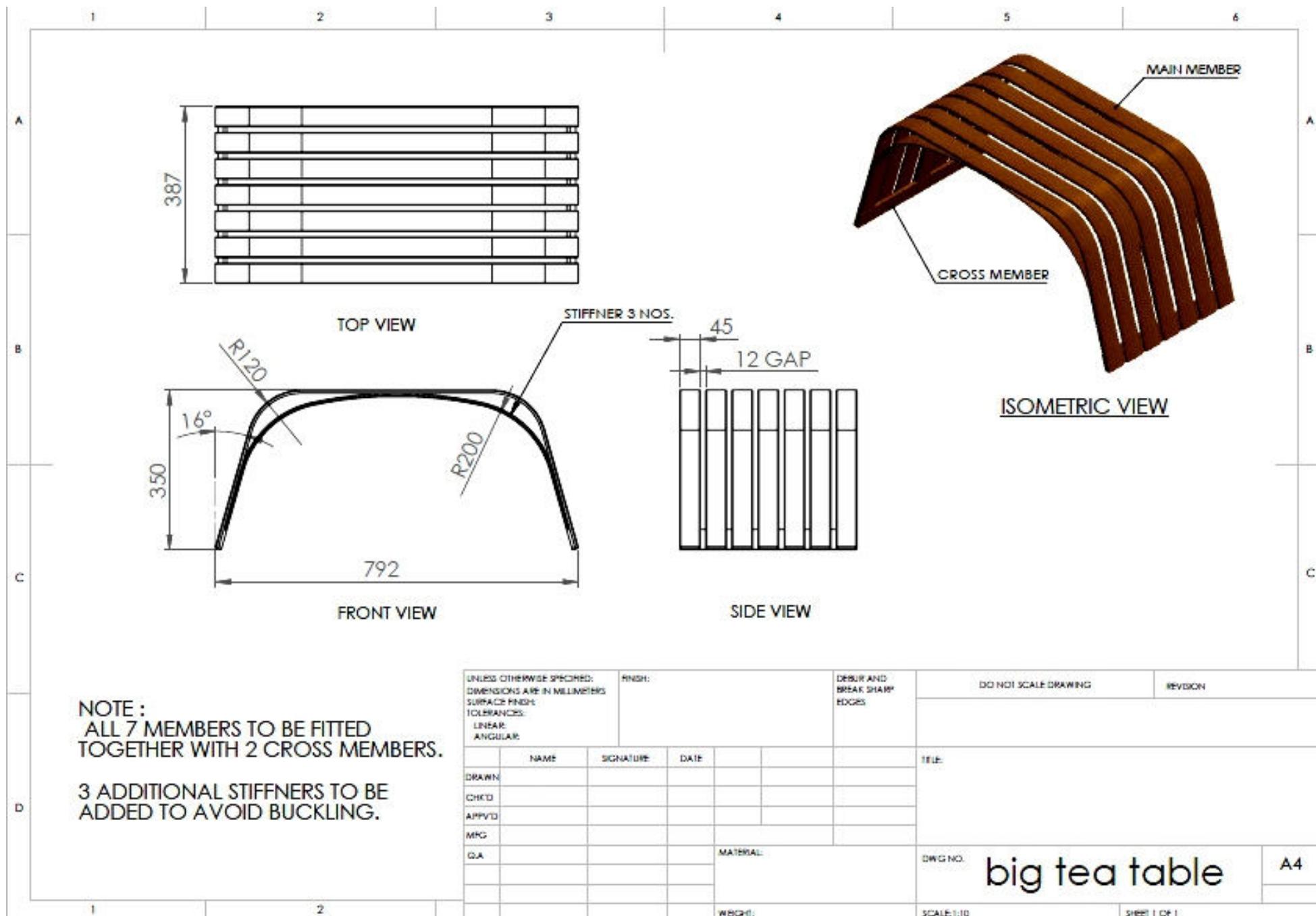
## LEARNINGS

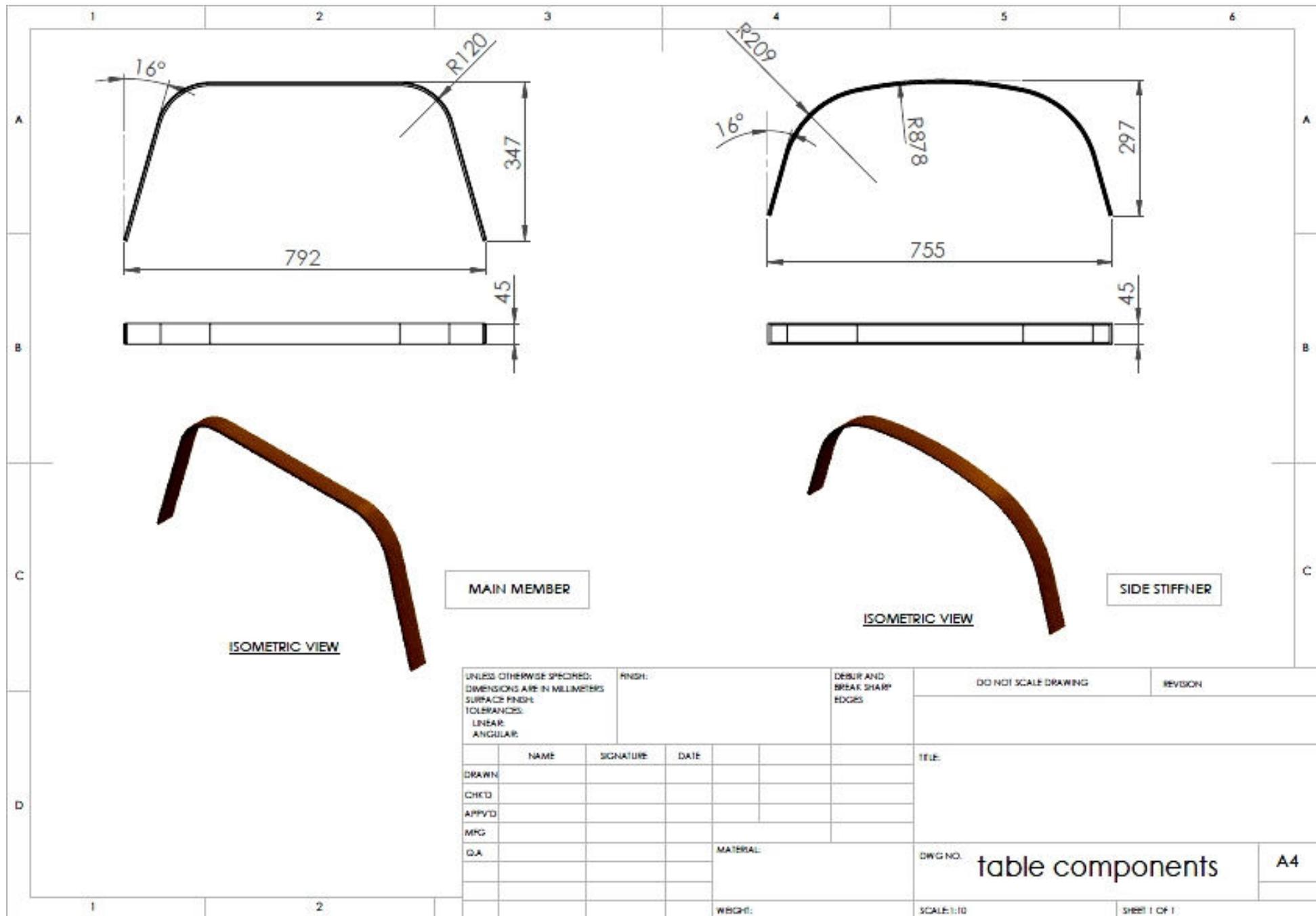
- 1) Relooking into the lives of the local craftsmen & mural artists, what they actually need & want.
- 2) I could apply the learning from the Applied Ergonomics module in IDC and used it for understanding the bio-mechanics of the craftsmen.
- 3) I learnt how to make quick & easy miniature prototypes, which gave me a sense of what the entire scale of the structure would be.
- 4) Testing of the first rig prototype with the end user helped give me a sense of what my own concepts might manifest into a tangible sense.
- 5) I was able to gather a lot of details about Bamboo material in depth & various processes, from the local artisans, craftsmen.
- 6) I understood the value of maintaining good relationships, to mutual understanding from the simple balanced working environment at URAVU.
- 7) Time management was the main strength of the whole internship. How to juggle all the tasks , as per the suitable working conditions.
- 8) By spending time with different people & artists I learnt that as a designer we need to strive a lot & work intelligently to give the local art & craft a repositioning , a value to be reckoned in the market.
- 9) Biggest learning was the ability to gauge the nature of material even though it took a lot of time to achieve that level of understanding.
- 10) I was exposed to lot of ideas and techniques from all the artists & eminent designers all across the country in workshop conducted at URAVU.
- 11) Together with my colleagues I learnt how to be really critical with each others ideas and concepts. Daily we had discussions over various design theories & various great designers which in fact helped me to improve my knowledge.
- 12) Last but not the least, this internship brought me close to the nature & increased my curiosity to design more sustainable products.

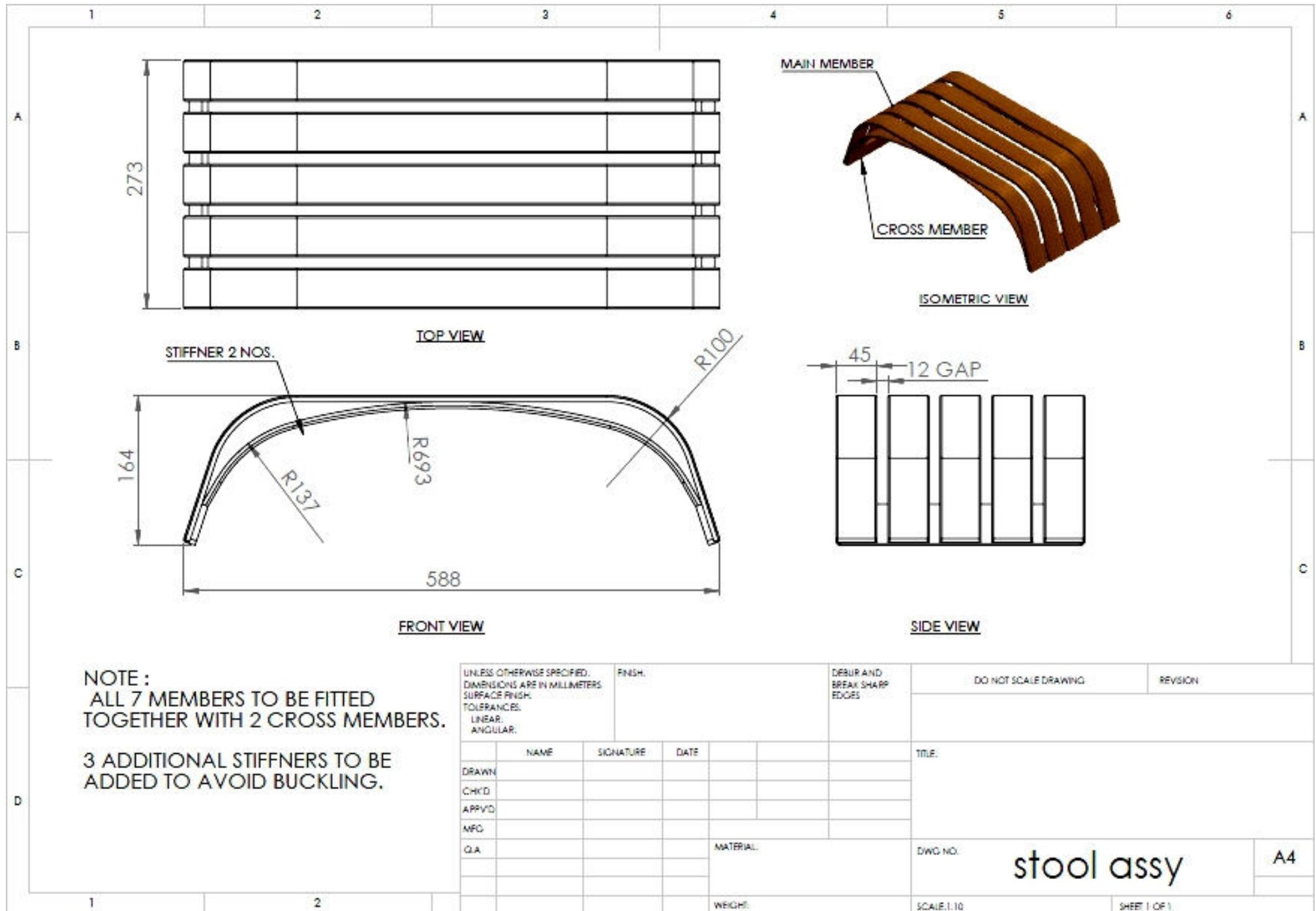
## **ANNEXURES**

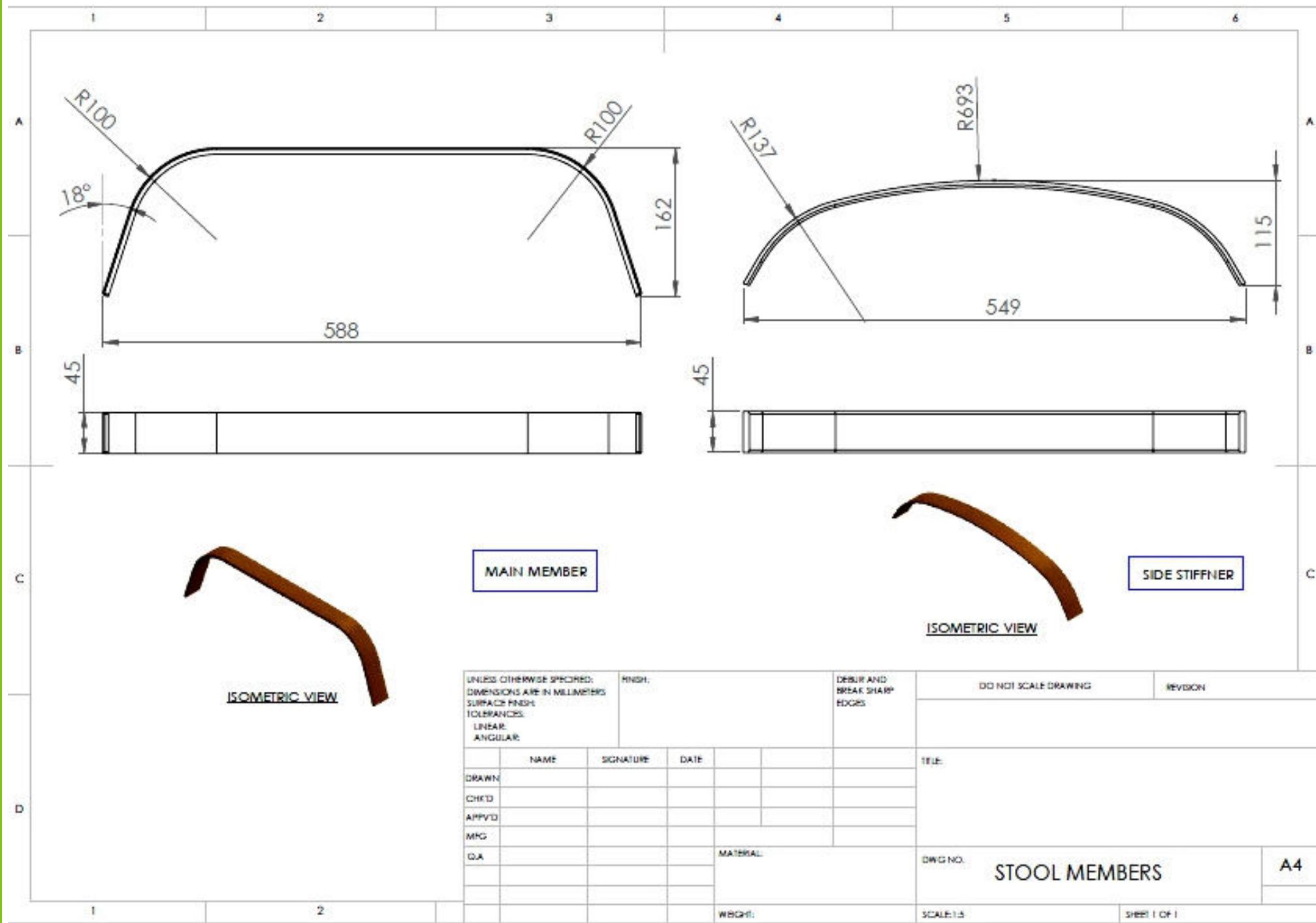
- ANNEXURE 1: ENGINEERING DRAWINGS**
- ANNEXURE 2: OFFICIAL DOCUMENTS**

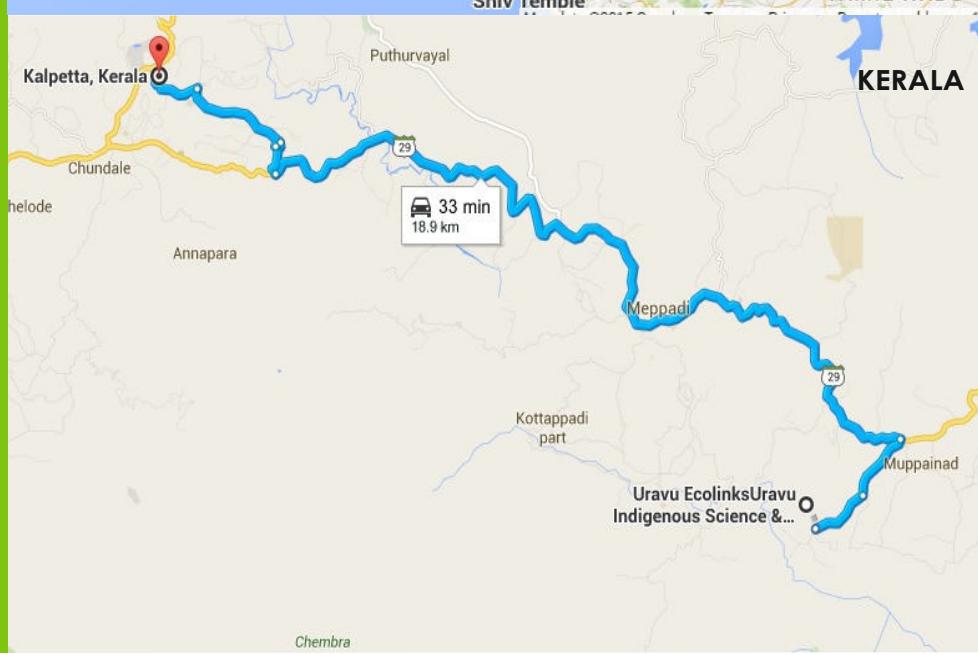
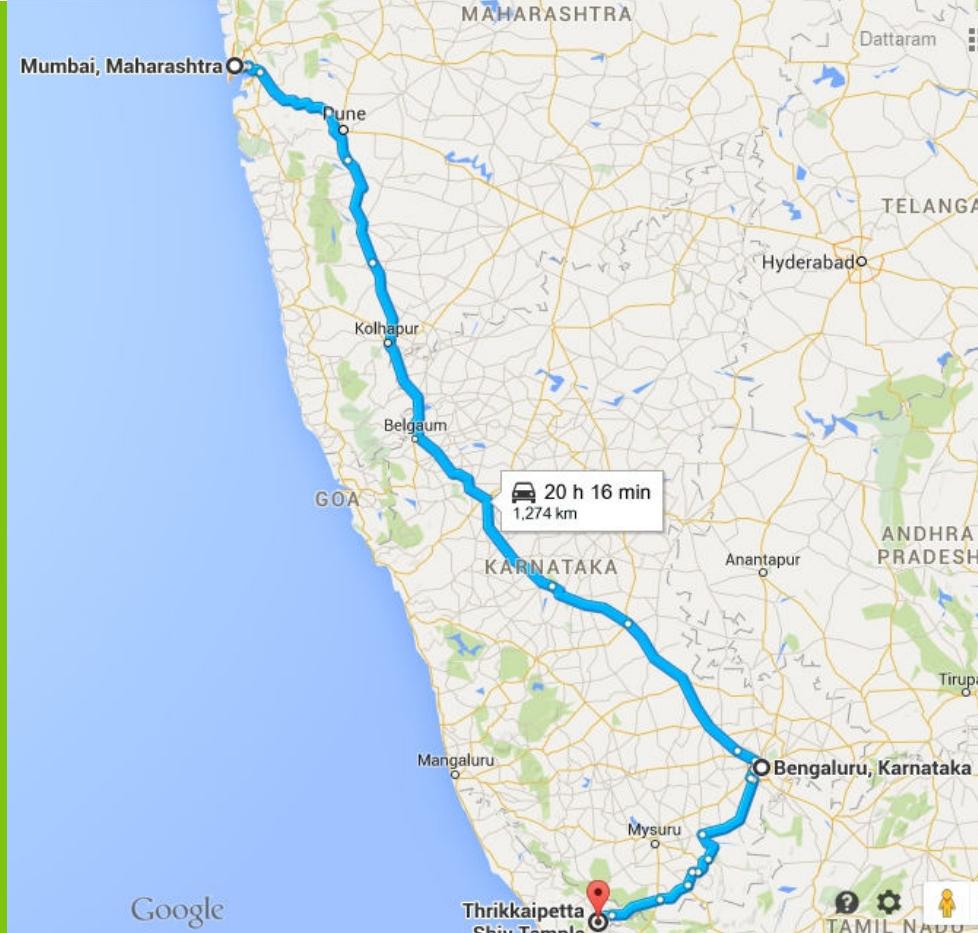












## LOCATION & CONTACT DETAILS

Address:

### URAVU

Indigenous Science & Technology Study Centre

Thrissur, Kerala - 673 577,  
Kerala, Ph : (04936) 231400

email: uravu.india@gmail.com

website: [www.uravu.net](http://www.uravu.net)

Contact:

Mr. M. Babu Raj + 91 9747075610 (President)

Mr. Surendranath C. + 91 9605770702 (Chief Co ordinator Marketing)

We got introduced to the Uravu Bamboo Centre by students from Senior batch. They had their summer internship at the same place in 2014.

We travelled by bus from **Mumbai** to **Bengaluru** route. It was a night long journey of 15 hours followed by 6 hours journey the next day to **Wayanad** via bus travel. We boarded down at **Kalpetta** which is a town in Wayanad district & which is located 72kms away from Kozhikode.

**URAVU**

—INDIGENOUS SCIENCE & TECHNOLOGY STUDY CENTRE

Regd.No. 122/96, Thrikalipetta P.O.  
Wayanad Dist., Keralam - 673 577  
Phone: 04936-231400, 275443  
e-mail: uravu.india@gmail.com  
website: www.uravu.net

Ref:

Date: .....

11-07-2015

This is to certify that Mr. Chari Dattaram Gajanan, student from Industrial Design Centre, IIT Bombay has completed his Internship with us from 8<sup>th</sup> May to 10<sup>th</sup> June 2015 and has worked in the field of Bamboo furniture, Chess set, Mural painting, Masks, Ergonomic table to aid mural painters. We are happy the way Mr. Chari Dattaram Gajanan has undertaken his responsibility.



For URAVU  
President / Treasurer

### COMPLETION CERTIFICATE:

**The Summer Internship duration at URAVU : 8th May 2015 to 10th June 2015**

Internal Examiner:

Date:



## BIBLIOGRAPHY

Reference Image : <http://www.dealsandyou.com/homestay-in-wayanad-kerala>

Reference Image : <https://www.indiegogo.com/projects/uravu-community-centre>  
<http://www.uravu.net>

<http://www.guaduabamboo.com/preservation/chemical-bamboo-preservation>

Reference Image : <http://bhavammurals.com>

Reference Image : <https://www.google.co.in/maps>

