Spring 2013

Star-Taker: Reconnection- An ancient solution to a contemporary problem

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James Madison University

Star-Taker: Reconnection

An Ancient Solution to a Contemporary Problem

A Project Presented to

the Faculty of the Undergraduate

College of Visual and Performing Arts

James Madison University

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in Partial Fulfillment of the Requirements

for the Degree of Bachelor of Science

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by Jaclyn Nicole Smith

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Accepted by the faculty of the Department of Studio Art, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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INTRODUCTION

We are not separate entities from time and space—we are all connected to it. It is quite humbling to think about the vastness and mystery that comes with the sky that surrounds us. But once we realize that we are a part of the universe, we can begin to see things differently. We can realize that despite all of our earthly differences, this one thing brings us together. “The boundaries we place between us vanish when we look skyward” (Wujec 2009).

Tom Wujec (author and expert on how we share and absorb information) argues, “Progress is simply a word for change. And with change, you gain something, but you lose something.” While modern conveniences have allowed us speed and precision of becoming informed, through this we have lost our connection with the universe. We have lost sight of our context in this large place. We are disconnected from something so great that we are all a part of. “Children can identify up to 1,000 corporate logos, but fewer than 10 plants or animals native to their backyard” (Hall 2009). It is obvious that our priorities have become mixed up somewhere.

We rarely acknowledge this planet as part of our being, even though it nourishes and provides for us. But even beyond these earthly boundaries, the universe is part of our lives as well. As astronomer Carl Sagan once said, “We are a way for the universe to know itself. Some part of our being knows this is where we came from. We long to return. And we can, because the cosmos is also within us. We’re made of star stuff.” We are literally the product of stars; many of the heavy elements in our body come from generations of stars billions of years ago (Melina 2010). Sometimes we forget that there is more to being than school, work, and pop culture.

Through this project, I use ancient technology as a tool for reconnection, specifically focusing on youth. An astrolabe is a tool that dates back as early as Ancient Greece and was used in astronomical measures and navigation. This device can do everything from telling us the time to our horoscopes and planet positions. Before iPhones and clock-radios, people all over the world used astrolabes daily to keep them informed and connected to the world, their surroundings, and to the heavens. An astrolabe allows us to literally hold a model of the universe in our hand. Through it, we can once again begin to appreciate our place and context in this vast space.

This project focuses on rethinking and reintroducing the astrolabe in a way that transitions us away from our modern convenience mentality where we simply Google things instead of finding them out on our own. I want to get people outside and exploring, looking all around and asking questions. This project aims to inspire a mindset that feeds off of patience, curiosity, and mystery.

Figure 1. Renaissance astrolabe created by Jean Fusoris

THE ASTROLABE

An astrolabe is a two-dimensional model of the universe—a model of the heavens that you can hold in your hand. In Greek, the name means "the one who catches the heavenly bodies," or "star-taker." The device has several functions, ranging from time-telling and horoscopes to navigating to Mecca (Meech 2000). It is used by astronomers, astrologers, and navigators. Astrolabes wrap math and science into a beautifully crafted and interactive exterior.

The astrolabe is an ancient astronomical instrument that owes its original concepts to Greek astronomers. Earliest credit is often attributed to Hipparchus around 150 BCE (Meech 2000). Greeks continued to use this device throughout the Byzantine period. The earliest Islamic version of the instrument surfaced circa 8th century CE. Around the medieval era in the Islamic world, astronomical and mathematical advances were incorporated into the instrument. In 1235, Arab scientist transformed the instrument into the geared, moving astrolabe that we are most familiar with today (Bedini 1966).

Once astrolabes reached Europe, they became quite popular, especially during the Renaissance. Astrolabes were often used as educational tools for children in learning mathematical calculations. However the invention of accurate scientific instruments such as the pendulum clock and the telescope made the astrolabe obsolete in most locations by the 17th century. Thus many people around the world today are unfamiliar with what an astrolabe is and its countless affordances (Morrison 2010).

The astrolabe functions as an early analog computer for mathematical and astronomical calculations. Some of its most accepted uses include determining the following:

- planet positions
- star positions
- time
- date
- altitude
- latitude
- direction
- horoscopes
- constellation locations and visibility
- mathematical computations
- observing eclipses
- sunrise and sunset times and locations

Different iterations of the astrolabe include:

Quadrant
used to measure angles up to 90°

Spherical Astrolabe
model of the celestial sphere

Armillary Sphere
model of the celestial globe constructed from rings and hoops

Mariner's Astrolabe
used to determine the latitude of a ship at sea

Planisphere
star chart instrument in the form of two adjustable disks

Figure 2. Iterations of the astrolabe

The astrolabe is typically made of 5 pieces: the alidade, mater, plate, rete, and rule. The mater is the mother plate, containing the hours in a day and cardinal direction. The back of the mater usually has calculation scales including altitude measures, zodiac scales, and a calendar scale. The alidade privots along the back of the mater and is used as a rule and for determing altitude using passing light. The plate is generally fixed in place on the mater and has latitude and longitude lines, as well as the horizon line. The rete moves atop the plate and mater front and serves as a map of the sky above. It marks signficant stars in the sky as well as another zodiac scale which serves as the sun's ecliptic plane, or path in the sky throughout the year. The front rule simply serves as a marker and guide for aligning calculations (Wymarc 2013)

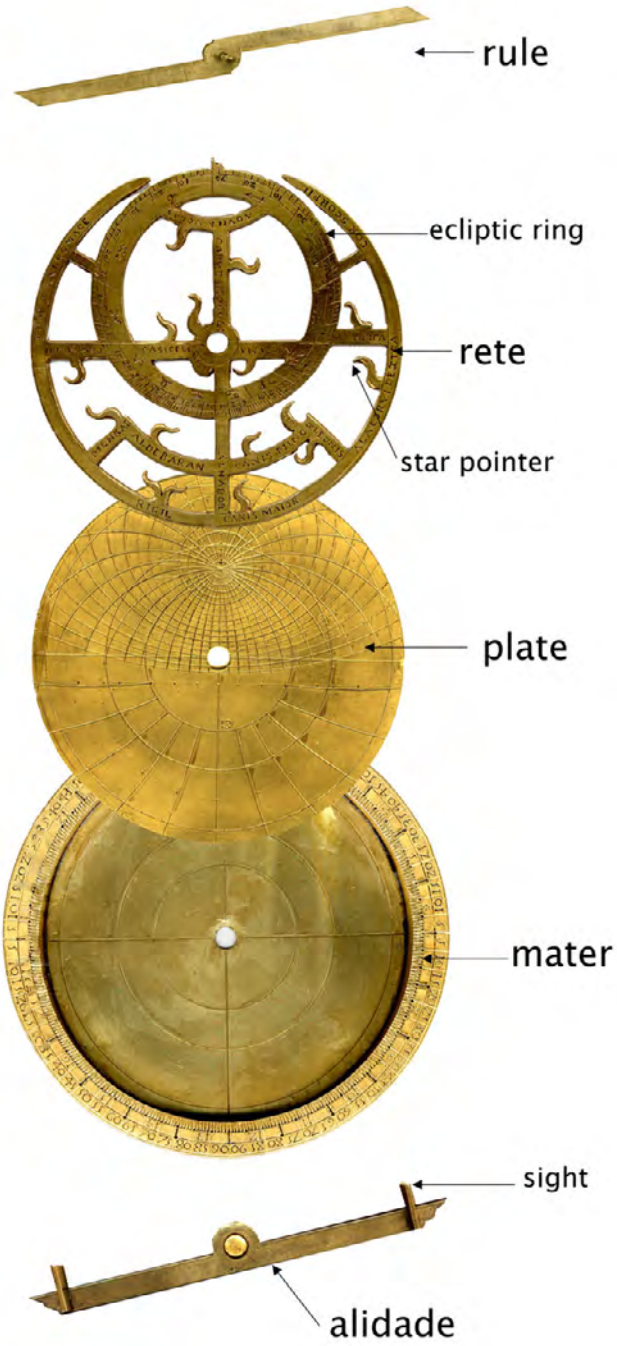
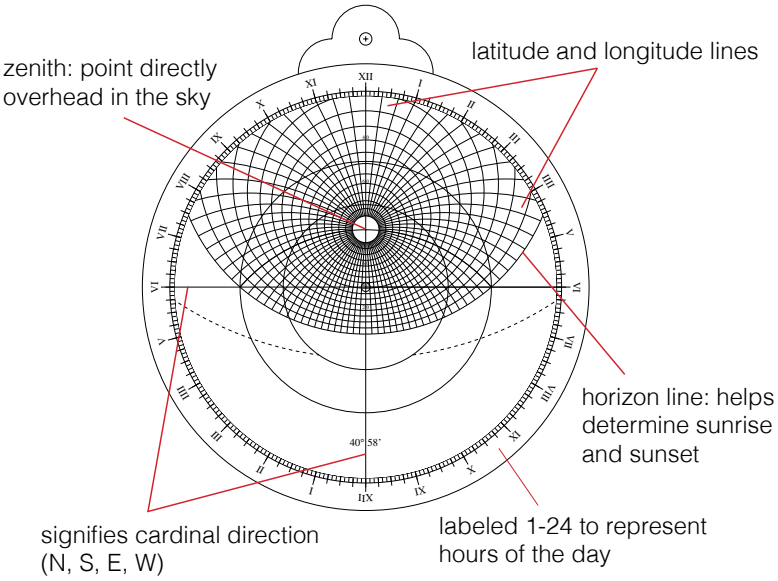
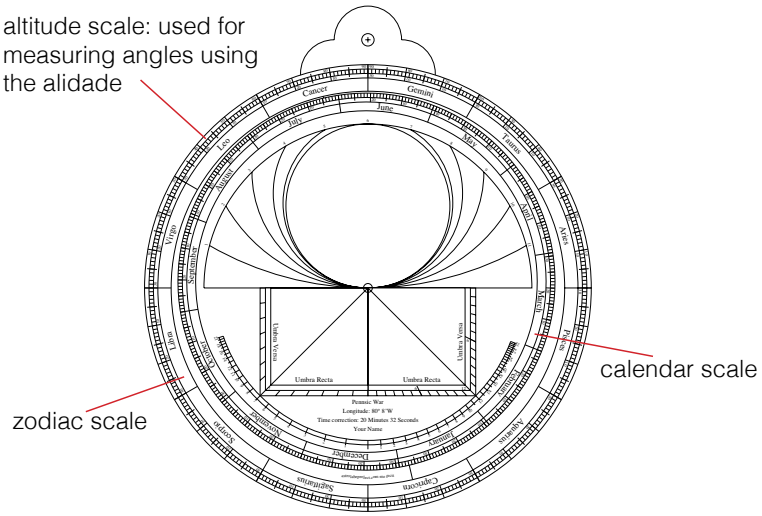


Figure 3. Parts of the astrolabe

MATER (FRONT) & PLATE

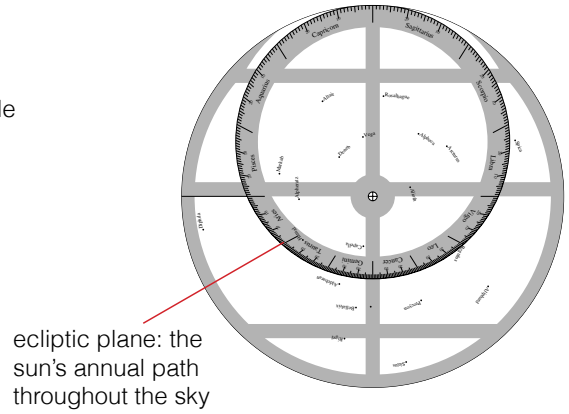


MATER (BACK)



RETE

The rete is a projection of celestial landmarks. If you look at the star chart, you can see that the rete acts as a map of the stars.



ALIDADE

The alidade (found on the back of the astrolabe) is used as a sight. To measure the angle of the sun, you would rotate the alidade so that the sun shines through the top hole and reflects down onto the rear opening.

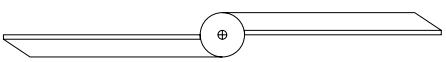


Figure 4. Piece-by-piece descriptions of an astrolabe

PROBLEM STATEMENT

How can an object reconnect our youth with the world around them?

Today, children in the United States are disconnected from the natural world. Often they are too busy with video games and other technology to make an effort to experience the outdoors. According to the Children and Nature Network, "American children spend more than 30 hours per week connected to electronic devices, but less than an hour a month in nature" (Hall 2009).

Richard Louv defines Nature Deficit Disorder as "the human costs of alienation from nature, among them diminished use of the senses, attention difficulties, and higher rates of physical and emotional illness" (Louv 2005). A majority of our children are afflicted with this "alienation from nature." As a result, ADHD is prevalent across America, and childhood obesity is at its peak. Our ever-growing youth population is, as a whole, disinterested and unmotivated with little context of their place in our world. How do we re-inspire curiosity?

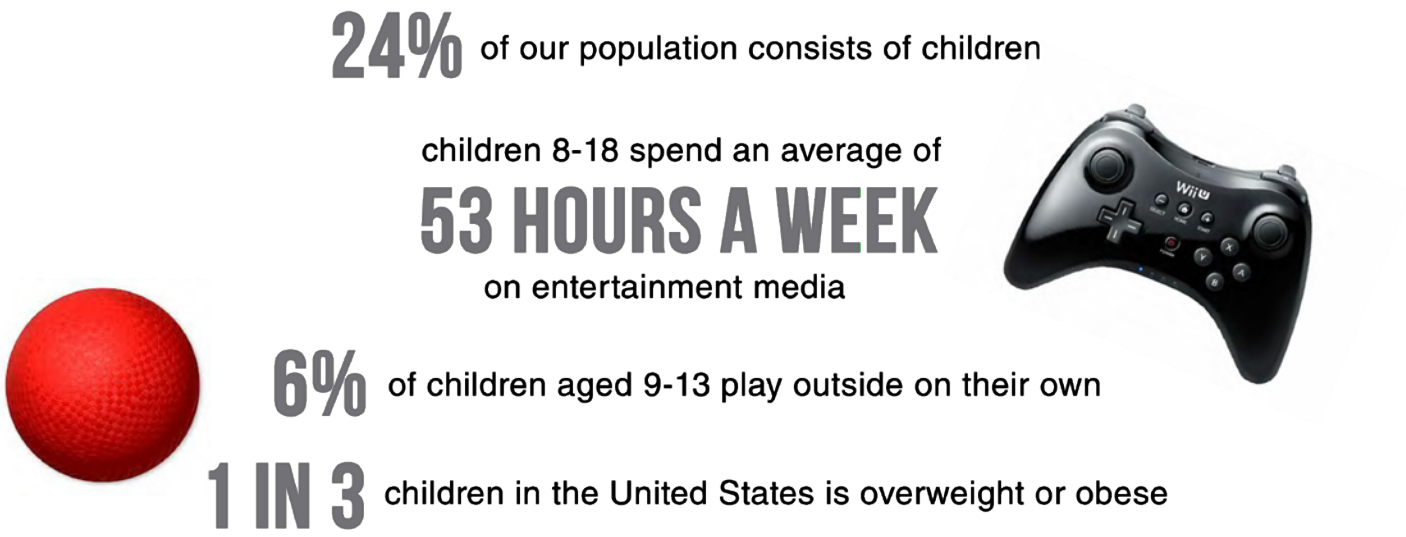


Figure 5. Statistics on children and technology

How can an object **reconnect** our youth with the **world around them?**

SOLUTION

The Star-Taker

Figure 6. The Star-Taker

The Star-Taker encourages children aged 10-13 years old to get outside and experience nature and the world around them, promoting patience and curiosity.

The Star-Taker specifically leverages the potential that lies within our next generation. By starting this connection at a young age, children can begin to develop a relationship with the universe early on, allowing an opportunity for the relationship to grow and develop over their lifetime.

The spherical shape of the Star-Taker provides an approachable and inviting outer aesthetic and encourages touch and a physical experience with the object. The Star-Taker's primary material is cherry wood. It gives a feeling of warmth while once again referring back to the connection between man and nature.

Figure 7. Star-Taker closed

The Star-Taker is formed to fit especially well in children's hands. By holding the object in their hands, children have the opportunity to better absorb the information being presented to them, and can process their surroundings on a more personal level. The hollowed interior helps maintain the object's lightness.

The object is enclosed within this sphere by a snug lid which protects the device and also provides a bit of mystery to the object, inviting its users to open and discover an exciting interactive learning tool.

The Star-Taker's interior is topped with the pieces of a classical astrolabe: the mater, plate, rete, rule, alidade, and scales. The user can flip the Star-Taker's astrolabe face for additional tools found on the rear scales.

Figure 8. Star-Taker aerial view

Figure 9. Star-Taker perspective view

Figure 10. Star-Taker turning

Figure 11. Star-Taker back side

DESIGN PROCESS

My design process does not follow a specific pattern or method, but is more of an exploration. I take what I am given and push that into the realm of things that I want to know. For this project in particular, I began with the concept of using an astrolabe as a vehicle for connection with world around us. From there, I chose a demographic to focus on. Then I listed functions of the astrolabe and investigated related objects on the market that draw interest. Collecting and manipulating the characteristics I saw fit, I developed ten rough concepts for the redesigned astrolabe. From there, I chose the one I felt had the most potential for my needs, and I created sketches and models of the object, modifying the design as necessary. This process delivered a final product.

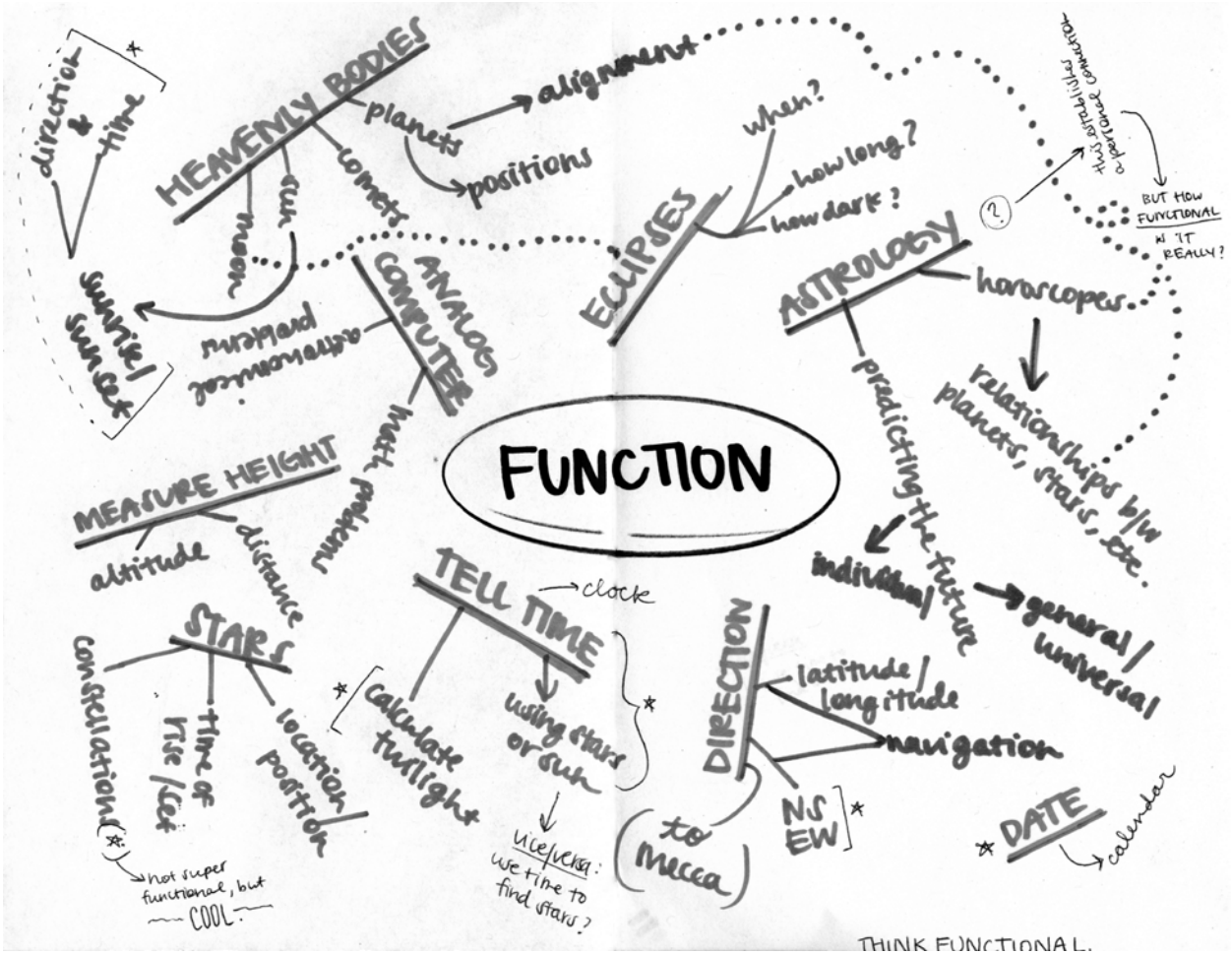


Figure 12. Early mind-mapping of astrolabe functions

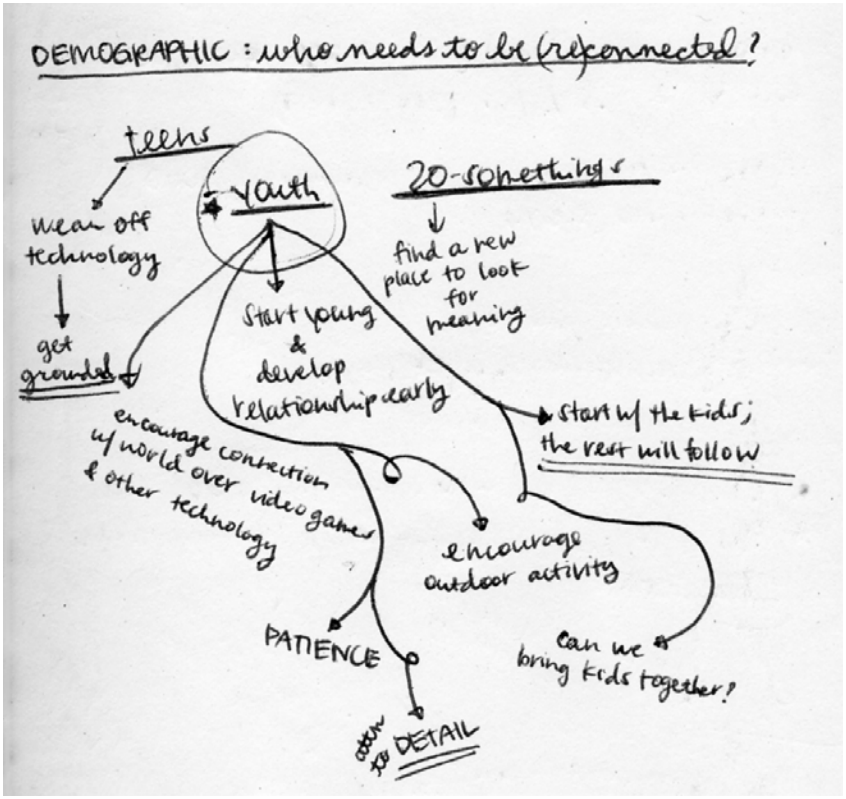


Figure 13. Demographic brainstorming

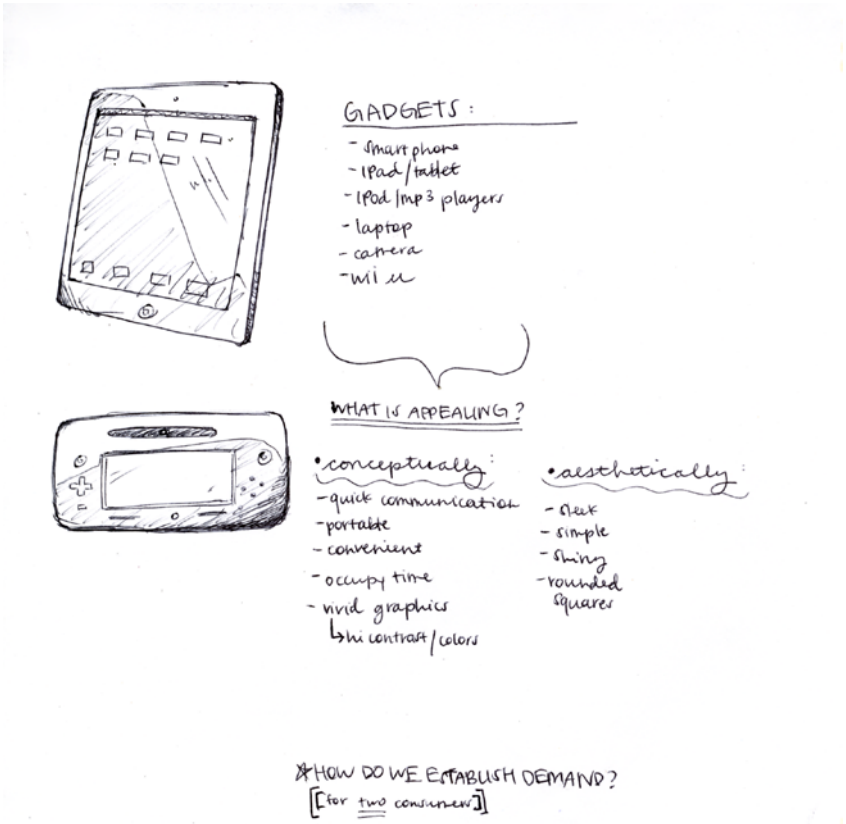


Figure 14. Market investigation

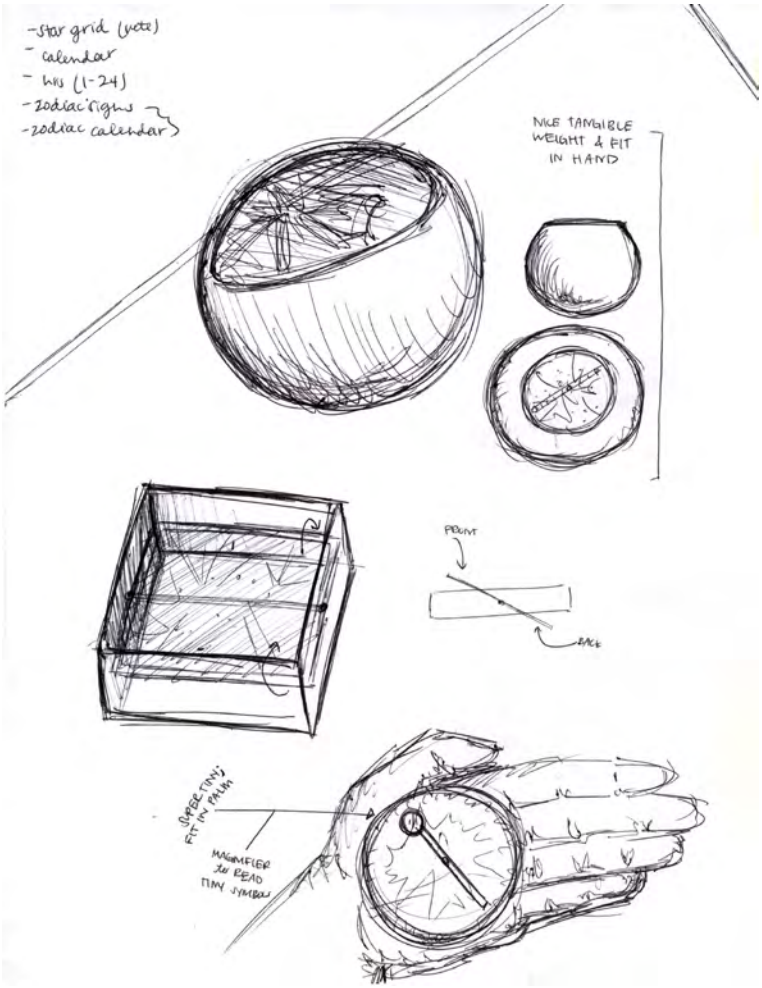


Figure 15. Early concept sketches (1)

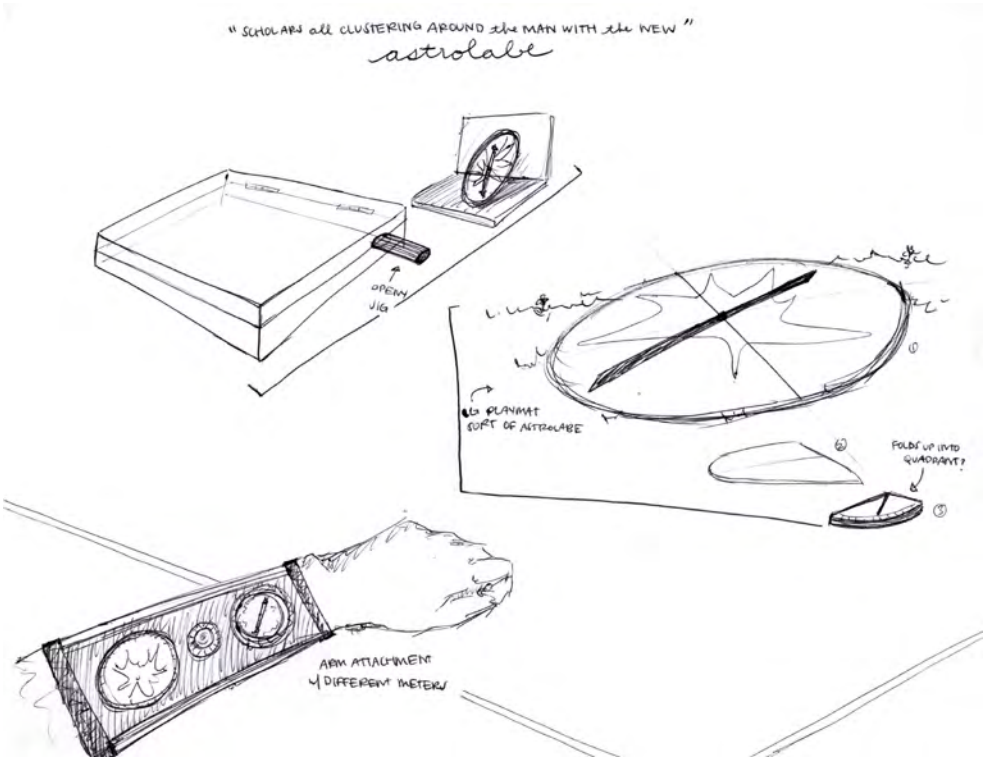


Figure 16. Early concept sketches (2)

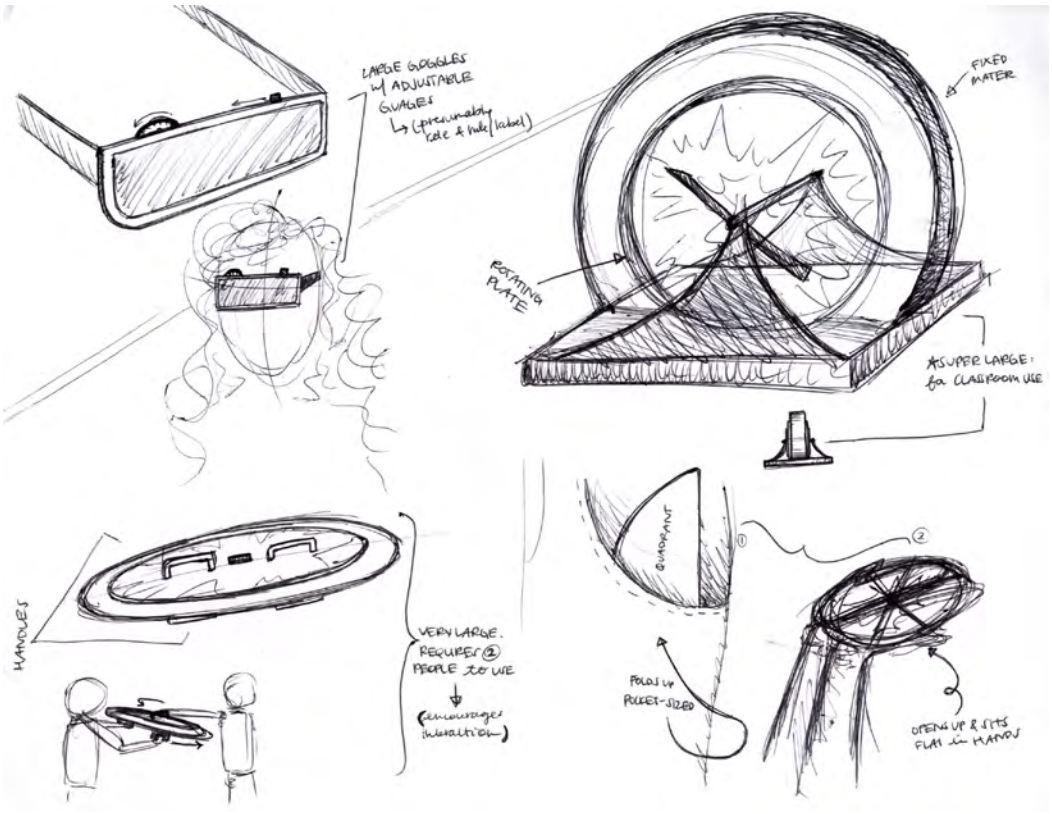


Figure 17. Early concept sketches (3)

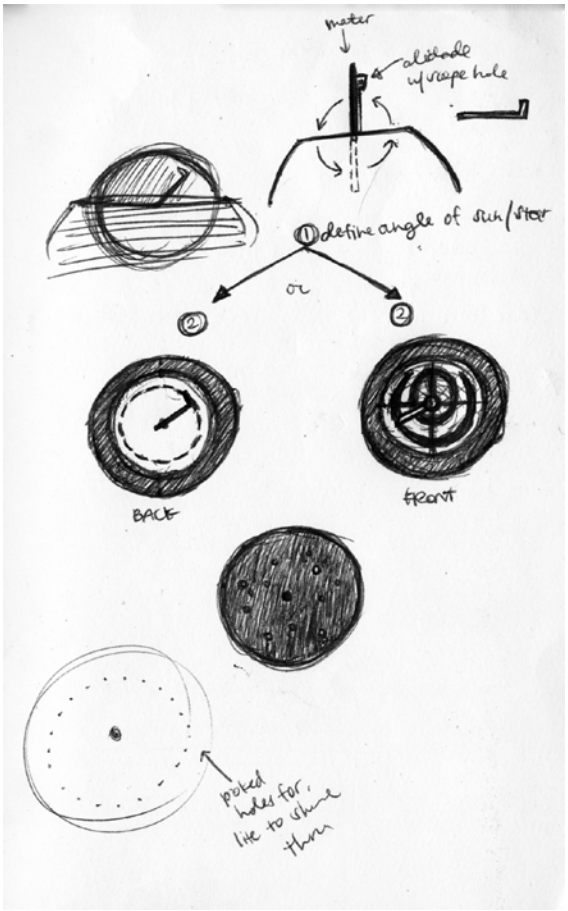


Figure 18. Design refinement sketches

MAKING PROCESS

Figure 19. Joining and planing
I joined, planed, and cut the wood into large pieces to work with

Figure 20. Measuring
I then cut the wood into 8” squares

Figure 21. Gluing up
After cutting all of the pieces into circles, I glued them on top of each other, roughly matching the wood grain, then clamped

Figure 22. Starting on the lathe
Once the pieces were dry, I put the cylindrical shape onto the lathe and began shaping the form with a hand

Figure 23. Still turning
Turning the shape on the lathe took a couple of hours of shaping and reshaping

Figure 24. Turning the inside
Once the exterior shape was finished, I cut the top part of the sphere off for the lid, and I hollowed the interior using a similar shaping method

Figure 25. Final shape closed

Figure 26. Final shape with lip on lid

Figure 27. Lid open

Figure 28. Oiling the wood

IN THE CLASSROOM

Figure 29. Astrolabes in the classroom

The Star-Taker is an object intended to be sold on the market. However, it is more important to the overarching concept behind the object that it be widely accessible to children, rather than profitable to the manufacturer. For this reason, elementary and middle schools will have a collection of Star-Taker devices in their possession. In the ideal scenario, students that do not already own a Star-Taker will be assigned a unit at the beginning of the school year. Assignments using the Star-Taker will be given throughout the year, changing with season and the lessons learned in school. This will encourage a slow but steady development of concepts and practice that will increase the likelihood of the new behavior sticking with the child over time. At the end of each school year, students will have the option of purchasing the Star-Taker from their school at a discounted rate. This approach is meant to expose the students to the device without any financial obligation, allowing every child the chance to experience the Star-Taker and get connected with nature and their surroundings.

Figure 30. Astrolabe poster in middle school classroom

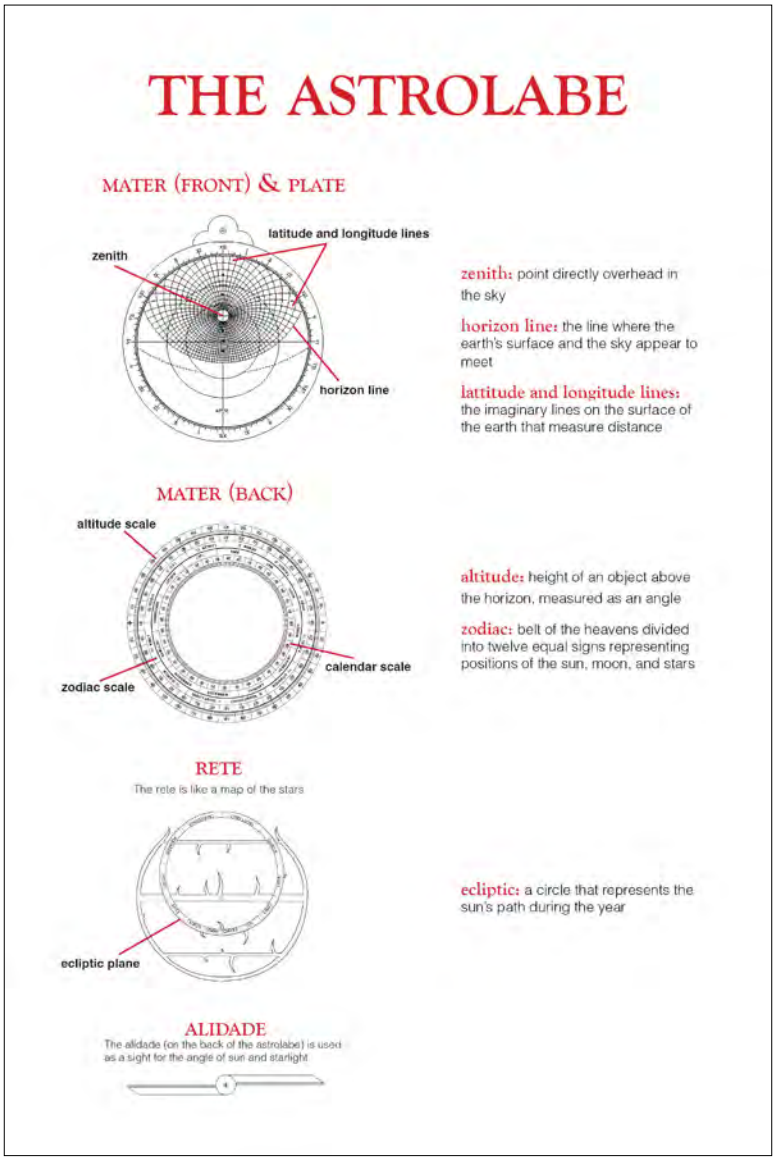


Figure 31. Astrolabe poster

EXHIBITION

ArtWorks Gallery, March 18 - 30, 2013

Contents:

Panel Series
Print
24” x 48” Each

Star-Taker: Final with Lid
Cherry Wood, Oak Plywood, Vellum with ink, Wooden dowels
7” x 7”

Star-Taker: Prototype
Insulation Foam, Plaster, Paper, Wooden dowels
7” x 5”

Initial Concept Sketches
Pencil on Paper
17” x 11”

Northern Hemisphere Star Chart (WildernessAstronomy.com)
Print
17” x 11”

Progression of 3D Prints: Blue Mater
3D Print, Plastic
4” x 4”

Progression of 3D Prints: White Astrolabe
3D Print, Plastic
4” x 4”

Progression of 3D Prints: Interactive Astrolabe
3D Print, Plastic
4” x 4”

Artist Statement

As a graphic and industrial designer, I look at design as a way of life rather than a career or a project. I view the world holistically, on macro and micro scales, investigating the systems that are all around us. I use design as a vehicle for change and progress, and often this means addressing societal issues.

The project exhibited takes my passion for design and progress and pairs it with a love for the night sky. The ultimate goal for this project was a finished product: a product that could reach out and inspire a new way of thinking about the world. The celestial sphere all around us provided a means for this transformation to ensue, and the ancient technology offered by the astrolabe made it possible.

The astrolabe—though it seems obsolete today—was a remarkable astronomical device heavily used in the Renaissance era that allowed users to find the time based on the position of the sun, practice astrology using planet positions, determine what time the sun will set, and so many other affordances. Today we have devices like the iPhone that can tell us all of that, literally in seconds. But interestingly enough, we also have short attention spans and a general lack of interest in the world around us.

We are all a part of the universe, even though we often feel so disconnected from it. Reconnection happens through exploration. The astrolabe allows us to be explorers and forces us to be patient and curious. It provides an opportunity to hold the universe in the palm of our hands. Through this project, I hope to inspire a universal connection, beginning with young people. This object is meant to create a transition from a mentality of modern convenience to a mindset that feeds off of patience and curiosity.

Other works in this exhibit include my design process shown through sketches and prototypes, as well as experimental sketches and other themed images.

Figure 32. Right wall

Figure 33. Left wall

Figure 34. Posters

Figure 35. Poster detail

Figure 36. Star-Taker with prototype

Figure 37. Star-Taker display

Figure 38. Concept sketches, star chart, and 3D prints

Figure 39. 3D print iterations detail

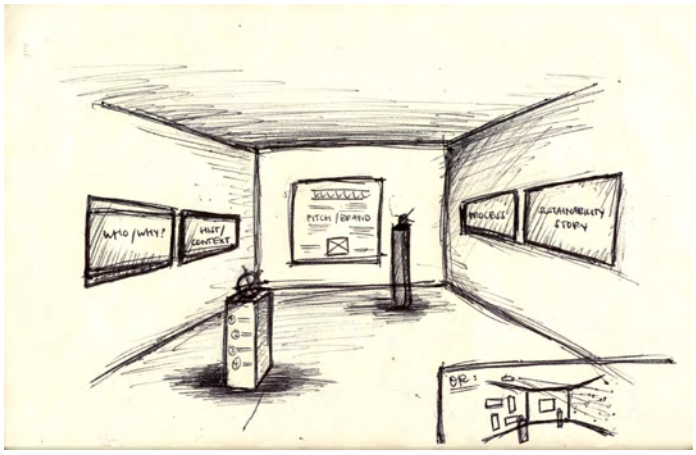


Figure 40. Early exhibition layout sketch

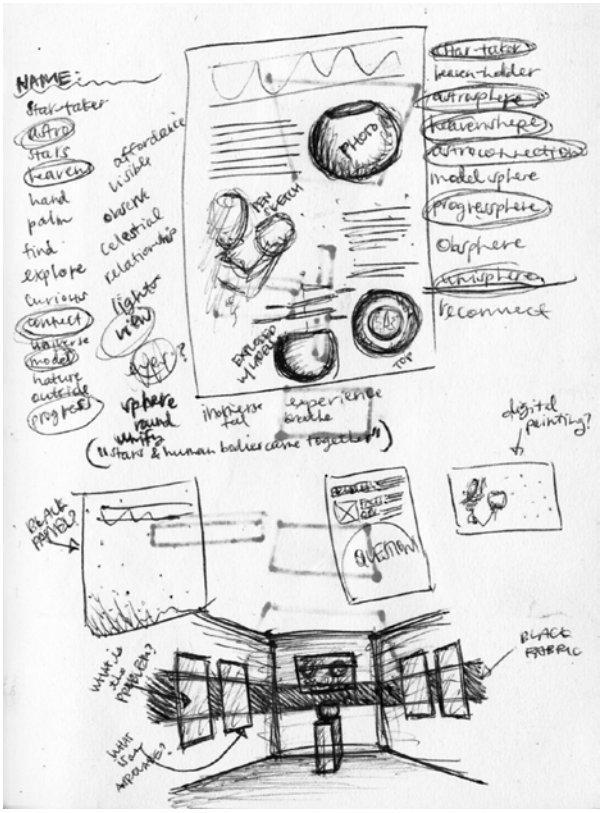


Figure 41. Name brainstorming

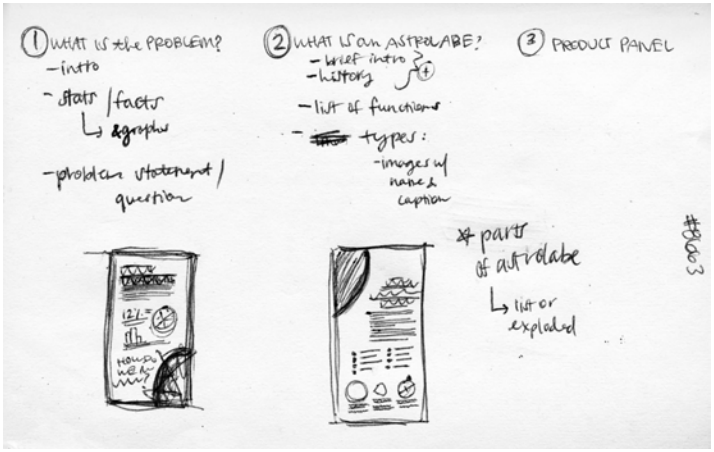


Figure 42. Poster layout thumbnails

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