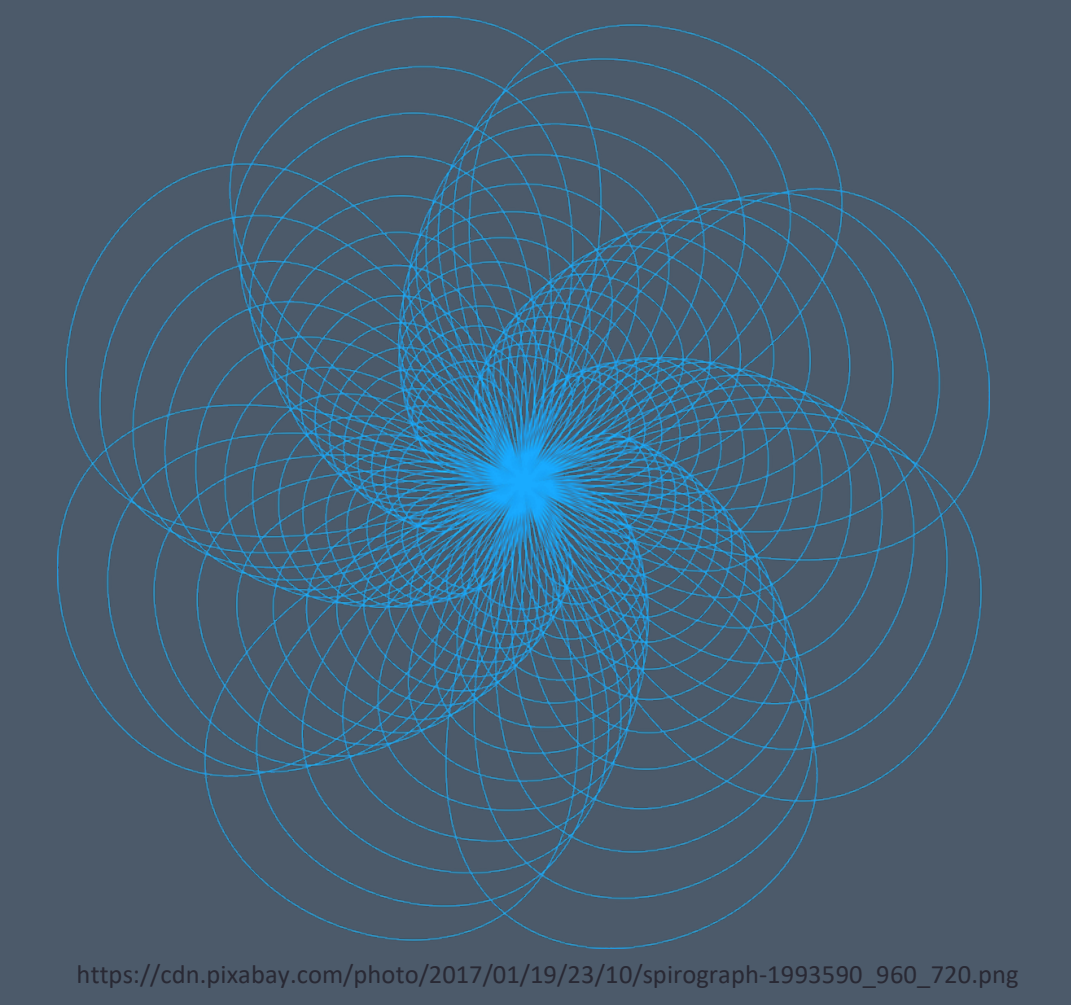




Inspirograph

The Upcycled Spirograph

ENGR 215: Introduction to Design – Fall 2017
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INTRODUCTION

Team BlackBox collaborated with the Redwood Discovery Museum, an educational, non-profit children’s museum located in Eureka, California. The Redwood Discovery Museum educates young children in Humboldt County through fun exhibits intended for ages 3-8, incorporating the foundations of science and mathematics with limited exposure to digital screens. Redwood Discovery Museum requested that Team BlackBox create a table top Spirograph.

OBJECTIVE

To create a table top version of a traditional Spirograph that is fun and inspiring for children ages 3-8.

CRITERIA

The criteria below are elements which are of importance to the client in the design of the project. The constraints are the way in which the design meets the criterion. Each is weighted on a scale of 1 to 10 for importance.

CRITERIA	CONSTRAINTS	WEIGHT (1-10)
Appeal	Multiple Color Options	5
O&M	<\$1.00/per day	8
Ease of Use	Fluidity	8
Durability	Lasting longer than 1 year	9
Education	Understood by users ages 3-8	9
Inspiration	Stoke factor	9
Safety	ASTM Toy Safety Standards	10
Cost	≥\$500	7

Table 1: Criteria & Constraints table for the Inspirograph project.

THE FINAL DESIGN

The design of the Inspirograph was based off the traditional children’s toy Spirograph, which is a set of plastic gears used to draw small geometric patterns. Team BlackBox reinvented the technology of the traditional Spirograph by using upcycled bicycle cogs and chains. The resulting Inspirograph can create larger geometric patterns than the traditional Spirograph with ease.

To learn more visit:
http://www.appropedia.org/Redwood_Discovery_Museum_inspirograph

THE INSPIROGRAPH



COMPONENTS



A: Metal L-Brackets preventing over-extension and enhancing durability.



B: Bike Cog inner pieces with protective plywood covering.



C: Paper roll & steel Pipe hook holder.



D: Bike Chain lining the circumference of the plywood top piece.



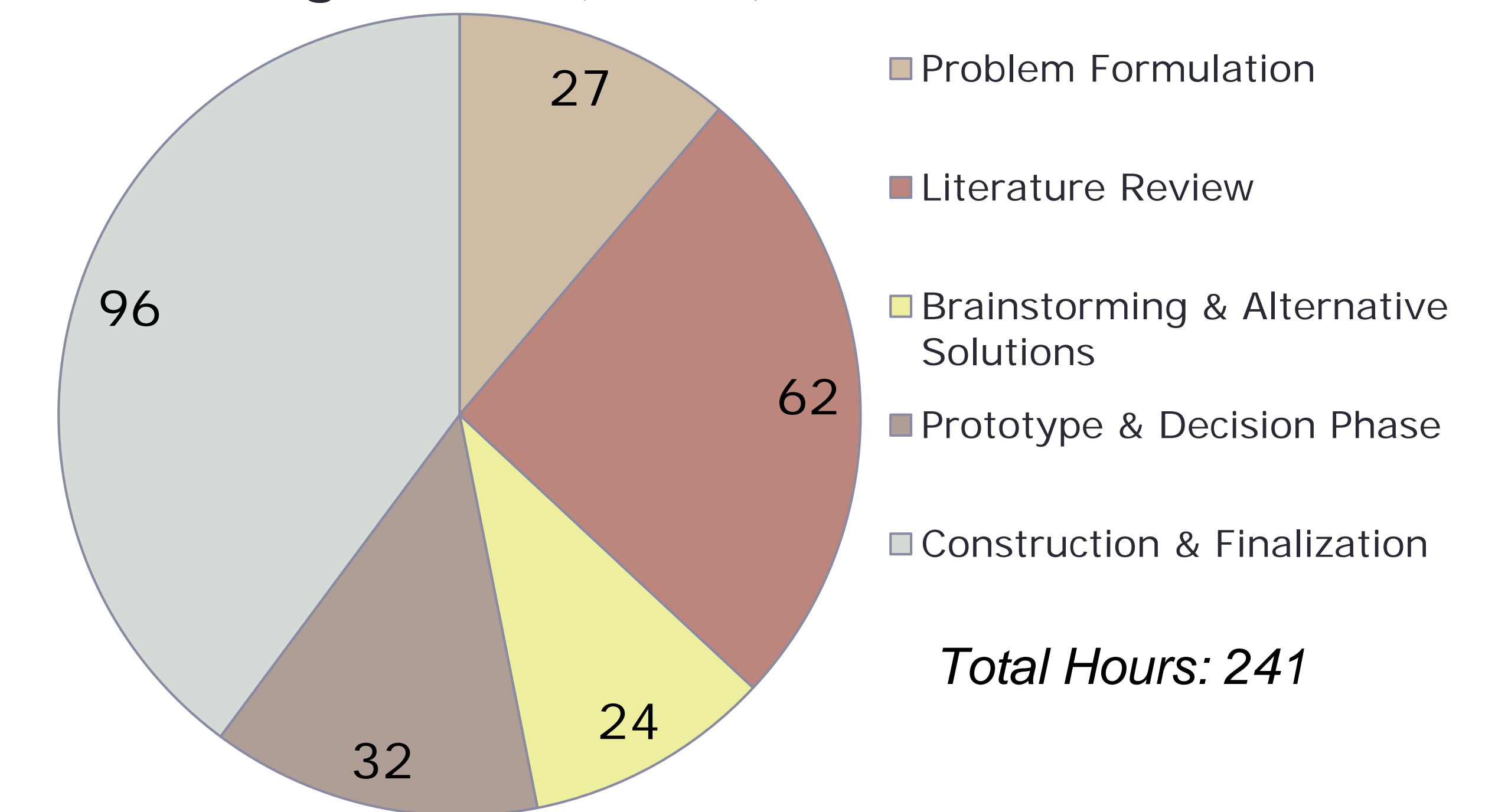
E: Hinged Spirograph cover piece.



F: Handmade plywood marker box.

LABOR AND MATERIALS

Design Costs (hours)



SUPPLY TYPE	COST (\$)
Bearings	10.88
Bike chains/sprockets and cog handle pieces	10.85
Screws, drill bit, felt pads, pens	24.21
Plywood	11.83
Brackets, hinges, epoxy, screws	33.39
Dowel, hooks	4.17
Steel pieces for paper roll component	66.46
Corner Braces, hinge covers, PVC caps	8.20
Epoxy, wood plugs	18.41
Sand Paper	6.34
Felt pads, rubber grommets	24.98
Felt tip markers	7.37
Hacksaw blades	6.49
Cable ties	5.41
TOTAL	\$238.99

Table 2: Cost of new and upcycled materials used to design the Inspirograph.

RESULTS

The Inspirograph successfully acts as a fun and interactive toy while inspiring children to play in ways that do not involve screens, enhancing cognitive learning. The criteria provided by the Redwood Discovery Museum was met. The cost of the project was kept below budget, the durability of the Inspirograph has proven to withstand excessive use and it has shown to be highly appealing to kids of all ages.

ACKNOWLEDGEMENTS

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