

Wooden Lions

Solar Powered Robot Charging Station

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Background

Zane Middle School is a middle school in Eureka, California that has partnered with the Engineering 215 class at Humboldt State to create solutions for some of the schools problems. Team Wooden Lions has been asked to fix and waterproof a nonfunctional solar robot charging station.

Objective

Team Wooden Lions objective is to revamp the solar powered charging robot station so that it is of more use, educationally for the kids; while also being waterproof. This new and improved gadget will help continue the success of its previous design in interesting kids about solar power.

Criteria

Criteria	Constraints	Weighted Ranking
Safety	Must be “safety approved” by faulty.	10
Mobility	Needs to move around the classroom easily.	8
Durability	Must be able to withstand being transported and middle schoolers.	8
Security	The robots are very expensive.	7
Capacity	It must be able to charge 6 robot bat-teries.	6
Cost	\$400 max.	4
Versatility	Station must at least be water re-sistant.	3
Aesthetics	Must look as professional as last pro-ject.	2

Table 1: Criteria.



Figure 1.1: Final station locked up, outside charging.



Figure 1.2: Interior of the station with the LED lights on.

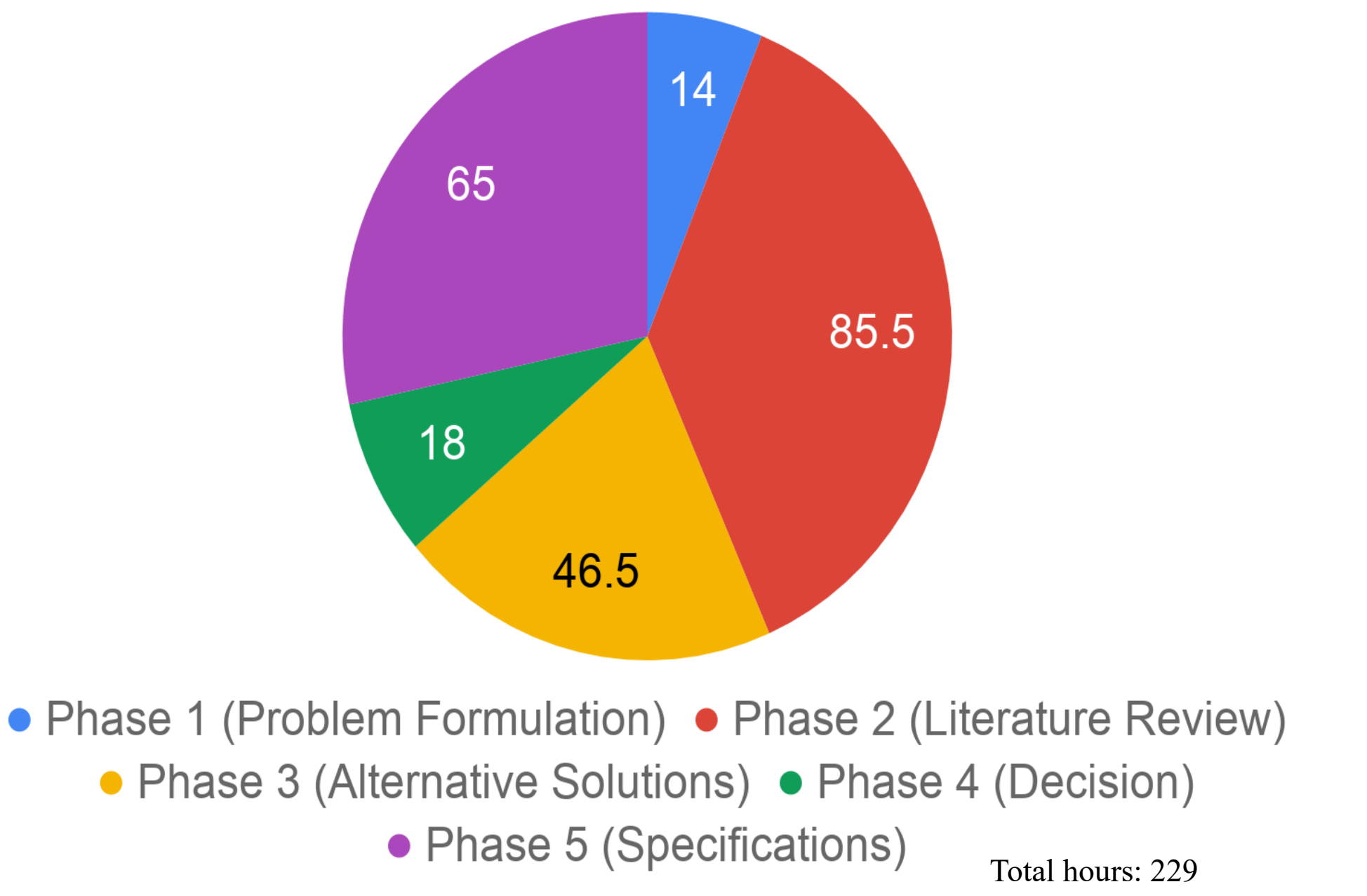
Design description

A solar panel is attached to the top of the structure at an angle to get the most solar irradiance. The solar panels are attached to a 12V 35Ah deep cycle battery and charges it up. A charge controller will be attached to the battery so that the operator can be informed when it’s done charging. The station is made of all metal. A falcon and the words “Zane Middle School” will be spray painted onto the station. The outer edges are made of metal sheets and street signs along with the doors attached with hinges. The electronics inside will be secured with a lock on the middle shelf. The station will be water-proofed by the metal sheets around the sides as well as epoxy for any small gaps.

Results

We met our various criteria in what we both implemented to the station as well as what was already existing. Safety—The station will be locked up so the children are unable to electrocute themselves. Mobility—The station fits and moves in and out of the classroom as requested by the teacher. Durability—The station is durable enough to withstand the harsh coastal climate and protect the electronics. Security– Metal sheets and a lock were installed to protect the electronics from theft

Costs



Material	Quantity	Cost (\$)	Cost after donation
Street signs	8	\$50.00	Donated
Structure	1	\$50.00	Reused
Tools	7+	\$100.00+	Donated
Electronics	10+	\$150.00+	Reused
Wire stripper	1	\$12.34	\$12.34
Assorted hardware	20+	\$7.42	\$7.42
Caulk gun	1	\$3.79	\$3.79
Waterproof epoxy	2	\$25.62	\$25.62
Caulk rope	1	\$8.35	\$7.59
Charge controller	1	\$19.99	\$19.99
Lock	1	\$9.49	\$9.49
Paint	2	\$8.34	\$7.58
Battery	1	\$71.90	\$71.90
Trickle charger	1	\$16.26	\$16.26
Weather-strip	1	\$19.49	\$19.49
Handles	2	\$10.43	\$9.48
Blade	1	\$23.86	\$21.69
Total Cost		\$587.28	\$232.64

Table 1.2: Costs (\$)