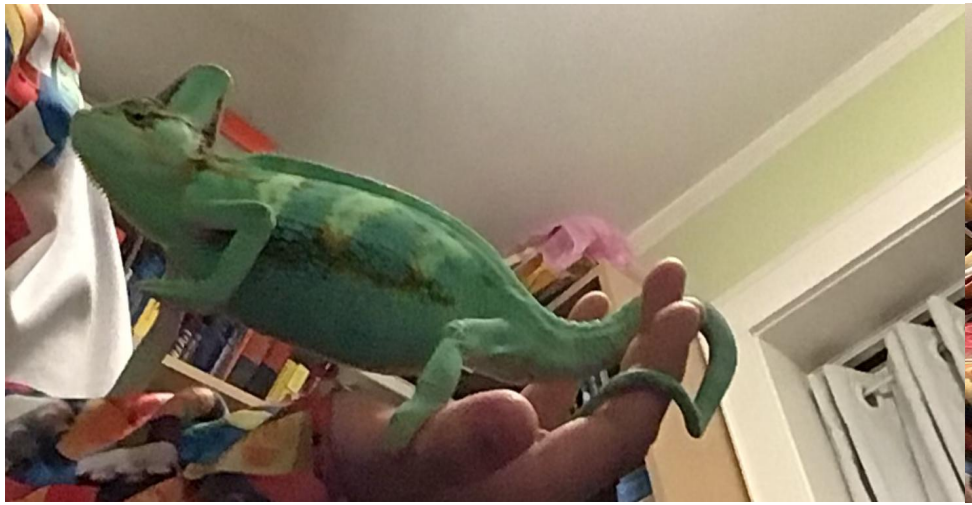
Chameleon feeder

Grade: 4th grade



Title & Description:

I have a chameleon, which needs to be fed every morning with live crickets. Unfortunately, my orchestra and chorus practices meet every morning very early. My chameleon usually does not wake up when I leave home. In this project, I plan to design an automatic chameleon feeder. Every morning I will put the feeder filled with live crickets in my chameleon cage before I leave home. The feeder will automatically open at 8 a.m. to feed my chameleon.

Asking Questions & Defining Problems:

P: How do I feed my chameleon at a fixed time?

P: How can I install the whole set of devices, including the electricity, control, motor,... on the cricket cage?

P: What contraption should I use for opening and closing the door of the cricket cage?

The following are the constraints.

1. I have minimum space to work with in the chameleon cage. The cricket cage cannot be too big.

2. I can not destroy the chameleons cage.

3. I need to keep the cost relatively low.

Research:

1. This project is important because it saves time and energy for me and feeds my chameleon timely.
2. Other products are stations and cricket cups.
3. I plan to improve the cricket cup by adding an automated door to prevent the crickets from escaping and feed the chameleon at a specific time.

Imagine:

I thought about the following.

1.Use a piston the push to crickets out.

2. Use a vacuum tube to suck crickets into the cage.

3. Use an opening and closing trap door.

4. Build a on and off light in a cricket cup.

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5. Put a cap on a cup connected with a motor to open the door.

Plan 1:

I decided to use the “Build an on and off light in a cricket cup.”

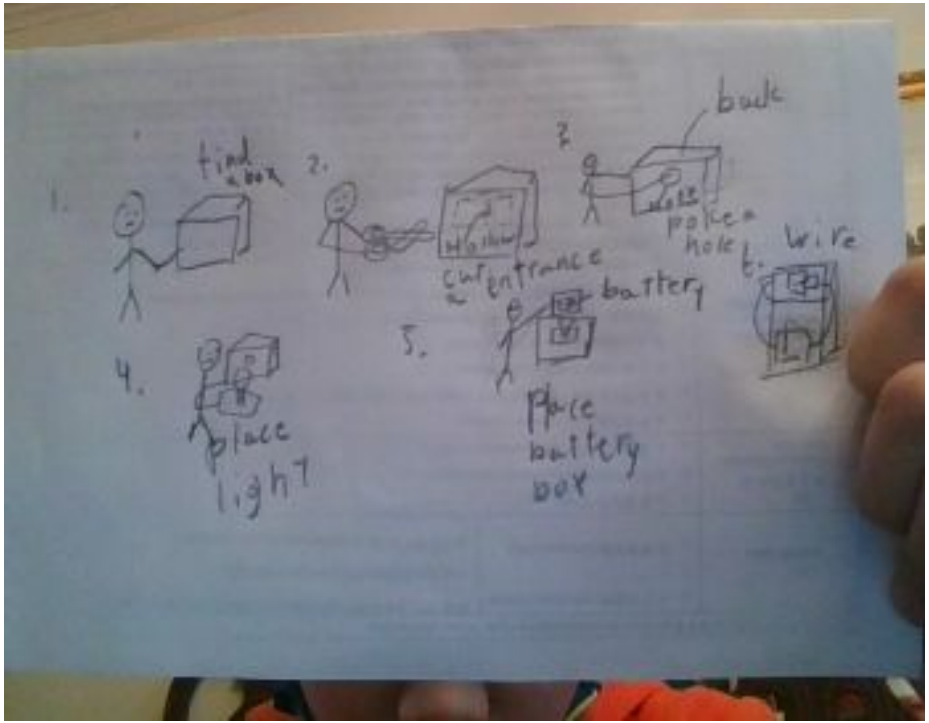
Steps to build the on and off light.

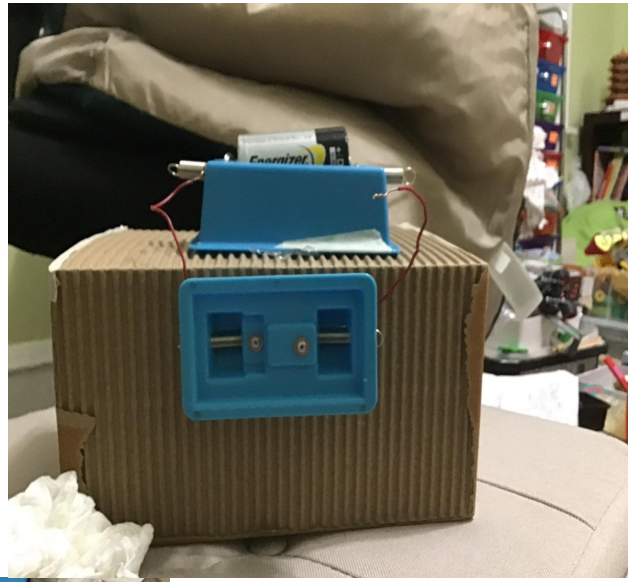
1. Build a box out of cardboard
2. Poke a hole inside the box
3. Install a light inside

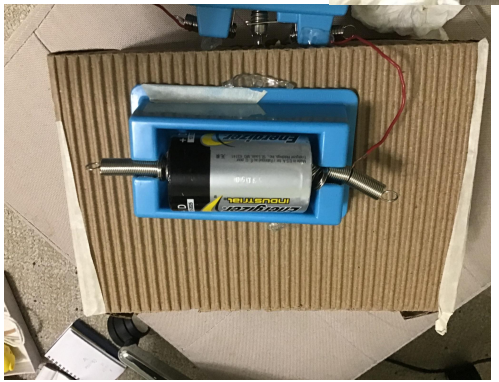
Create:

1. I used cardboard to build a box and put eggshells inside it to make the build.
2. I added a light by poking a hole inside the.
3. I taped the battery box to the top of the box.
4. I wired the light to the battery to finish the set.

Building process and solution pictures







Test and Evaluate Prototype/Improve and Redesign as Needed:

When I tested the box, the crickets hided inside the box and the light was not strong enough for my chameleon to see the crickets.

I was surprised that the crickets all hided in the corner. I had too little space to put in the crickets.

To improve my design, I will make the container transparent and also make it tall but not long so that it is easy for me to put in the crickets.

Redesigning second prototype

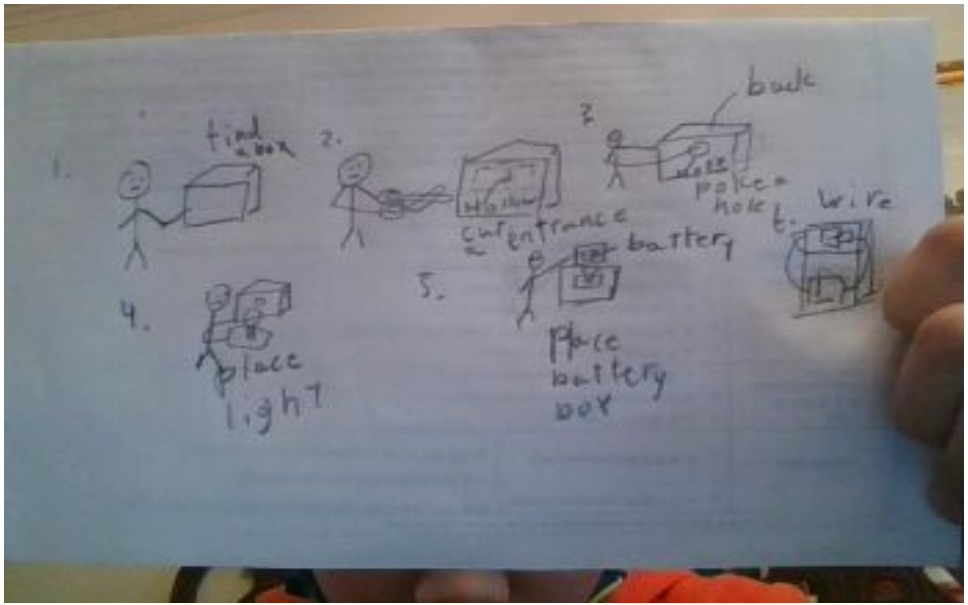
After completing and testing my first prototype, I continued with the second prototype. I decided to use a smaller cricket cup instead of a huge cardboard box. I designed to add a cap to the cup which is strapped to a motor. The motor will open the cup by electricity. I will put the motor, cup, and the battery box.

Steps :

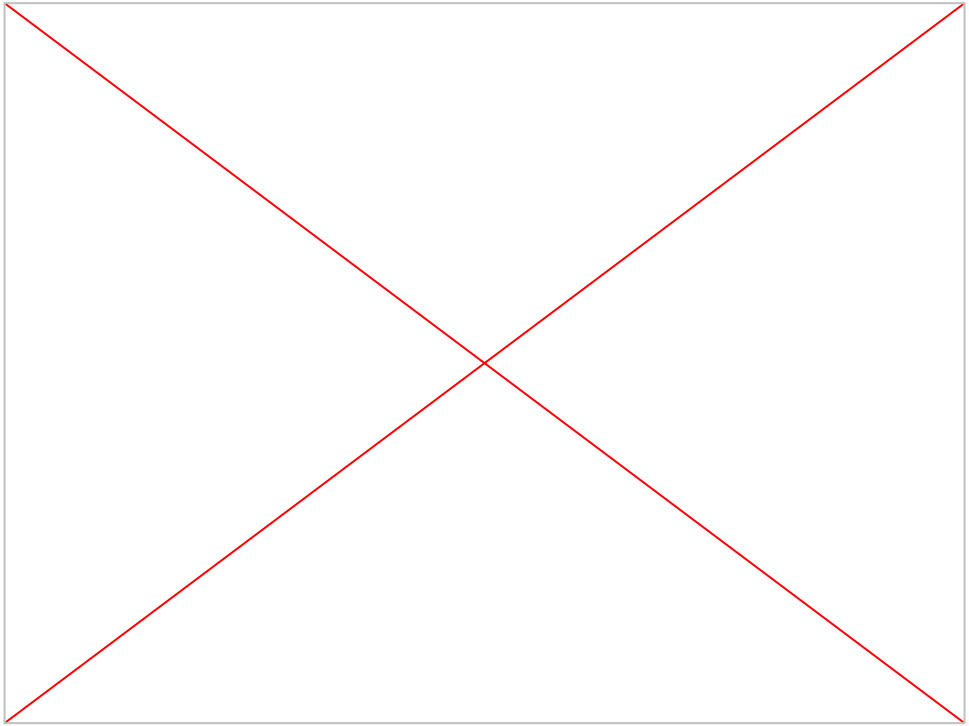
1. I tape the cup onto the new cardboard box
2. I poke a hole in the cap
3. I pull the string through the hole
4. I connect the motor and tie the string to the motor
5. I wire the motor to complete the construction

Create 2:

I cut the previous cardboard box into a flat piece of cardboard. Then use one of those flat cardboards trace the the open side of the cup. I also taped a tail for the string to go through.I tied the motor onto the string and completed the build.



How the cup works explanation



Further evaluation after completion of the second prototype.

When I tested the second prototype, the motor spun but sometimes the string would be twisted and become so tight that it would not spin.

What criteria does it not meet? Requirements it needs to have still are…
1. I need a remote control system or an automatic system so that the door can both open and close when I am not around.
2. The crickets can't fit inside the cup.

How can I improve this design?
I decided that I need a micro computer brain for my feeder siince the door has to automatically open.

Making a third plan

After the second prototype failed, I started to focus since I did not have much time left.
I realized that I could attach a motor to the door, and use a controller to automatically open the door. So after some research, I created the following plan.

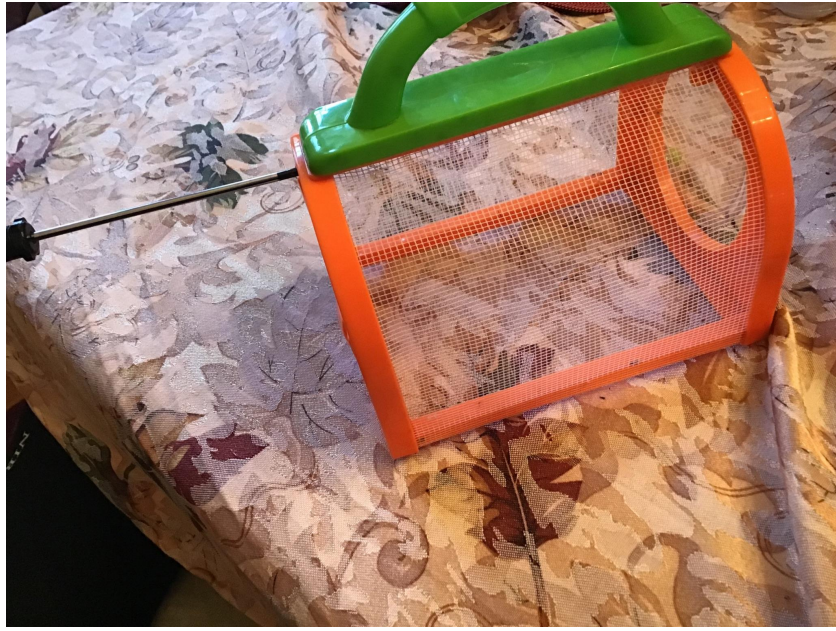
Steps

1. Create an arduino nano code for a timed motor.
2. Mount and build the contraption.
3. Connect the motor to the door of the cricket mesh cage.

Creating the third prototype

After the items arrived at the doorstep, I started to build. But since the clayton chromebook does not allow the use of arduino, I decided to build the contraption then coded it on my home devices. After connecting the motor to the battery we met a problem. Our the cage door was to thick for the screw to connect to the motor. We did not have a sufficiently long screw. We searched stores in St. Louis including Home Depots, Ace didn’t sell them we were unable to complete the build in time.

Building process



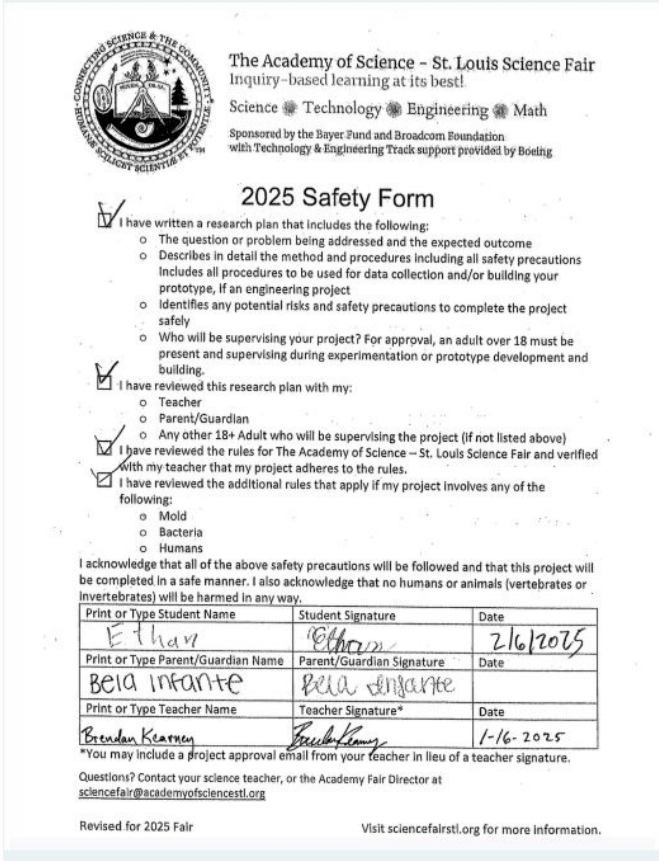
Reflection on building

What I should not have done is to build so many prototypes.

I should think more deeply before I started building.

Another big constraint was the materials needed. They were specific and hard to find.
If I had more time I would look for the materials needed and code the arduino code.

Signed Safety Form and Guidelines:



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2025 Safety Form

☑ I have written a research plan that includes the following:
- The question or problem being addressed and the expected outcome
- Describes in detail the method and procedures including all safety precautions includes all procedures to be used for data collection and/or building your prototype, if an engineering project
- Identifies any potential risks and safety precautions to complete the project safely
- Who will be supervising your project? For approval, an adult over 18 must be present and supervising during experimentation or prototype development and building.

☑ I have reviewed this research plan with my:
- Teacher
- Parent/Guardian
- Any other 18+ Adult who will be supervising the project (if not listed above)

☑ I have reviewed the rules for The Academy of Science – St. Louis Science Fair and verified with my teacher that my project adheres to the rules.

☑ I have reviewed the additional rules that apply if my project involves any of the following:
- Mold
- Bacteria
- Humans

I acknowledge that all of the above safety precautions will be followed and that this project will be completed in a safe manner. I also acknowledge that no humans or animals (vertebrates or invertebrates) will be harmed in any way.

Print or Type Student Name	Student Signature	Date
Ethan	Ethan	2/6/2025
Print or Type Parent/Guardian Name	Parent/Guardian Signature	Date
Bela Infante	Bela Infante	
Print or Type Teacher Name	Teacher Signature*	Date
Brendan Kearney	Brendan Kearney	1-16-2025

*You may include a project approval email from your teacher in lieu of a teacher signature.

Questions? Contact your science teacher, or the Academy Fair Director at sciencefair@academyofsciencestl.org

Revised for 2025 Fair

Visit sciencefairstl.org for more information.

I stayed safe by always having an adult or mentor nearby when I used electricity. I also stayed safe by washing my hands after touch the cage or crickets. Finally I stayed safe by being careful when using scissors or a saw.