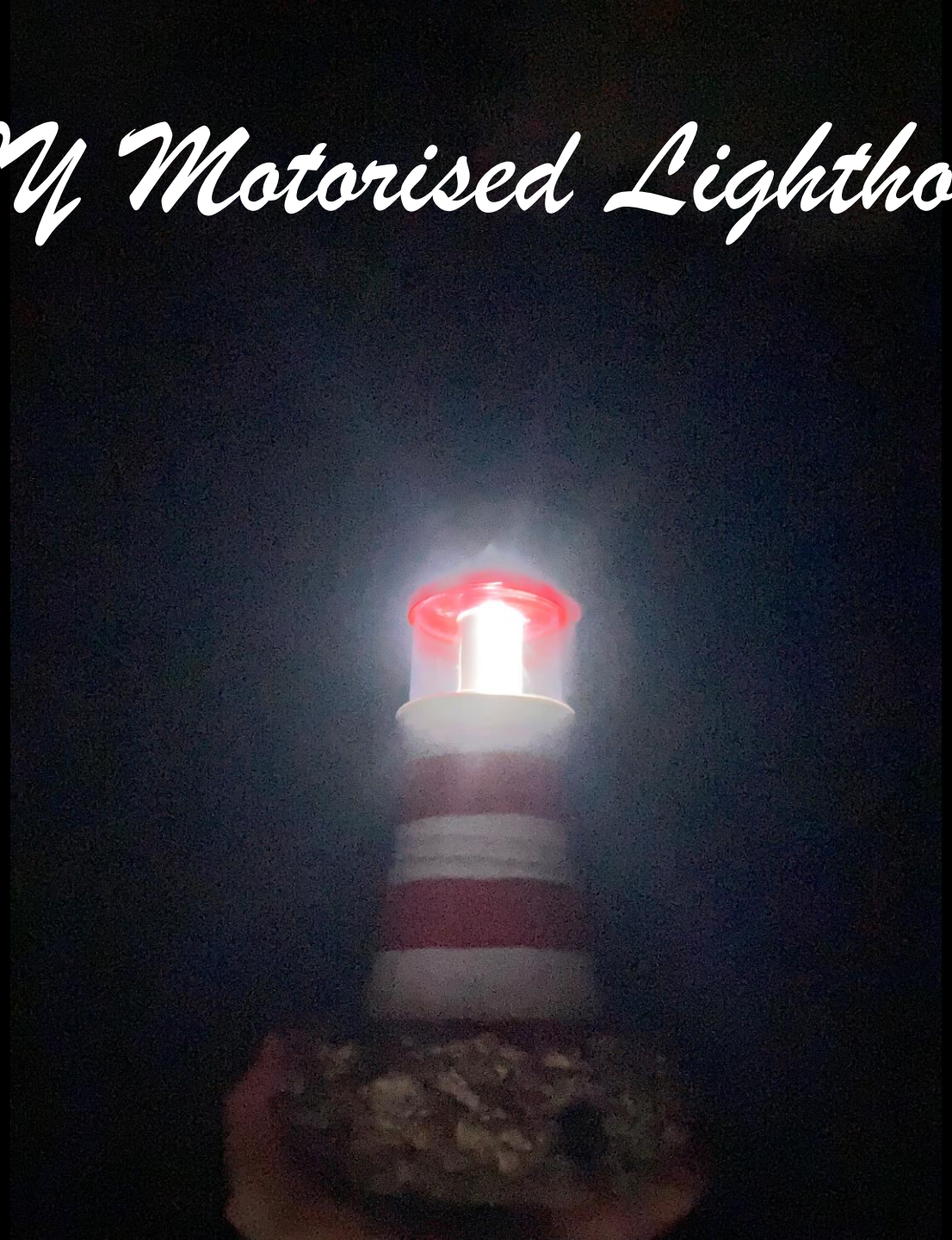
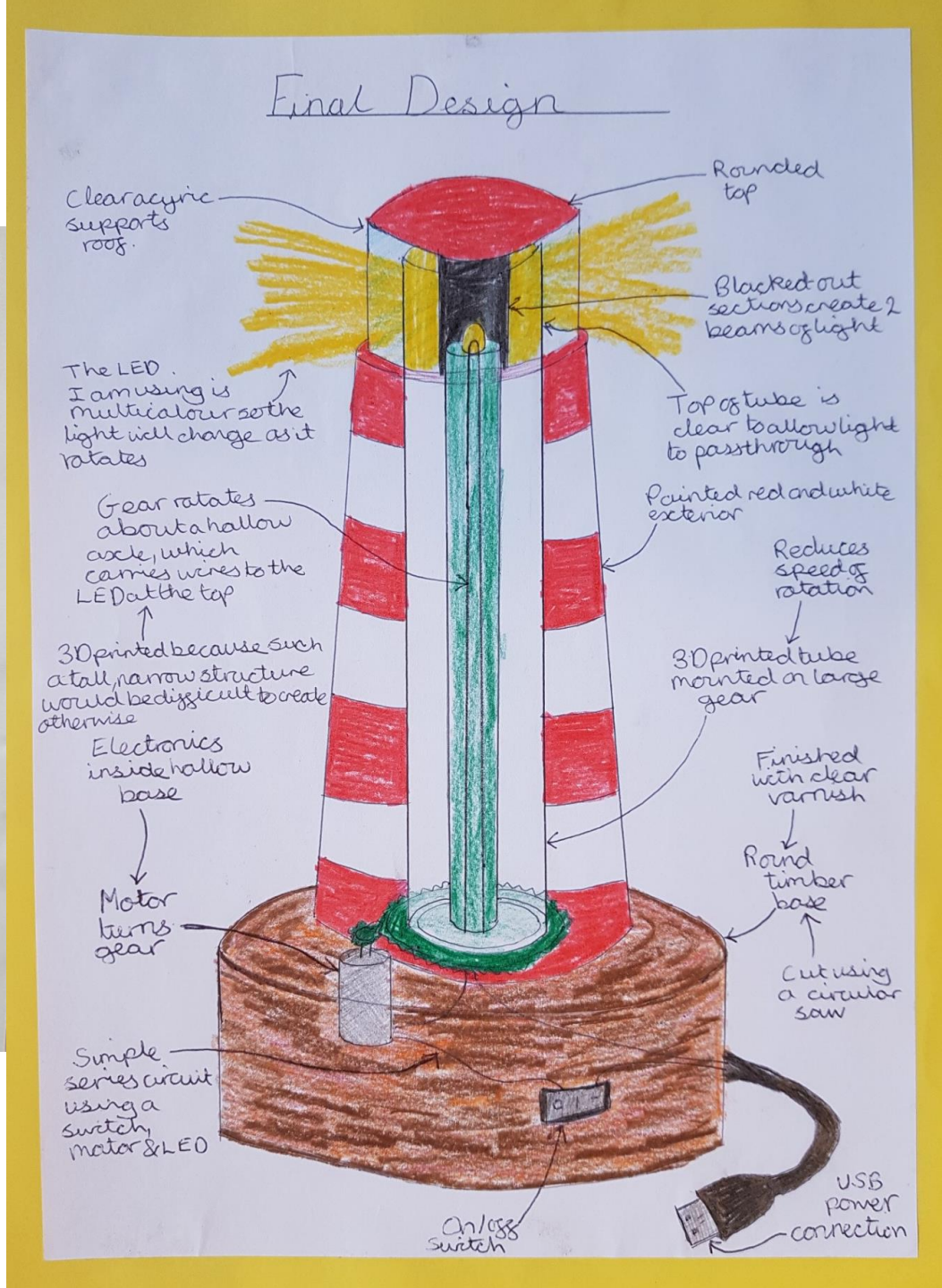
DIY Motorised Lighthouse



Starting Out:

To get started, I looked at designs for pre-existing lighthouses and used this to come up with my own initial design. Although parts of my final product differ to this initial design, it uses the same basic mechanism.



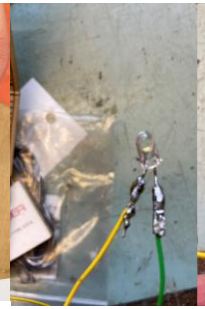
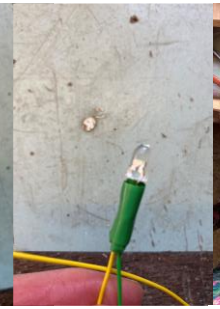
Making Process:



I used wheel throwing techniques on a potters wheel to form a hyperboloid shape (a tapering cylinder with flared base). It hardened overnight. The next morning I waxed the bottom and removed rough edges in preparation for it to be fired.



After testing different gears to slow down the motor, I found the best solution was to use a Lego worm gear. However, this meant I needed a custom -made spindle. I made this with the help of a neighbour on his metal lathe. I also learnt how to use a Verena gauge and a micrometer.

Next I soldered an LED to some wires to fit them up a central pipe, which would also be the spindle for the gear to rotate about.

I cut out 2 circular bases using a jigsaw, then screwed and glued them together to make the base thicker. The bottom circle wall is hollow to allow for wires and a battery box underneath.

I used a pillar drill to mount the pipe and gear to make a perfectly perpendicular hole. I attached the motor and worm with a jubilee clip.

I drilled a hole in the side to fit the switch. Then I used air drying clay around the perimeter of the top of the base to hold the lighthouse in place without it getting scratched by stones.

The light was to be mounted at the top of a rotating tube, which I built out of cardboard. I painted the top white to be more in keeping with the lighthouse colour scheme, but the other areas didn't matter because they would not be on display.

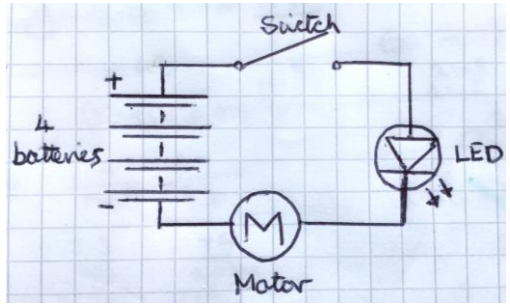
Initially I painted the whole ceramic lighthouse plain white, then added 3 rings of frog tape so I could paint over them to produce accurate red rings.

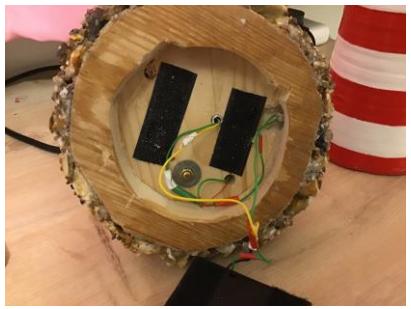
Lighthouses operate to warn ships of dangerous rocks, so I decided to incorporate rocks into the base by covering it in small stones found at the local beach. I then coated it in resin to seal them in. I hot glue gunned on larger pebbles before sprinkling on the smaller stones, to hold them in place more easily.

I reused an old plastic lid and coated it in air drying clay. I did this to achieve the domed shape on the roof of the lighthouse. I painted it with acrylic red paint and then with varnish.

Many traditional lighthouses have a weather vane on top. I made a miniature version using a plastic painted bead, some wooden lollipop sticks, and a nail (both coated in tinfoil for a 'shiny' metal effect).

Next I soldered all the components together (an LED, motor, a switch and the battery compartment). On the right is my circuit diagram.





I used Velcro to attach the battery pack to the base because I wanted it to be removable if it or another component needed replacing. This would expand its working life. I decided not to cover the wiring for the same reason.

All finished! Time to test it out and take a few photos!

Conclusion:

What I like…

- **Colourful** and eye-catching design
- Easily **recognisable**
- **Functional**
- All electrical components can be **replaced**
- Many parts are **recycled or reused**

What I found most difficult…

When I started soldering all the components, I cut the **wires very short**, which made it quite challenging! Also, the quality of the wires on the motor was poor, which meant they kept breaking!

Final thoughts…

I like the design feature that each component is removable, so if one part brakes, it can easily be removed and replaced. If I were to design a similar project again, I would include this feature. It means the product is less likely to be thrown away once a part fails, as parts can be easily replaced. This is more **sustainable** and better for the environment.

My favourite part…

I especially enjoyed using the **metal lathe**. This was a new skill I have not encountered before, it was fun to try!

What I have learnt…

Embedding a **motor** into a **working model** is challenging. Next time I would not try to squeeze so many components into such a small space.

What I changed…

My final product is different from my original final design. Many changes I had to make during construction because of restrictions I had not anticipated, such as size and weight of materials. Here are some things I changed:

- After researching local lighthouses at Hurst Castle Museum, a model weather vane was added on top.
- A **support** just **bellow** the **LED inside the rotating tube** was added, to hold the **spindle more centrally** without wobbling.
- A **pebble-covered base**, instead of plain timber.
- A **worm gear** instead of a small gear driving a larger gear- this did not slow the motor down enough.
- **A battery pack inside the base**, instead of a USB. This is because I wanted the model to be more **self-contained** and not require being plugged in to an external power supply.

Conclusion…

My design was **successful** and worked well. It is both **aesthetically pleasing** and practical.


Final Photos:













End
Of
Project.