Submarine Alarm Project Write-up

By: Peter Gorecki, Patrick Rice

Executive Summary

Our assignment was to create a flood alarm system for a submarine using logic gates. There would be two water level alarms; a low water level will trigger a caution alarm, and a high water level will trigger a warning alarm. To accomplish this we used mechanical switches connected to floats to trigger the alarms. We used four logic gates. Two of them were exclusive OR gates and the other two were AND gates. Some of our challenges were; wiring logic gate outputs properly, and feedback. Some of the solutions were; rewiring the logic gate outputs correctly using transistors, and using diodes to alleviate feedback issues.

Constraints

Our constraints for this project were:

- A lower level caution alarm when the water in the submarine got to a certain level
- A warning alarm for when the water got to a higher level.
- When the water came up to the caution level, the caution light needed to blink and an alarm needed to sound; the same was true for the warning level
- To have a cutout switch for both the caution and warning light. When the alarm was on and the cutout switch was flipped, the alarm would stop, and the light would turn from flashing to a constant on.

Challenges

Some of the challenges we had with accomplishing this objective were:

- Getting the logic gates to work correctly
- Wiring the logic gates to the correct LEDs and transistors
- Problems from feedback from signals that interfered with the logic gates and 555 timers.
- Separating the different inputs and making them trigger the correct outputs without interfering with each other

Solutions

Some of the solutions were to:

- Rewire the transistors differently
- Add diodes
- Rewire the logic gate outputs

What we learned

After working on this project, we learned a lot about different types of logic gates and how to apply them to various situations. We also learned about what values of pull-up/pull-down resistors to use.

Improvements

One example of how we improved on our circuit is how we used diodes to prevent feedback from running back into the logic gate chips. We used diodes to replace an OR gate meaning we could use one less chip.

Circuit Diagram