Analyzing Parameters for a Low Power Circuit in a Net Buoy

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ABSTRACT

- Solar powered circuit that stays on for the duration of fishing and is rechargeable
- Low power circuit that is easily understandable, low cost, and small enough to fit in the buoy
- Sea turtles are getting caught in fishing nets and dying
- Research has shown a reduction in turtle bycatch by illuminating the fishing net with green LEDs.
- Fisherman need an easy way to incorporate the LEDs

PROBLEM STATEMENT

- Make it easy for fisherman to reduce turtle bycatch

Regular Buoys

- Turtle does not see net and swims towards it
- Turtle gets caught in net and drowns

LED Buoys

- Turtle sees the green LED light and swims away
- Death of sea turtles reduces by 60%

Basic function of the circuit

- Charging the battery with solar panels
- Using an NE555 timer to blink the LEDs
- Using a water sensor or pressure sensor to turn on and off the circuit for the LEDs

Testing turtle response

- Turtles responding to different intensities both daytime and nighttime
- Turtles responding to blinking lights
- Turtles responding to 4Hz-12Hz frequencies

EXPERIMENTAL METHODS: CIRCUIT

Different Parameters

- Intensity – How bright the light is
- Frequency – How fast the light blinks
- Pulse width – How long the light stays on when blinking
- Switching Power – How much power is consumed while blinking the light

Basic components of the circuit

- Three main components to the circuit
- Charging and discharging the battery
- Controlling the frequency and length of the blink

METHODS: CIRCUIT

Relationship between Intensity and Power

\[ I_s (mcd) = \frac{P(W) - \delta (mW)}{12} \]
\[ I_v (lm) = \frac{P(W)}{12} \]

As resistance \( R \) increases, the Intensity \( I_v \) decreases

Before Resistance is increased:

- Power

After Resistance is increased:

- Power
- Intensity

Printed circuit boards

1) Efficient logic gates, SMD
2) Standard logic gates, SMD
3) Standard logic gates, through hole
4) No logic gates, SMD
5) No logic gates, through hole

REFERENCES

[2] J. Chias, Sea turtles often get entangled in dangerous nets with little hope of escaping unless a Turtle Excluder Device is installed. Some sea turtle species are at more risk than others due to their size and location. 2015.