



# Coca-Cola Light Up Interactive Packaging

Dr. James Kenney, *Georgia Tech*

Dr. Jasmeet Kaur, *Coca-Cola Company*

Alex Plager - [japlager@gmail.com](mailto:japlager@gmail.com)

Fan Chen - [fchen63@gatech.edu](mailto:fchen63@gatech.edu)

Hamim Nigena - [hamimnigena@gatech.edu](mailto:hamimnigena@gatech.edu)

Mitcham Tuell - [mitchamtuell@gatech.edu](mailto:mitchamtuell@gatech.edu)

Varun Malhotra - [varun.doom@gmail.com](mailto:varun.doom@gmail.com)

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# Introduction



- A package for Coca-Cola beverages that interacts with users by lighting up when activated
- Proposed prototyping cost: \$56.78

# Background



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NFC

# Motivation

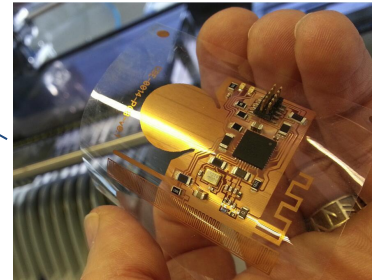
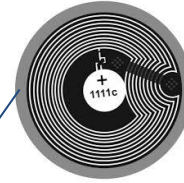
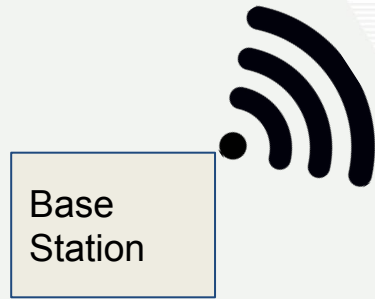
- New concept
- Customer connection
- Brand image



# Approach Overview

*Coca-Cola*

Georgia  
Tech 



# Project Specifications



Temperature Range 2°C to 35°C

Water Resistance IPX4

Drop Resistance 1.5m

Active Duration 30 sec

Storage and Shipping Life 4 weeks

Cost (approx., million-unit scale) \$6

Luminous Intensity 500 mcd

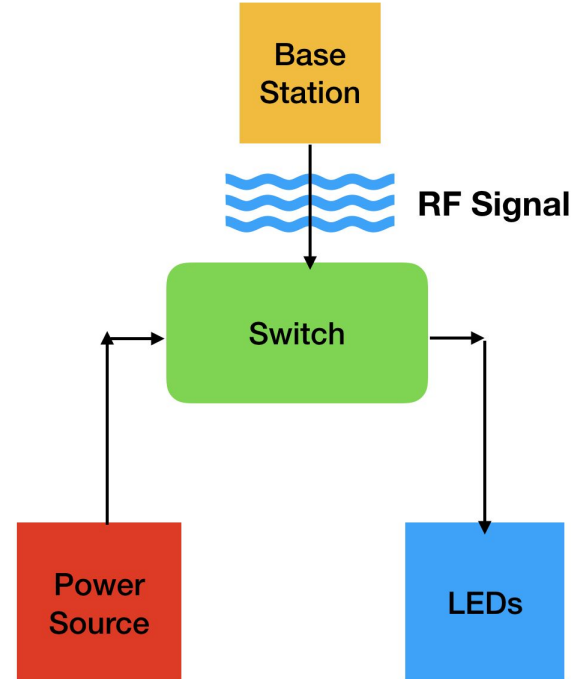
Weight 20g

Form Factor +8mm to bottle radius  
+0mm to bottle height



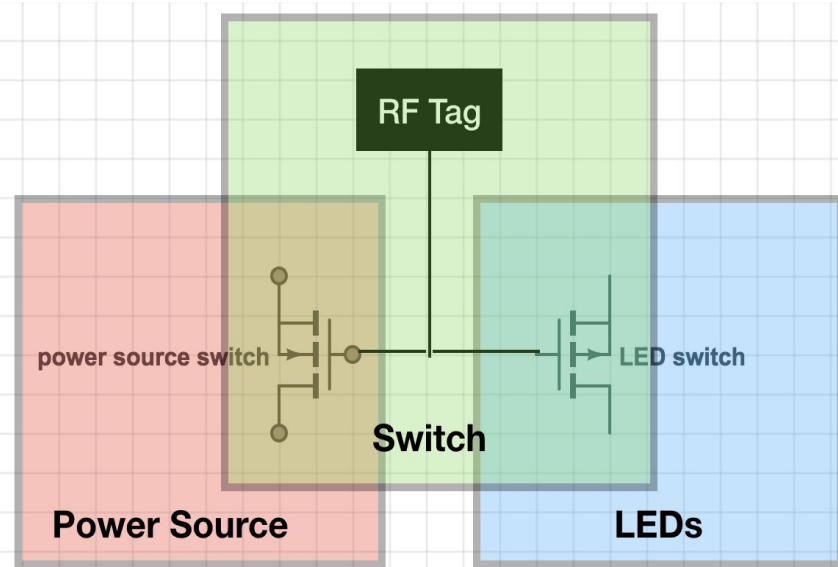
# Design Proposal Overview

- Switch
- Power Source
- Lighting (LEDs)



# Switch

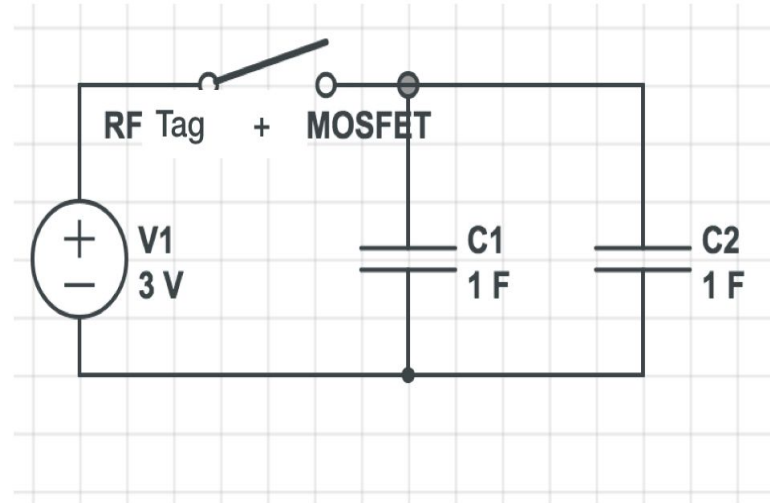
- P type MOSFET for Power Source
- N type MOSFET for LEDs





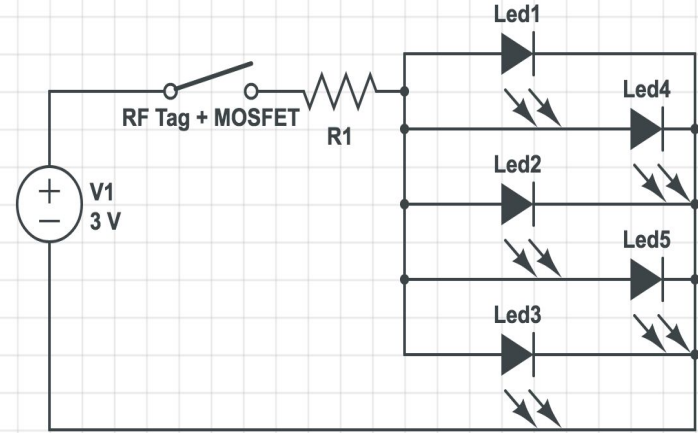
# Power System

- One coin cell battery
- Two 1F Supercapacitors
- One p-type MOSFET



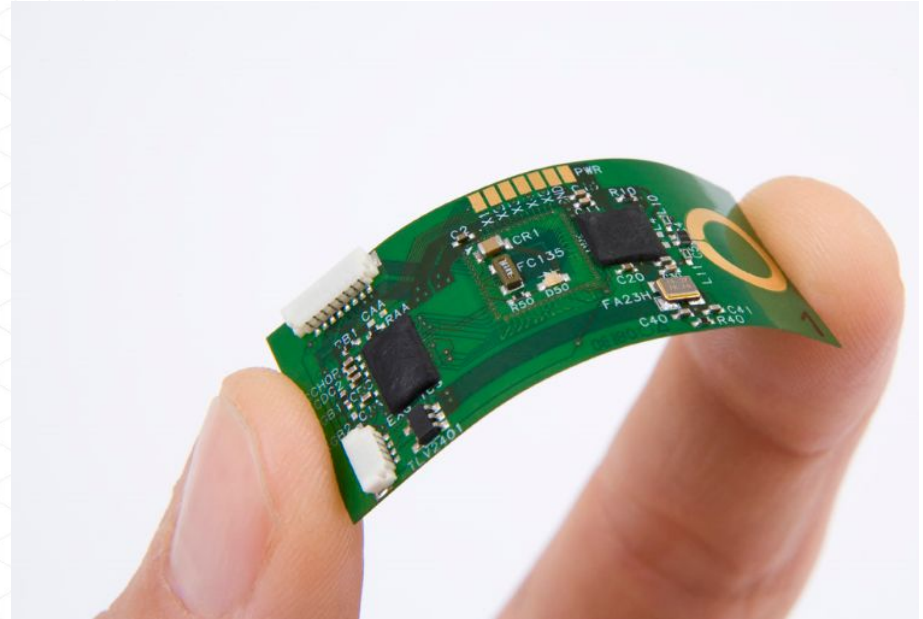
## Lighting (LEDs)

- Five red LEDs
- Total luminous intensity of 500 mcd
- Voltage drop of 1.9V
- Current draw 100mA



# Flexible PCB

- The team intends to work with Dr. Tentzeris
- Components are silver epoxied to board
- Laminate to waterproof



# Alternative Approaches: Power



- AAAA battery

- Reliable power supply
- Relatively Cheap (~\$0.4 @ 2500 units)
- Additional part
- Form factor

- Flexible Solar panel

- Form factor
- Environmental concern
- Cost (\$20 on Amazon)
- Limited performance in low light conditions

# Alternative Approach: Saralon

- Saralon Saralillu
  - Pre-made, fits most specs
  - Computing aspect
  - Cost can be an issue
  - Young company - scale issues
  - Is it still senior “design”?





## “Fallback” Design

- Force sensitive resistor controls LEDs - no RF
  - Simpler implementation
  - Less interesting interaction
  - May be more expensive





## “Reach” Design

- Use NFC protocol to turn on and off lights in a pattern - maybe a 7-segment display
  - More interesting interaction
  - More complicated implementation
  - More expensive (microcontroller)



# Environmental Considerations

- Bottle is no longer recyclable
- E-waste facility not usually easily accessible
- During campaign, Coke must collect waste for processing
  - Customer incentive (\$ deposit)
- Removable E-label?

# Components Cost for prototyping



1F Capacitor x2  $\$3.69 \times 2 = \$7.38$

Red LED x5  $\$0.76 \times 5 = \$3.80$

3V Coin cell battery \$0.33

MOSFET, SMD x2  $\$0.15 \times 2 = \$0.30$

Resistor, SMD x3  $\$0.15 \times 3 = \$0.45$

**Total, three prototypes \$36.78**

Shipping & Unforeseen costs \$20

**Grand Total \$56.78**

# Approximate Large Scale Components Cost



1F Capacitor x2 @5,000  $\$1.52 \times 2 = \$3.04$

Red LED x5 @48,000  $\$0.21 \times 5 = \$1.05$

3V Coin cell battery @2,000 \$0.173

N-channel MOSFET, SMD @6,000 \$0.147

P-channel MOSFET, SMD @6,000 \$0.147

Resistor, SMD x3 @48,000  $\$0.011 \times 3 = \$0.033$

Flexible PCB @1,000 \$0.40

**Total \$4.99**



# Key Project Milestones

Ordering Parts (end of next wk)

Final Round of Prototyping (End of Oct.)

Test fallback/reach alternatives

Develop flex PCB with Dr. Tentzeris  
(End of Sept.)

Finalize Costs (Middle of Nov.)

First Round of Prototyping (First week  
of Oct.)

Senior Design Expo (Dec. 5)



## Conclusion

- Expect to meet specifications with primary proposed design
- User interaction is simple, but engaging
- Build three prototypes for about \$57



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