

## Retrofitting an iMac G3 & Mouse for Use in the 21st Century

Team 23

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#### **Meet the Team**



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## Introduction & Background



#### **Problem**

Disposal of outdated technology contributes to 50
 million tons of e-waste annually

#### Goal

- Save our iMac G3 from an uncertain future!
- Give it a new purpose!



#### Solution?

- Plenty of ways to "save" an iMac...



- But we'd like to do one better...





#### Introduction

- Update the iMac G3 & its mouse → extend the lifespan of these devices
- Foster a more eco-friendly & innovative technological landscape





#### **Background & Inspiration: iMac G3**

- Innovative design
- Intuitive
- First computer for the everyday person
- "Personal computing"
- Integral in evolution of technology





#### **Objectives**

- Replace hardware within the **1998 iMac G3** with components of a **2014 Mac Mini**
- Replace the **CRT** display with a **LCD**
- Update Apple USB mouse by using a modern optical sensor & Bluetooth
- Enable the mouse to be **battery-powered** & **rechargeable**



#### **High-Level Requirements**



#### Mouse must:

- Use Bluetooth to connect
- Allow cursor movement
- Click
- Have a latency of no more than 20 ms



#### iMac must:

- Connect to WiFi
- Have Bluetooth capability
- Run at least 2 applications at once







## Subsystems

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#### **Block Diagram**





### **Computer Control & User Interface Subsystem Requirements**

- LCD screen will display w/ correct aspect ratio
  → Verify entirety of screen displays when Mac is powered on (1024x768)
- Mac mini ports are accessible & functional
  - $\rightarrow$  Plug USB keyboard into port, verify functionality





#### **Computer Power Subsystem Requirements:**

- Mac Mini & LCD screen power on

 $\rightarrow$  Both display & Mac Mini turn on with no issues, screen does not "sleep"





#### Mouse User Interface Subsystem Requirements:

- Mouse button switch is "clickable"
  - $\rightarrow$  The switch activates on click & release (no bouncing)
- The optical sensor allows the cursor to move
  - $\rightarrow$  Mouse moves along x & y axis









#### **Mouse Power Subsystem Requirements:**

- 3.7 volt-rated battery connected to the BMS will provide 3.3V(+/-.3V) DC
  - $\rightarrow$  Probe the microcontroller with a multimeter to ensure correct voltage flow
- 3.7 volt-rated battery will power the optical sensor with 1.9V(+/-.3V) DC

→ Probe the optical sensor with a multimeter to ensure correct voltage flow







#### **Mouse Control Subsystem Requirements:**

- Microcontroller will connect to the computer using Bluetooth
  - $\rightarrow$  Microcontroller will communicate to the computer to move the cursor & click with a latency of  $\leq$  20 ms



## Build Process & Final Product



#### **New vs Old Mouse: What Changed?**







#### **Project Build Process**







#### **Final Product - Mouse**



#### **Final Product - iMac**





#### **Overall Successes & Challenges**

#### Successes

- Fully implemented Mac Mini & LCD
- Individual subsystem implementation

#### Challenges

- Soldering issues
- Board flashing issues
- Design of mouse





# Conclusions & Recommendations

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#### **Conclusions & Potential Revisions**

- Learned a lot about PCB Design process
- Utilization of CRT display to maintain original tech





#### **Recommendations for Future Work**

- Hoping this idea will inspire others to do the same, ultimately creating a global revolution of reusing outdated technology





## Thank you for listening!

## Any questions?



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