Swim Team Scoreboard
Karl South, Nathan Keane and Sang Hoon Choi
Senior Design
Dr. James F. Frenzel, Technical advisor
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Background
• The Inland Empire Swimming Committee
  - A group of approximately 20 different clubs
• Sharing One single line scoreboard
  - Current event, heat number, Timer for current race, and upcoming event and heat number
• Not enough displaying time
  - Information displayed for a brief period of time

Goals
• Providing a new display system
  - Aid the existing system
  - Easier for people to see what they want to
  - Display the heat and event number

Objectives
• Data Retrieval & Interpretation
  - Get data from timing computer
  - Decode the data
• Data Transmission
  - Hard link from scoreboard to our scoreboard
• Display Data (Scoreboard)
  - Custom-made box, and 7-segment displays
Project Design Overview

Data Retrieval & Interpretation

- Colorado timing System
  - Channel number
  - Data
- Microcontroller
  - Event number
  - Heat number

Data Retrieval & Interpretation (cont.)

Data Transmission

- Hard link from Scoreboard to Scoreboard
  - ¼" Phone Plug
  - Phono to RS232 Converter
  - Use RS232 I/O Port on Microcontroller
Scoreboard Parts

- 5 Seven Segment Displays to Display Current Event and Heet
- A Maxim 7221 Eight Digit Driver to Control the 5 Digits
- Rabbit 2300 Microcontroller
  - Receives data from The System 5
  - Processes and Outputs the Event and Heet to the 7 Segment Displays
- 120/12 Volt AC to DC converter
- Voltage Regulators to Regulate the Voltage Levels for the Rest of the System

Power Requirements

- Rabbit Microcontroller
  - Voltage Range 4.75-5.25 V DC
  - Typical Current Rating of 108 mA
- Maxim 7221 Display Driver
  - Voltage 4.0-5.5 V DC
  - Typical Current Rating 330 mA
  - LM2937-5.0 to Step Down to 5 Volts
- 7 Segment Displays
  - Voltage Range 1.5-2.4 V DC
  - Peak Current 60 mA at Full Display
  - LM2674-ADJ to Step Down to 2 Volts
- 120/12 Volt AC to DC Converter
  - Supplies 500 mA of Current

Display Data

- Basic Schematic of Our Display System
  - Consists of
    - Maxim 7221 Display Chip
    - 7 Segment Displays
    - Rabbit Microcontroller
- Scoreboard
  - 3 Digits to Display the Event
  - 2 Digits to Display the Heet

Display Box Construction

- Frame Outline
- ¼" Plywood for Top and Back
- 1/2" Plywood for sides, bottom and front
  - Slots for sliding the removable top and back.
**Follow-ups for Fall Semester**

**Wireless Webpage Hosting**

- Capture Swimmer Names and Times from Meet Manager Software
- Store this information.
- Host a webpage that can be accessed wirelessly throughout the meet.
- Webpage will display swimmer names and scores.

**Timing Computer** ➔ **Scoring Computer / Web Page Host** ➔ **Wireless Network** ➔ **Swimmer Looking at their Times**

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**Follow-ups for Fall Semester**

**Additional Add-On scoreboard for Channel 12**

- Channel 12 displays the running time, lead split time and winning finish time.
- It doesn’t cycle through these, but displays them continually until the next heat or event.

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**Follow-ups for Fall Semester**

**Webpage**

- This is the main page, subsequent pages will show event scores and individual scores.
- See scores from a previous swim meet.
- Click an Event to see the final scores.
- Enter a Swimmers Name to see scores for all events / heats for either the current Meet or all previous meets.

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**BUDGET**

**Display Case:** $77.26
1 – 2’ x 4’ ¼” plywood removable top & back - $5.54 – $5.54
1 – 4’ x 4’ ½” plywood front, bottom & sides - $14.99 – $14.99
3 – 1 x 2 x 8' framing and runners - $0.99 – $2.97
2 – 2 x 2 x 8’ framing and runners - $1.99 – $3.98
2 – 120 mm pc case fans - $6.00 – $12.00
1 – 350 W Power Supply for fans - $10.00 – $10.00
2 – Carrying Handles - $3.89 – $7.78
1 – Fasteners (glue, screws, joist hangers) - $10.00 – $10.00
1 – qt. Paint - $10.00 – $10.00

**Display System:** $263.75
1 – Rabbit Microcontroller - $199.00 – $199.00
5 – 5’ 7-Segment Displays - $12.95 – $64.75

**Power System:** $60.00
1 – Power Adaptor - $20.00 – $20.00
2 – Voltage Regulator - $10.00 – $20.00
1 – Miscellaneous (wires, solder, etc.) - $20.00 – $20.00

**Total:** $341.01
shipping & tax: $35.41
**$346.42**
**LABOR BUDGET**

Labor: $25/hour

<table>
<thead>
<tr>
<th>Personnel</th>
<th>1st Sem. Hours</th>
<th>2nd Sem. Hours</th>
<th>Total $</th>
</tr>
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<tbody>
<tr>
<td>Karl South</td>
<td>150</td>
<td>100</td>
<td>6250</td>
</tr>
<tr>
<td>Sang Hoon Choi</td>
<td>150</td>
<td>100</td>
<td>6250</td>
</tr>
<tr>
<td>Nate Keane</td>
<td>150</td>
<td>100</td>
<td>6250</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18750</strong></td>
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**SCHEDULE**

<table>
<thead>
<tr>
<th>Completion Date</th>
<th>Task / Subtask</th>
<th>Personnel Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 / 9 / 04</td>
<td>Signal Interception &amp; Decoding.</td>
<td>All</td>
</tr>
<tr>
<td>3 / 30 / 04</td>
<td>- Intercept the Data Signal to the scoreboard.</td>
<td>All</td>
</tr>
<tr>
<td>4 / 2 / 04</td>
<td>- Use Hyperterminal to interpret the scoreboard signal.</td>
<td>All</td>
</tr>
<tr>
<td>4 / 9 / 04</td>
<td>- Find the required data in the data stream (event &amp; heat #).</td>
<td>All</td>
</tr>
<tr>
<td>4 / 23 / 04</td>
<td>Setting the Data to the Displays</td>
<td>All</td>
</tr>
<tr>
<td>4 / 23 / 04</td>
<td>- Use the microcontroller to get our data (event &amp; heat #) out of the data stream.</td>
<td>Choi &amp; Nate</td>
</tr>
<tr>
<td>4 / 3 / 04</td>
<td>- Send the proper signal to the display controller.</td>
<td>Choi &amp; Nate</td>
</tr>
<tr>
<td>4 / 23 / 04</td>
<td>- Get the display controller properly driving the 7-segment displays (software-wise).</td>
<td>Choi &amp; Karl</td>
</tr>
<tr>
<td>4 / 21 / 04</td>
<td>Display Box Construction</td>
<td>All</td>
</tr>
<tr>
<td>4 / 19 / 04</td>
<td>- Wood frame &amp; general construction.</td>
<td>Nate</td>
</tr>
<tr>
<td>4 / 19 / 04</td>
<td>- Fan &amp; fan power installation.</td>
<td>Nate</td>
</tr>
<tr>
<td>4 / 21 / 04</td>
<td>- Microcontroller, display, display controller installation (excluding wiring).</td>
<td>All</td>
</tr>
<tr>
<td>4 / 21 / 04</td>
<td>- Power supplies, voltage regulation, signal and power wires.</td>
<td>All</td>
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<tr>
<td>4 / 19 / 04</td>
<td>- External connections (power &amp; data).</td>
<td>Nate</td>
</tr>
<tr>
<td>4 / 26 / 04</td>
<td>Power Supply System</td>
<td>Karl &amp; Choi</td>
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<tr>
<td>4 / 26 / 04</td>
<td>- External power (standard outlet) conversion.</td>
<td>Karl &amp; Choi</td>
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<tr>
<td>4 / 26 / 04</td>
<td>- Internal power regulation, conversion &amp; distribution.</td>
<td>Karl &amp; Choi</td>
</tr>
<tr>
<td>4 / 29 / 04</td>
<td>Finalize System</td>
<td>All</td>
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**Conclusion**

Questions?