Swell Alert

Surf Lead:
Eric Goodman

Surf Dudes:
Ryan Summers
Adam Sundberg
Outhone Bounkhoun
Design Ideas and Goals

Priority:
Creation of a wifi-enabled, touch screen alarm clock that gathers surf data to determine when to awaken a user

Side goal:
Stream music from a server (possibly Pandora)
Utilizing GPS location to get appropriate surf data
Utilizing GPS to set atomic time
Basis of Project Swell Alert

National Data Bouy Center [http://www.ndbc.noaa.gov/](http://www.ndbc.noaa.gov/) has publicly available bouy data via a ftp server. This information is updated every half hour.

Websites such as surfline.com give week-long forecasts. Setting your alarm clock early because the forecast appears good may cause needless loss of sleep when there are no waves.
Team Member Expertise

Eric Goodman - Team Lead, Wifi and Buoy Data

Ryan Summers - Processor, RAM, GPS

Adam Sundberg - All things music (MP3, DAC, Pandora)

Outhone Bounkhoun - Touchscreen, Caterer
Top Level Block Diagram
# Checklist of parts

<table>
<thead>
<tr>
<th>Part</th>
<th>Model #</th>
<th>Price</th>
<th>Reason For Specific Part</th>
<th>Required Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>NXP LPC2478</td>
<td>Donated by NXP</td>
<td>External SDRAM, LCD Controller, Enough Busses</td>
<td>4 UART, 3 I2C, 1 I2S, SPI Controller</td>
</tr>
<tr>
<td>802.11b/g Wifi</td>
<td>RN171XVW-I/RM</td>
<td>37.93</td>
<td>Automated WEP/WPA2 ability, FTP and HTTP Clients on-board</td>
<td></td>
</tr>
<tr>
<td>Real Time Clock</td>
<td>DS1307</td>
<td>8.35</td>
<td>RTC accurate up until 2100</td>
<td>1 UART</td>
</tr>
<tr>
<td>Touchscreen</td>
<td>NHD-3.5-320240MF-ATXL-CTP-1</td>
<td>44.5</td>
<td>No microcontroller, Integrated capacitive touchscreen, Utilizes Processor LCD Controller</td>
<td>I2C OR SPI, 24Bit RGB</td>
</tr>
<tr>
<td>GPS</td>
<td>SSF 2929P SiRF III GPS Receiver</td>
<td>32.5</td>
<td>RS232, we don't need powerful/accurate module Date/Time Tags</td>
<td>UART/RS232</td>
</tr>
<tr>
<td>MP3 Decoder</td>
<td>VS1053</td>
<td>19.99</td>
<td>Serial interface, UART for debug, DAC/ADC</td>
<td></td>
</tr>
<tr>
<td>SDRAM</td>
<td>??</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL COST**

163.27
Processor

NXP LPC2478
- 3.3V Operation
- 512kb on chip flash / 98k on chip SRAM
- LCD Controller (For our TFT screen)
- Support for external static memory Via EMC
  - We will use an external 3.3 128Mb SDRAM module
- 4 UART busses
  - For Wifi and Audio Decoder
- 3 I2C bus interfaces / 1 I2S bus
  - For GPS and Touchscreen
- Ethernet interface

Datasheet
Wifi

RN171XVW-I/RM
- 3.3V Operation
  - Ultra-low power - 180mA Tx
- Supports AD-HOC and Infrastructure
- 802.11 b/g
- Contains complete internet protocols
  - WEP, WPA, WPA2
  - DHCP, DNS, ARP, ICMP
  - TCP/IP
  - FTP client, HTTP client
- TTL UART connections
- Communicates via ASCII

http://www.rovingnetworks.com/products/RN_XV
http://www.digikey.com/scripts/DkSearch/dksus.dll?WT.z_header=search_go&lang=en&keywords=rn-
xv&x=0&y=0&cur=USD
GPS

SSF 2929P SiRF III GPS Receiver
- UART interface
- 3.3v

Uses
- Used as a method of keeping atomic time.
  - Alternative to WWVB (Atomic Clock broadcast)
- Auto locate user and poll local beach data.
- Find number of beaches within user defined distance
  Via Server poll
- Automatically knows what current time is, no matter where/when it is plugged in.
Touchscreen

NHD-3.5-320240MF-ATXL##-CTP

- 3.5" Diagonal Screen
- Capacitive Touch Panel
- 320x240 Resolution
- I2C or SPI Interface
- 24 bit RGB Interface for the LCD
VLSI Solutions VS10053b
- MP3 decoder/DAC.
- Serial control and interface bus.
- UART interface to Processor for debug.
- Produces stereo sound.
Audio
Audio Storage

- USB/SD Card for easy storage and editing of music.
- Auxiliary in for easy connection to external MP3 player.
- Auxiliary out for easy connection to external speakers
- SDRAM as a buffer for streamed music.
Serial Real Time Clock

Dallas Semiconductor DS1307

-RTC counts seconds, minutes, hours, date of the month, month, day of the week, and year with leap year compensation valid to 2100.

-External Battery as backup.
Server

Required Protocols
- Java/JavaScript
  - Used to handle web queries to server
    - Where Am I
    - Get Local Beaches
    - Get Conditions of Specific Beach
    - Stream Pandora Data
- FTP
  - Used to stream and upload files to the Clock
    - Handle MP3 files on a remote device
- SQL
  - Potentially make parsing databases of data easier
Critical Elements

Wifi
- Needed for interaction with online buoy data

Server
- Extracting online data into usable format and send back to clock
- (Handling of Internet Music streaming)

Audio
- Without audio our alarm clock isn't an alarm clock.
- Redundant input and output of audio includes AUX IN, AUX OUT, SD Card, Hard Coded Sounds, FTP Music, Internet Streaming

Accurate Timekeeping
- Implemented with GPS
- Can use wifi data to periodically poll data from our server

LCD Display
- Clock is useless with no display of time
Questions?
Comments?