

Track Mate

Initial Design Review

Nathan Beste
Arzhang Badiozamani
Justin Flair
Evan Graves

Professor John Johnson
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Features

Track Mate is designed to fulfill the needs of an athlete on the go. With its on-board GPS, Track Mate will be able to provide to the LCD display information such as distance traveled, average speed, and roughly the number of calories burned. By setting calorie or distance goals beforehand, it will also be able to give feedback on progress and inform the user when he or she has met his or her targets.

Audio feedback will be conveniently combined with Track Mate's secondary function: MP3 playback. Songs will be preloaded onto any SD card, which when inserted will allow the user to construct a playlist or set to shuffle. Basic MP3 player functionality such as play, pause, skip and volume control will be included as well.

Microprocessor: LPC2478

- ARM7 processor running at 72 MHz
- 512 kb on chip flash program memory
- LCD Controller with TFT support
- SD card memory interface
- I2C interface controller for audio decoding
- RS-232 peripheral interface for GPS
- USB 2.0 controller



SDRAM

Micron Technologies MT48LC8M8A2P-6A

- 64MB Density
- 8Mb Depth
- TSOP package
- 166 MHz Clock
- PC133 Data Rate



Specifics: GPS

PMB-648 GPS Module

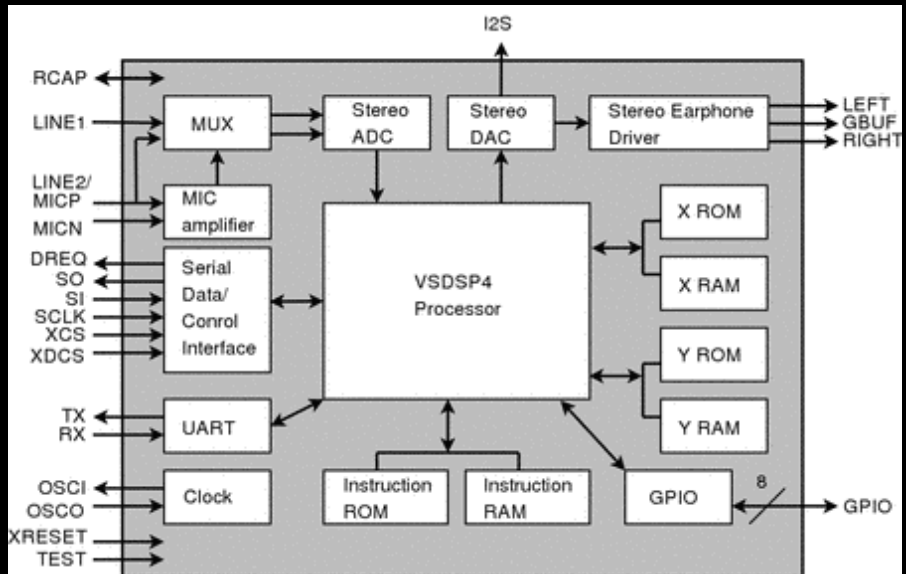
- 20 parallel satellite-tracking channels
- Power: 3.3V - 5V DC @ 65mA
- Output: NMEA string
- Communications: TTL or RS-232 asynchronous serial @ 4800 bps
- Cold start: 42s (average)
- Warm start: 38s (average)
- Hot start: 1s (minimum)



Specifics: Audio Decoding

VS1053 - Ogg Vorbis / MP3 / AAC / WMA / FLAC / MIDI Audio Codec Chip

- I²C interface
- Operates with a single 12-13 MHz or 24-26 MHz clock
- Internal PLL clock multiplier
- 16.5 KiB on-chip RAM for user code and data
- On-chip stereo DAC
- UART for debugging purposes
- 1.8V for digital operations
- 3.3V for analog operations
- 22 mA average
- 75 mA peak



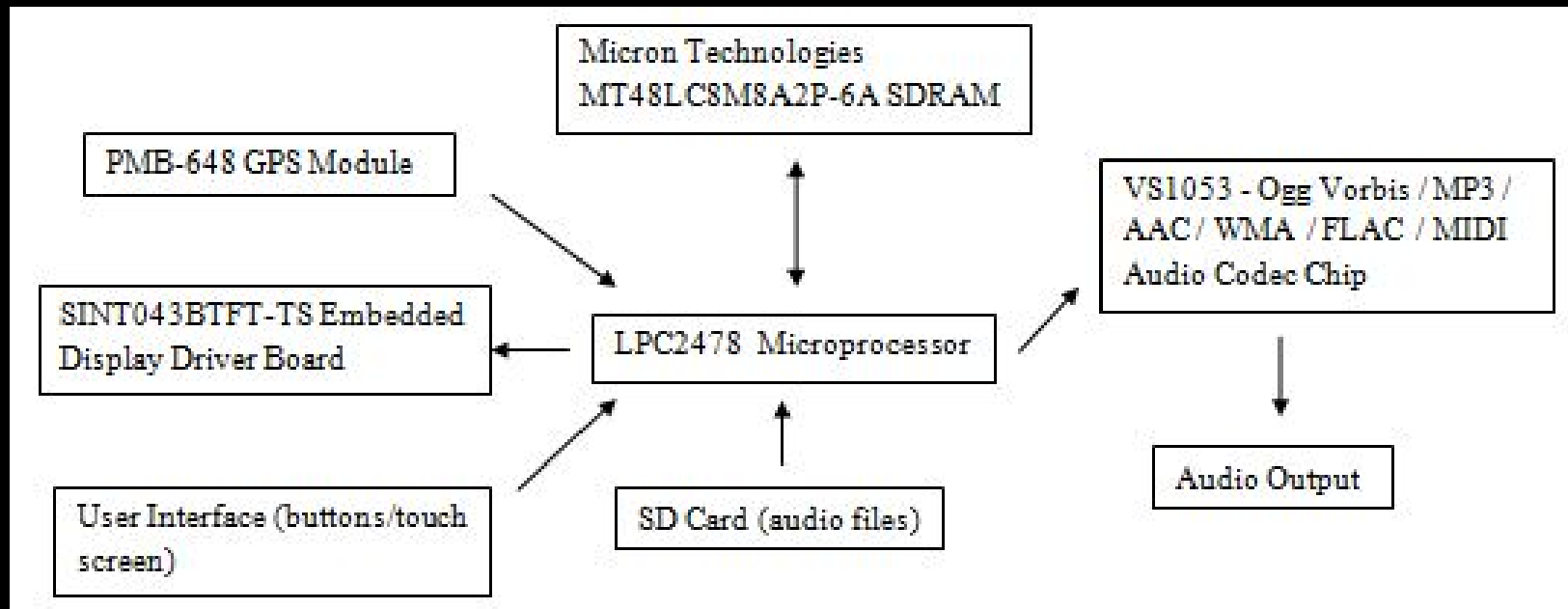
Specifics: TFT LCD Display

SINT043BTFT-TS Embedded Display Driver Board

- 4.3" 480 x 272 RGB resolution TFT display module
- 8080/6800 MCU Interface
- Built-in 675K byte Frame Buffer
- Solomon Systech SSD1961 LCD controller, supports common RAM-less LCD drivers
- Embedded 4-wire Resistive Touch Panel Control
- Dynamic Backlight Control via PWM Signal
- Power: 1.2V - 3.3V DC



High Level Block Diagram



Team

Nathan: Leader, SD Card, SDRAM

Arzhang: GPS

Justin: Display

Evan: Power, Audio

All: Processor

Technology and IP Reuse

- PMB-648 GPS Module
- VS1053 Audio Codec Chip
- SINT043BTFT-TS Embedded Display Driver Board
- Secure Digital Memory

Critical Elements

- Find GPS tracking with a high refresh rate, while balancing power consumption to ensure that calorie and distance information can be as accurate as possible.
- Functional LCD display to output information on burned calorie count, distance travelled, and MP3 details.
- Valid data paths for interfacing all modules through the microprocessor.

Additional Goals

- Implement a heart rate monitor to give the user information about calories burned. This would work with the GPS module using elevation and distance data to calculate a more accurate reading of calories burned.
- Implement the touch screen capabilities of the display.

Schedule

<u>ID</u>	<u>Milestone</u>	<u>Task</u>	<u>Duration</u>	<u>Start</u>	<u>Finish</u>	<u>Team Members</u>
1		Project idea	2 days	10/1/2012	10/3/2012	All
2		Team formation	1 day	10/1/2012	10/2/2012	All
3		Block Diagram	1 day	10/6/2012	10/7/2012	Nathan
4	Refined Project	Annotated block diagram	2 days	10/12/2012	10/14/2012	Nathan
5		External behavior specification	3 days	10/10/2012	10/13/2012	Arzhang
6		Project responsibilities	2 days	10/10/2012	10/12/2012	All
7	Initial Design Review	Processor selection	1 day	10/17/2012	10/18/2012	All
8		Power supply	4 days	10/17/2012	10/21/2012	Evan
9		Display	5 days	10/16/2012	10/21/2012	Justin
10		GPS module	3 days	10/16/2012	10/18/2012	Arzhang
11		Interface design	8 days	10/13/2012	10/21/2012	All
12		Audio decoder	5 days	10/16/2012	10/21/2012	Evan
13		Memory	5 days	10/16/2012	10/21/2012	Nathan
14		Parts selection	8 days	10/13/2012	10/21/2012	All
15		Interface design	10 days	10/11/2012	10/21/2012	All
16	System Level Design	GPS interface	4 days	10/24/2012	10/28/2012	Arzhang
17		Display interface	5 days	10/22/2012	10/27/2012	Justin
18		Memory interface	4 days	10/23/2012	10/27/2012	Nathan
19		Controls	6 days	10/22/2012	10/28/2012	All
20		Amplifier interface	3 days	10/23/2012	10/26/2012	Justin
21		Power supply interface	5 days	10/22/2012	10/27/2012	Evan
22	Testing Interfaces				11/2/2012	All
23	Preliminary Design Review				11/5/2012	All
24	Detailed Design				11/15/2012	All
25	Critical Design Review				12/3/2012	All
26	Implementation of Hardware Design				12/5/2012	All