

ABSTRACT

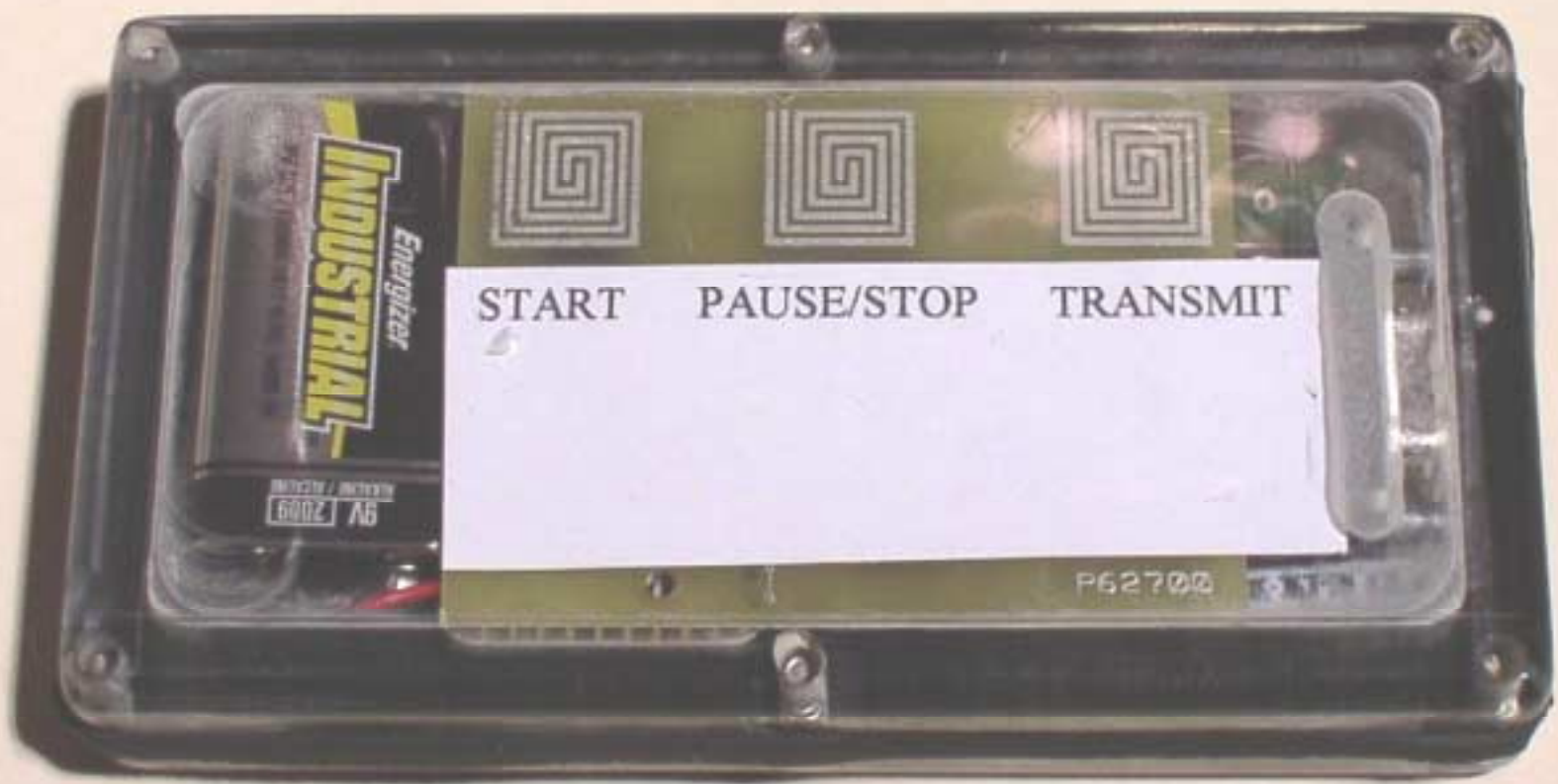
Zigbee Wireless Swimming Trainer

April 27, 2005

Training to be an Olympic swimmer requires a lot of hard work and determination. Part of reaching that goal is determining the swimmers strengths and weaknesses. Being able to actually see the improvements as the swimmer progresses up the ranks reinforces the swimmer's determination to be the best swimmer possible. The objective of this project is to develop an inexpensive tool to assist in training swimmers to qualify for the Olympic swimming team. The qualifying swimmers are not only judged on their speed but also on their movements through the water and their turns. The monitoring of the swimmers movements is usually done visually by the swimmer's coach. The big problem is there are many swimmers and one coach. To help the coach plot the swimmers progress, the eSwim trainer makes use of the following five Freescale components to sample, record, and transmit the swimmers movements.

- MC9S08GT60 microcontroller controls the operation of all the devices and is programmed in the "C" language using the Metrowerks CodeWarrior Development Studio.
- MC33794 Electric Field Imaging Device provides 3 touch buttons to control the Eswim device and allows the unit to be housed inside a waterproof enclosure.
- MMA1260D Z axis accelerometer measures the swimmers up and down movements when the swimmer is horizontal.
- MMA66261Q X and Y axis accelerometer measures the swimmers forward and side movements when the swimmer is horizontal.
- MC13192 Zigbee wireless controller provides the communication link used to upload the stored measurements to a host machine for processing.

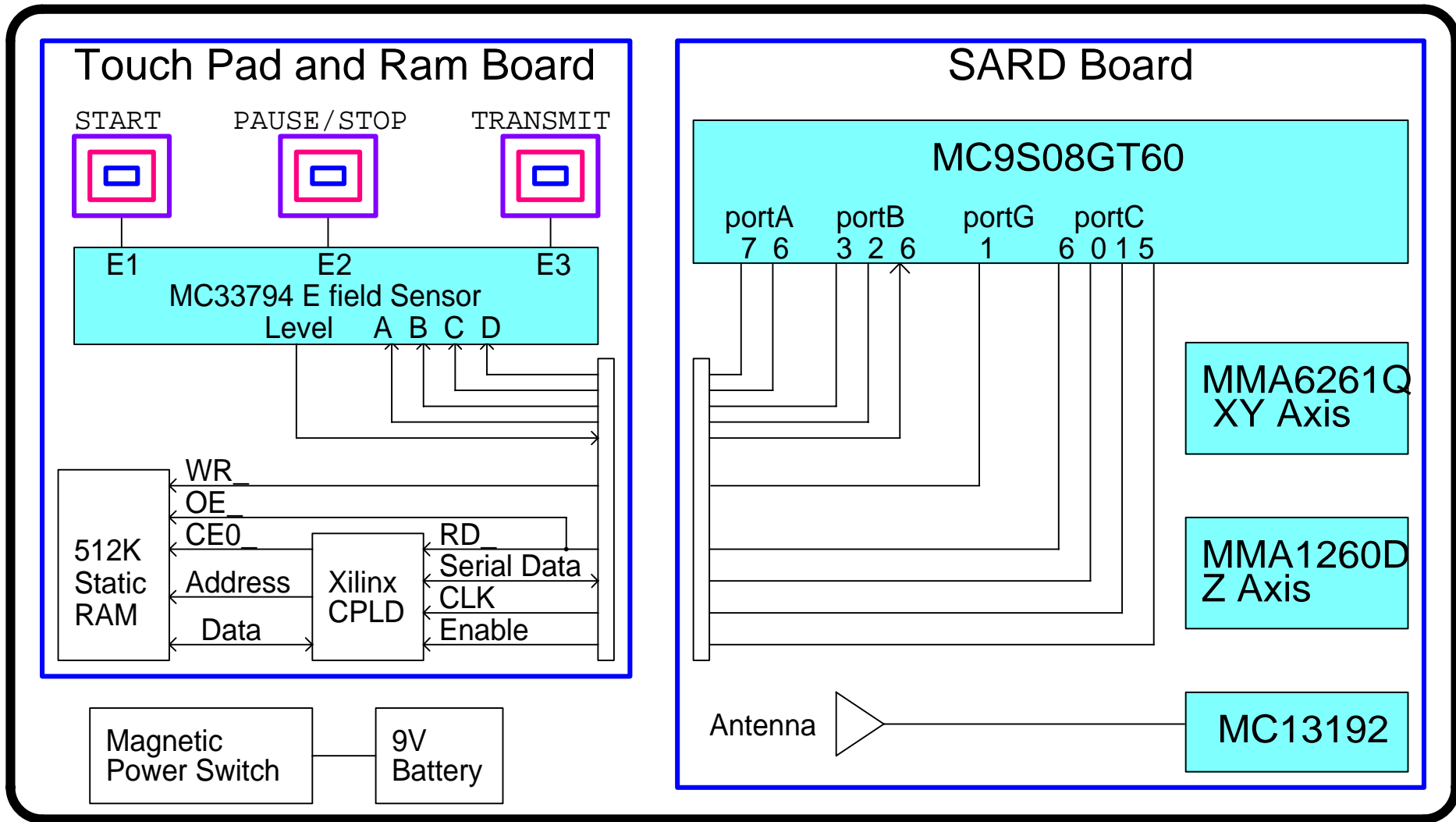
The hardware for this contest entry/prototype makes use of the SARD board from the Wireless Design Challenge Kit. More RAM and touch buttons were needed which required developing a daughter board to mate to the SARD board. The daughter board contains the E-Field sensor, a 512K RAM and a Xilinx CPLD. The Xilinx CPLD was required in order to interface to the RAM because of the limited I/O pins on the version of microcontroller used on the SARD board. The SARD software is based on the example **Accel_V2.0** project. The eSwim processing application runs on a PC and is written in Managed C++ using Microsoft Visual Studio.net 2003.



START PAUSE/STOP TRANSMIT

P52700

Zigbee Wireless Swimming Trainer



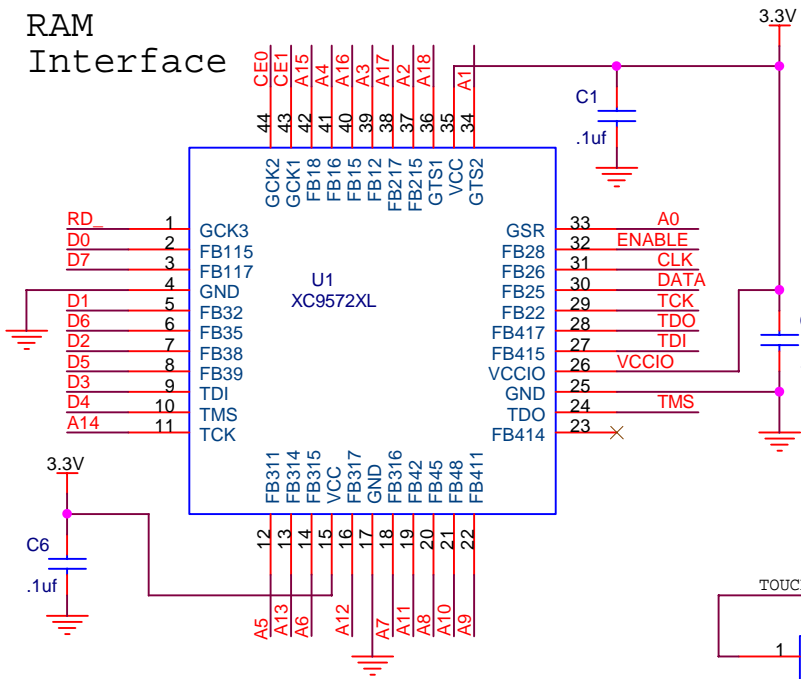
Magnet

Laptop
eSwim
S/W

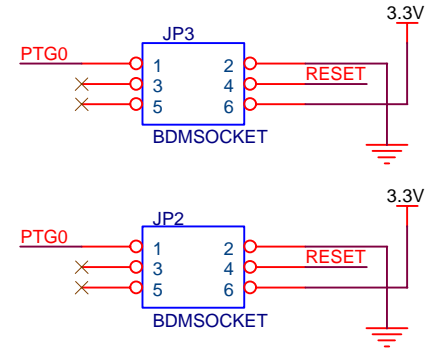
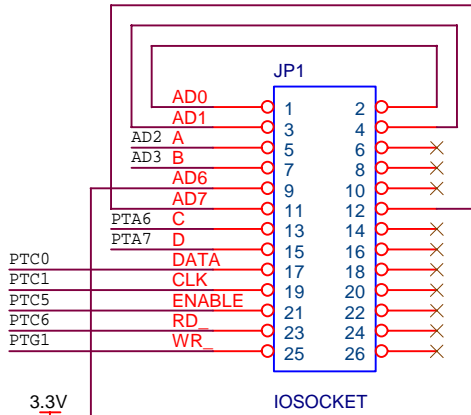
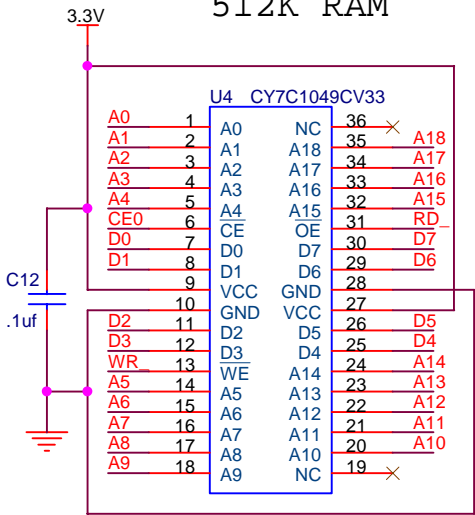
SARD

Title		
eSwim Progress Trainer - Block Diagram		
Size	Document Number	Rev
A	eSwim	A
Date:	Monday, April 25, 2005	Sheet 1 of 3

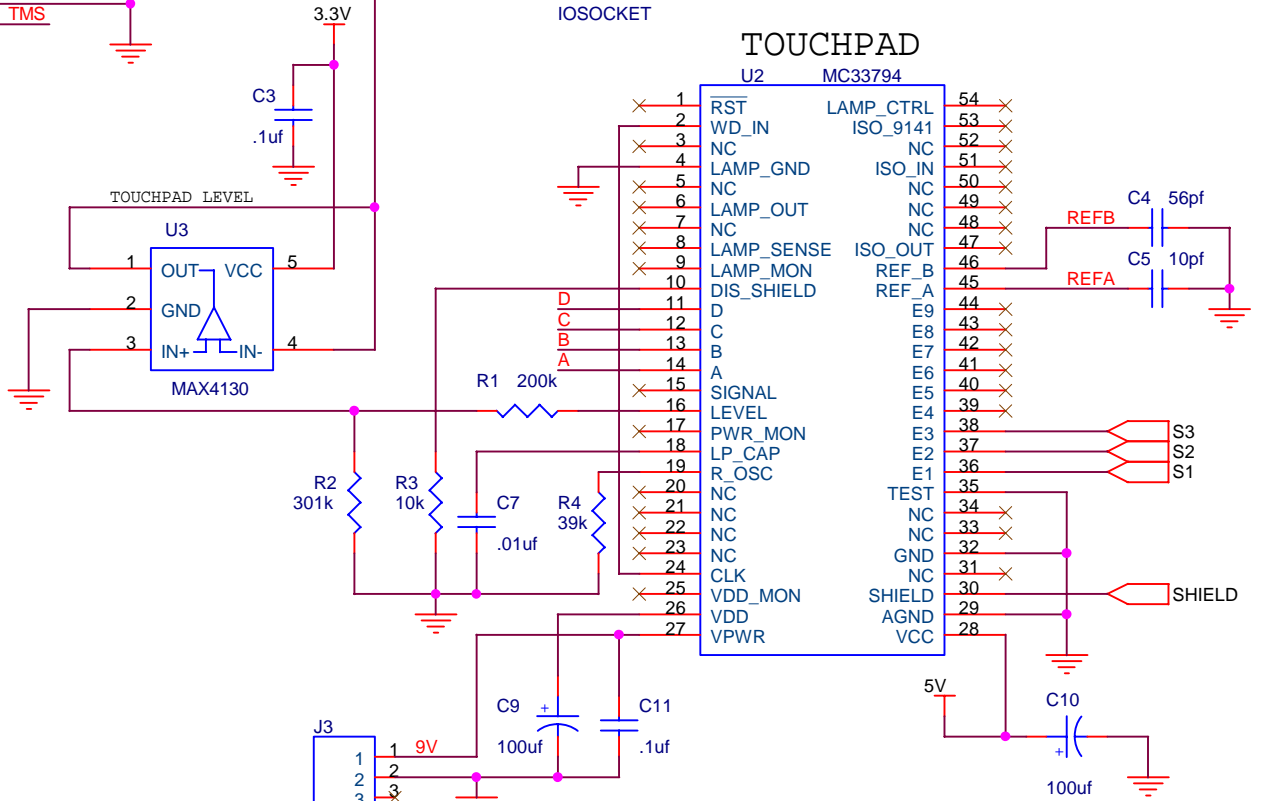
RAM Interface



512K RAM



TOUCHPAD



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eSwim Progress Trainer		
Size	Document Number	Rev
A	eSwim	A
Date:	Tuesday, April 12, 2005	Sheet 2 of 3

Ram Interface Timming

CE0 - High when ENABLE is high, Low when ENABLE is low and address counter less than 0x80000.

CE1_ - Not implemented at this time.

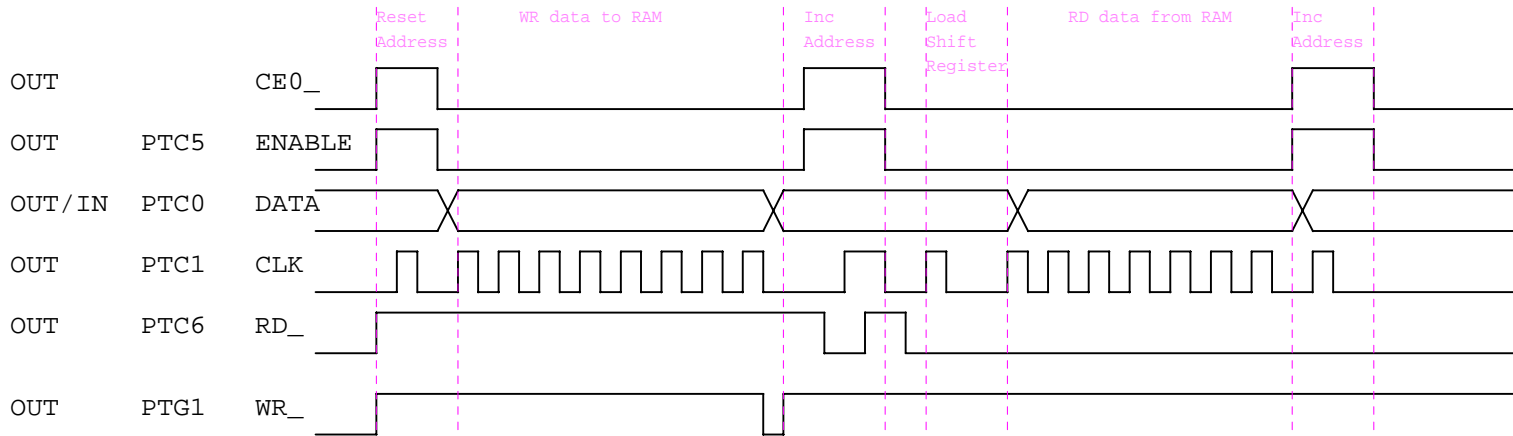
ENABLE - When high, resets address counter or increments address, disable DATA driver. When low enables RAM.

DATA - On Write, data shifted in MSB first. On read, data shifted out LSB first.

CLK - Events occur on leading edge of clock.

RD_ - ENABLE low: RD_ controls the ram D7..D0 drivers/receivers. Also selects shift data in/out.

ENABLE hgh: RD_ high - resets address cunter, RD_ low - increments address.



Start Sampling

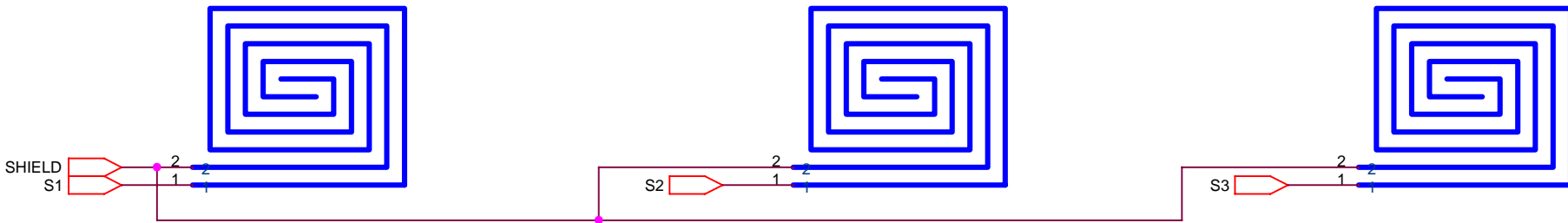
Pause/Stop

Transmit Samples

TP1

TP2

TP3



Touch Buttons

Title		
eSwim Progress Trainer - Timing Diagram		
Size	Document Number	Rev
A	eSwim	A
Date:	Wednesday, April 20, 2005	Sheet 3 of 3