

TALKING, SINGING, AND
GAME BOY PRINTING

PARALLAX EXPO 2012

BY JOE GRAND
GRAND IDEA STUDIO

Me .



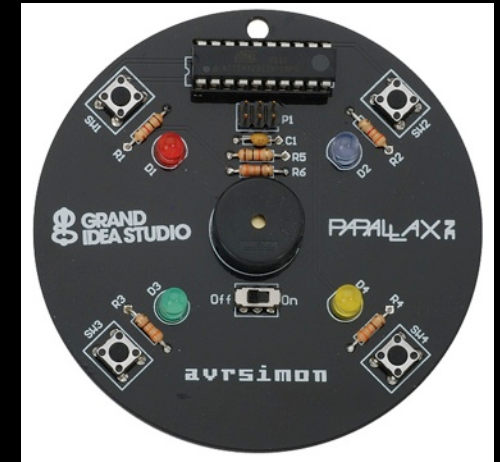
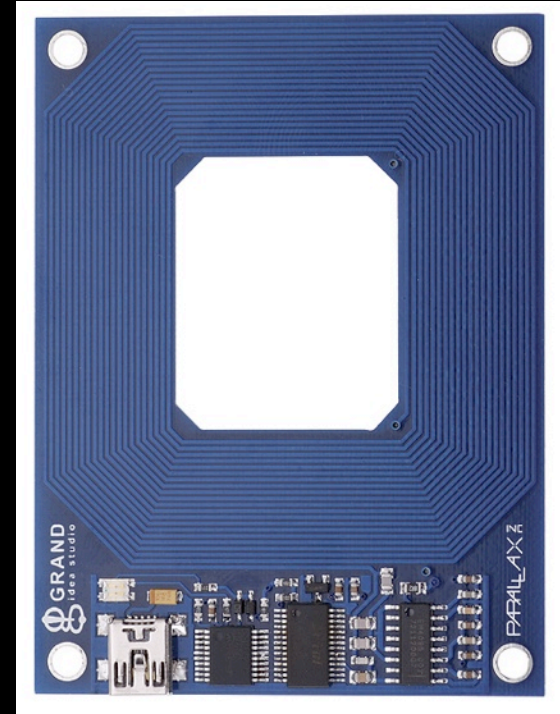
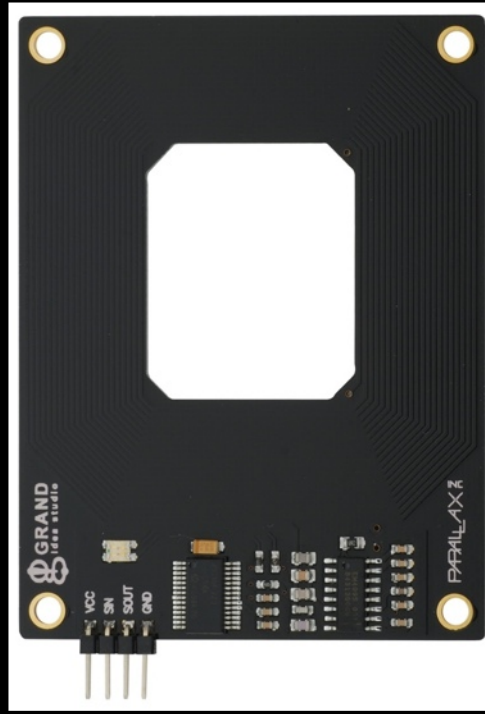
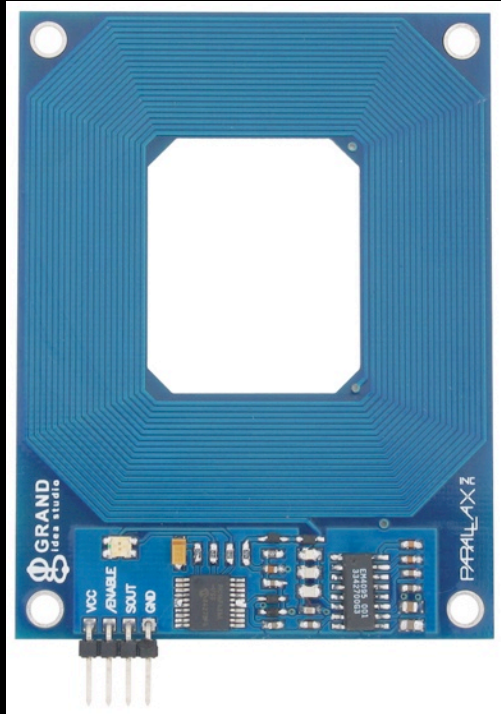
electrical engineer.

hardware hacker.

former tv host.



Designer of Parallax things...



Agenda



Emic 2 Text-to-Speech Module



LRF-to-Game Boy Printer Hack

Emic 2: Overview



Multi-language text-to-speech synthesizer



Fonix DECtalk 5.0e1 TTS engine via Epson SIV30120 TTS IC



Dynamic control of speech & voice characteristics

- Pitch, speaking rate, word emphasis, phoneme, etc.



5V @ 30mA idle, 46-220mA active



1.25" W x 1.5" L x 0.37" H



Significant improvements over original Emic 1



Emic 2: User Interface

- Simple TTL-level serial interface, 9600bps
- ASCII commands/responses
- Connections to host:
 1. GND
 2. VCC
 3. SOUT (Serial Out)
 4. SIN (Serial In)
- Audio output:
 - SP+/SP- (8 Ω Speaker, Bridge-Tied Load)
 - 1/8" Audio Jack (Single-Ended)

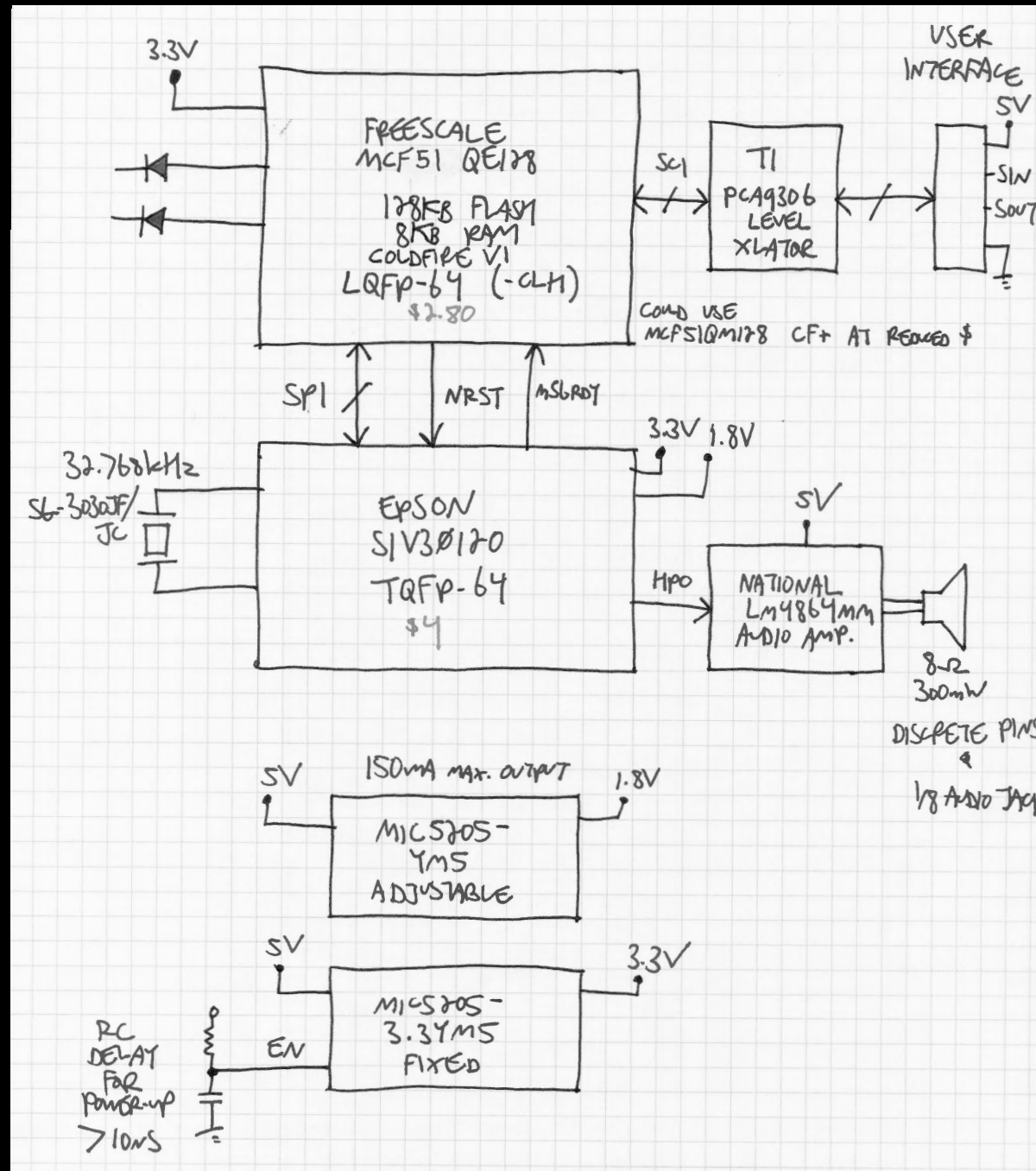


Emic 2: Commands

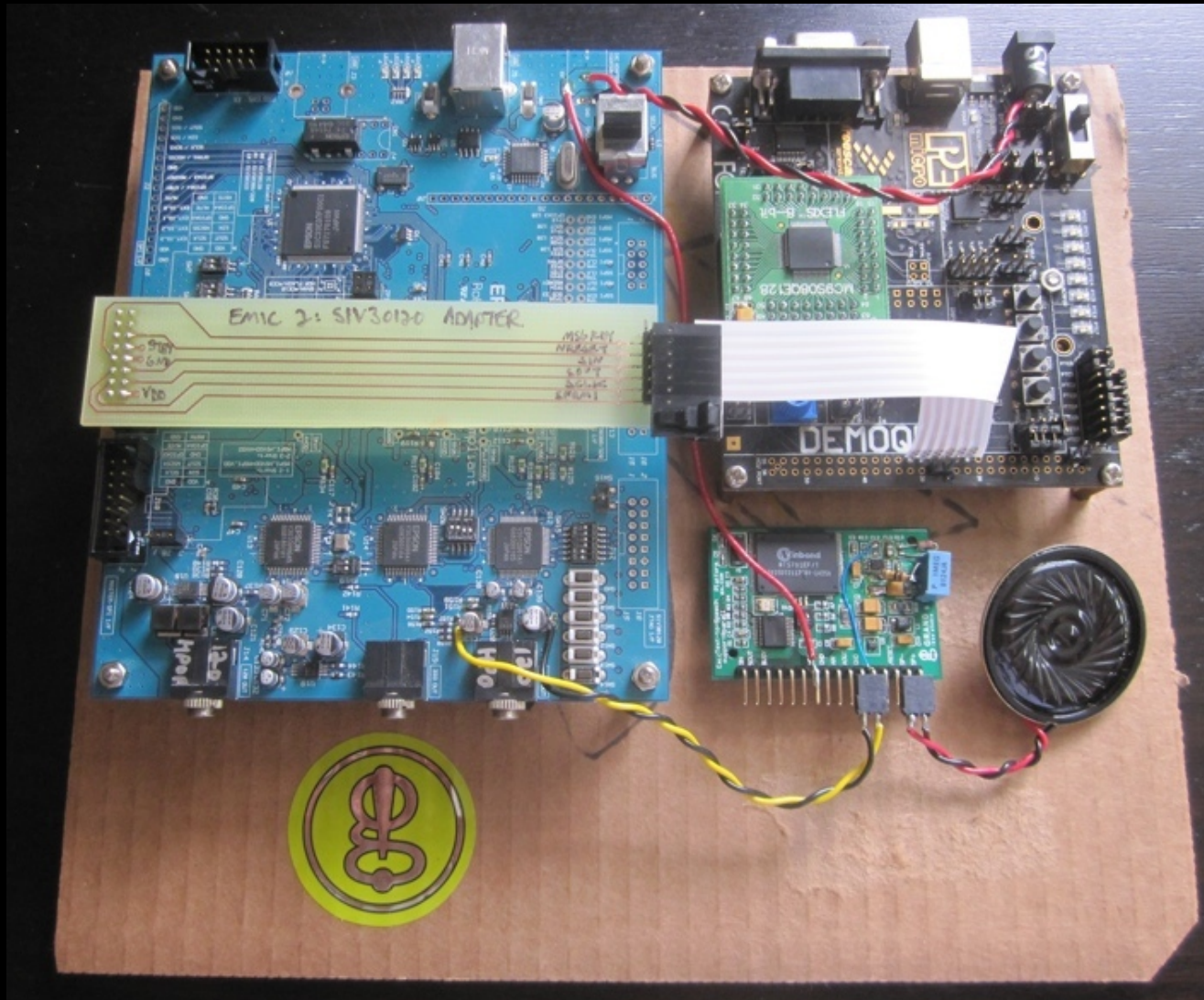
- Convert text-to-speech (1023 byte maximum)
- Play demonstration messages
- Pause/stop playback
- Select voice (of 9)
- Set audio volume (-48 to 18dB)
- Set speaking rate (75 to 600 words/minute)
- Select language (English or Castilian/Latin Spanish)
- Select parser (DECtalk or Epson)
- Revert to default TTS settings
- Print version information
- Print list of available commands



Emic 2: Block Diagram



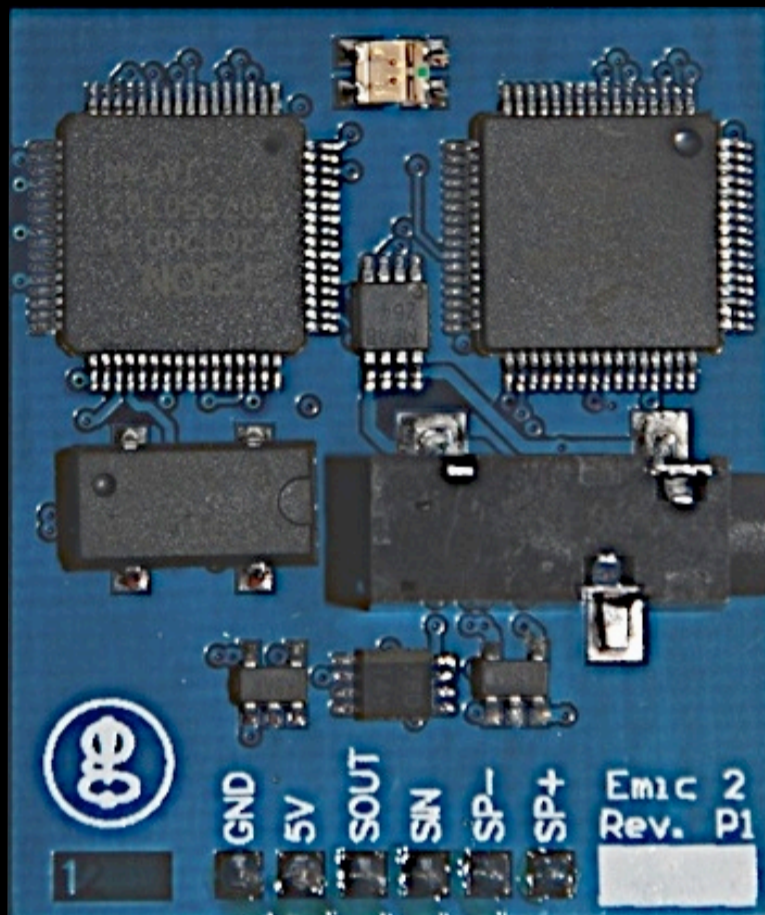
Emic 2: Development Platform



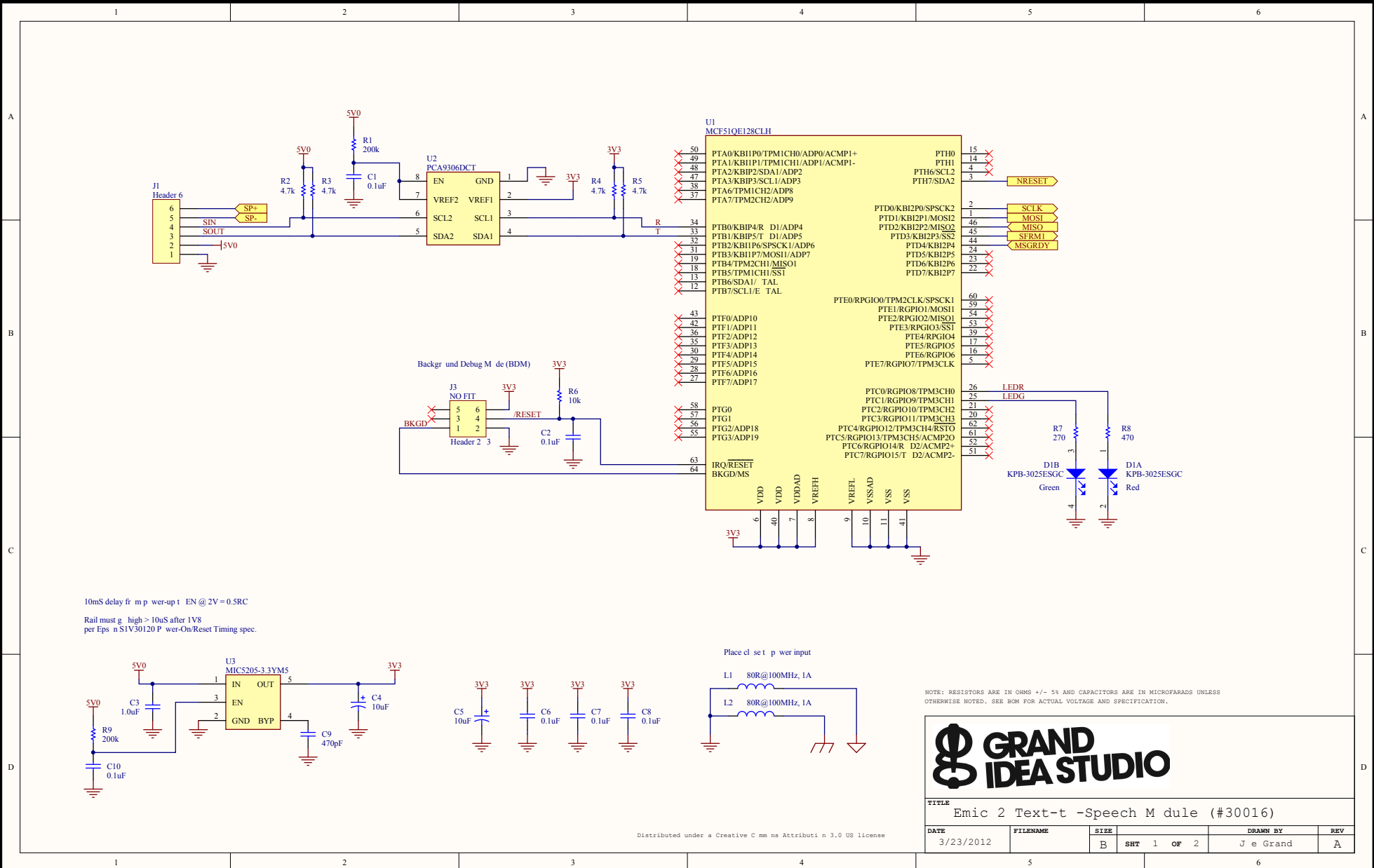
Freescale DEMOQE128 + Epson SIV30120 Eval. Board
+ Modified Emic I Module + Custom Interface PCB



Emic 2: PCB



Emic 2: Schematic (Main)

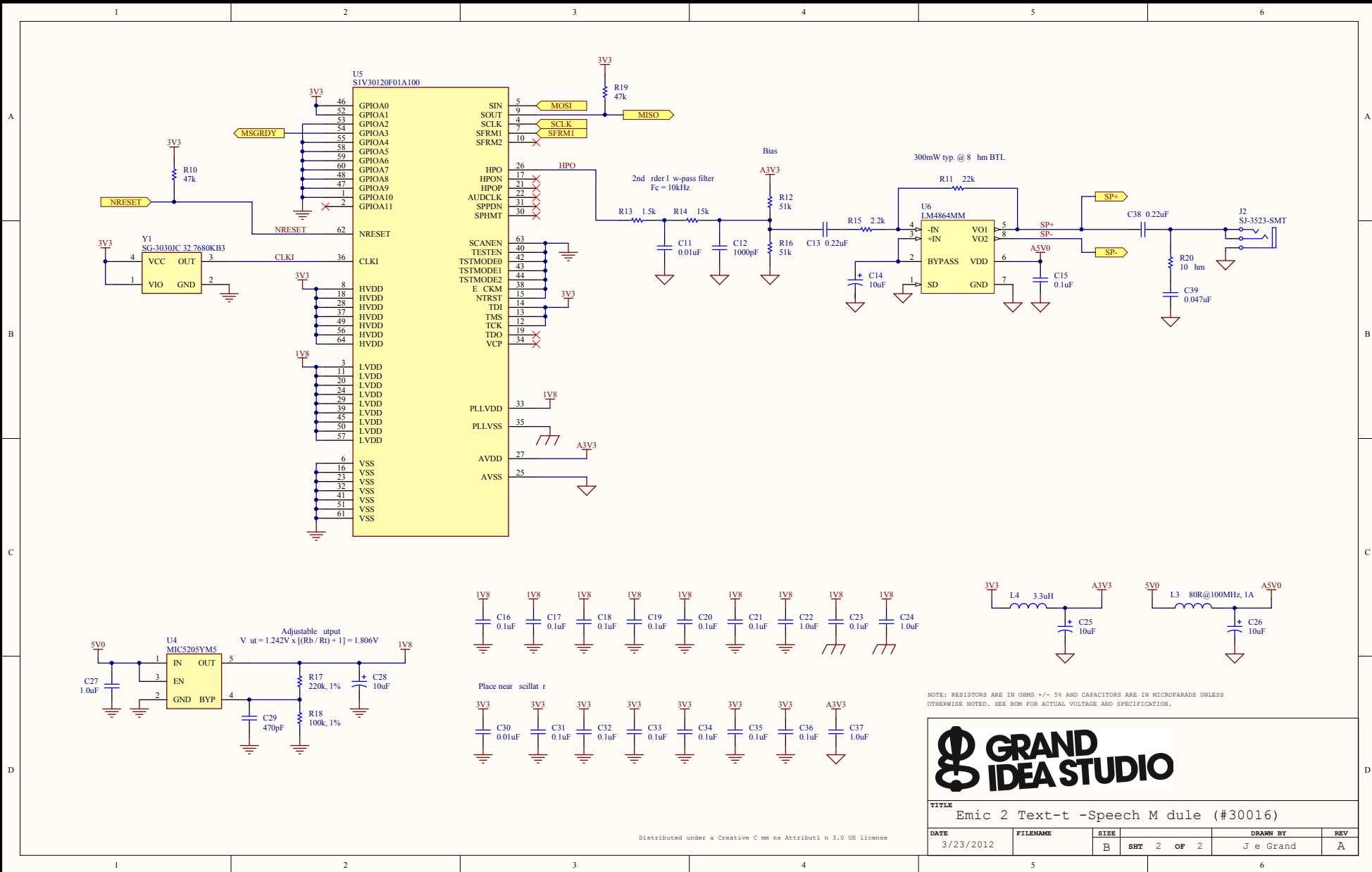


TITLE						
Emic 2 Text-t -Speech M dule (#30016)						
DATE	FILENAME	SIZE	SHT	1 OF 2	DRAWN BY	REV
3/23/2012		B			J e Grand	A

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Emic 2: Schematic (TTS)



NOTE: RESISTORS ARE IN OHMS +/- % AND CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE NOTED. SEE BOM FOR ACTUAL VOLTAGE AND SPECIFICATION.



TITLE: Emic 2 Text-t -Speech Module (#30016)				
DATE	FILENAME	SIZE	DRAWN BY	REV
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Emic 2: Demo Code



BASIC Stamp 2



Propeller



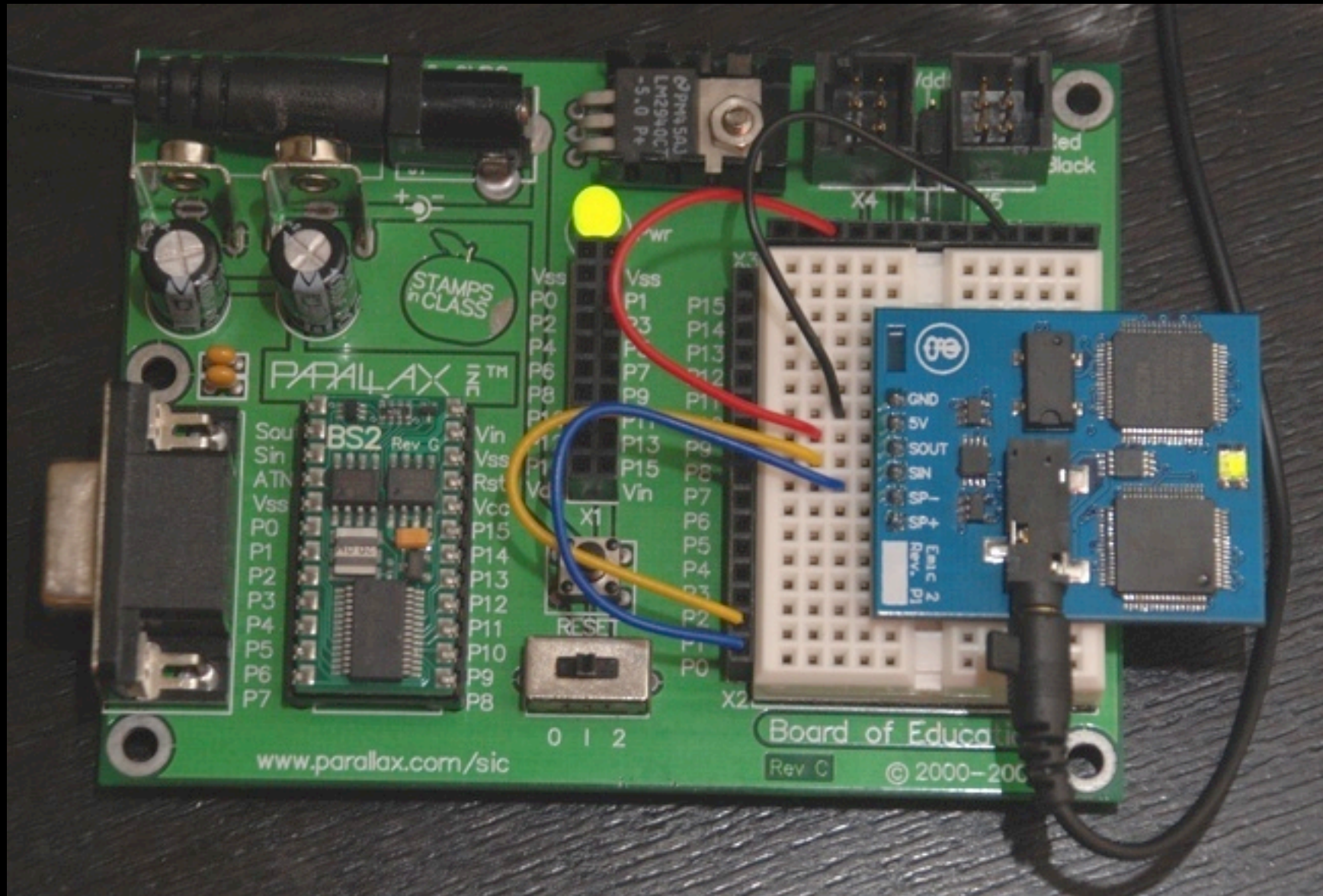
Arduino



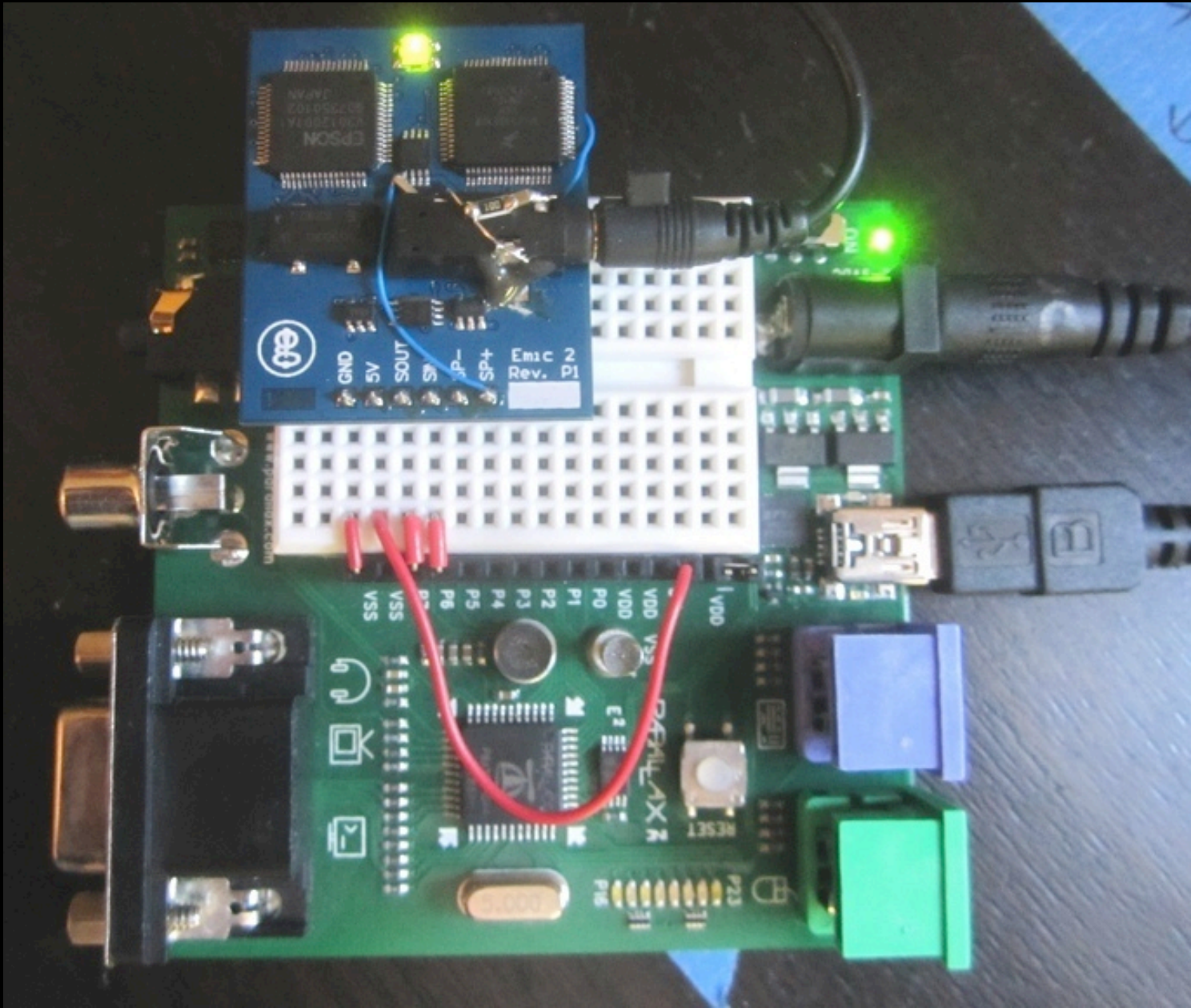
Microchip PIC12F675 (Emic 2-to-Elmo)



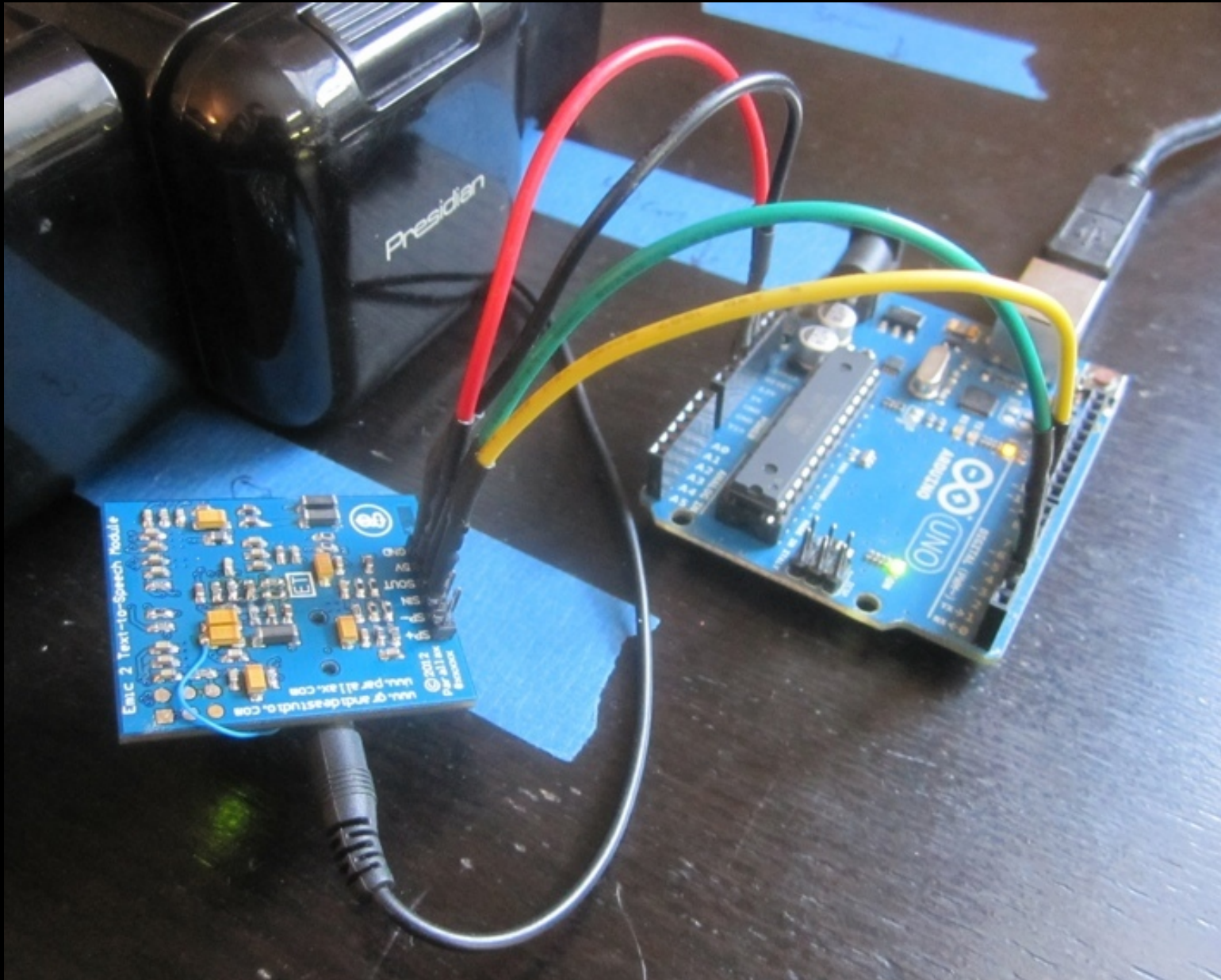
BASIC Stamp 2



Propeller



Arduino



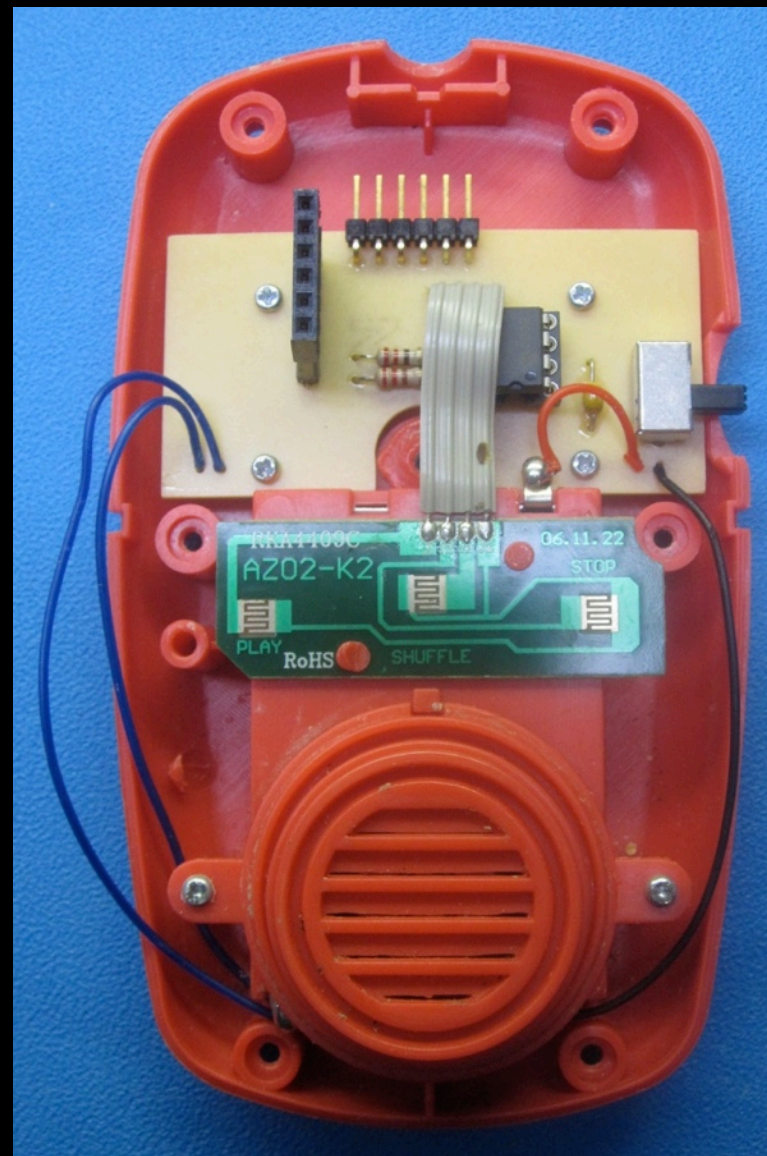
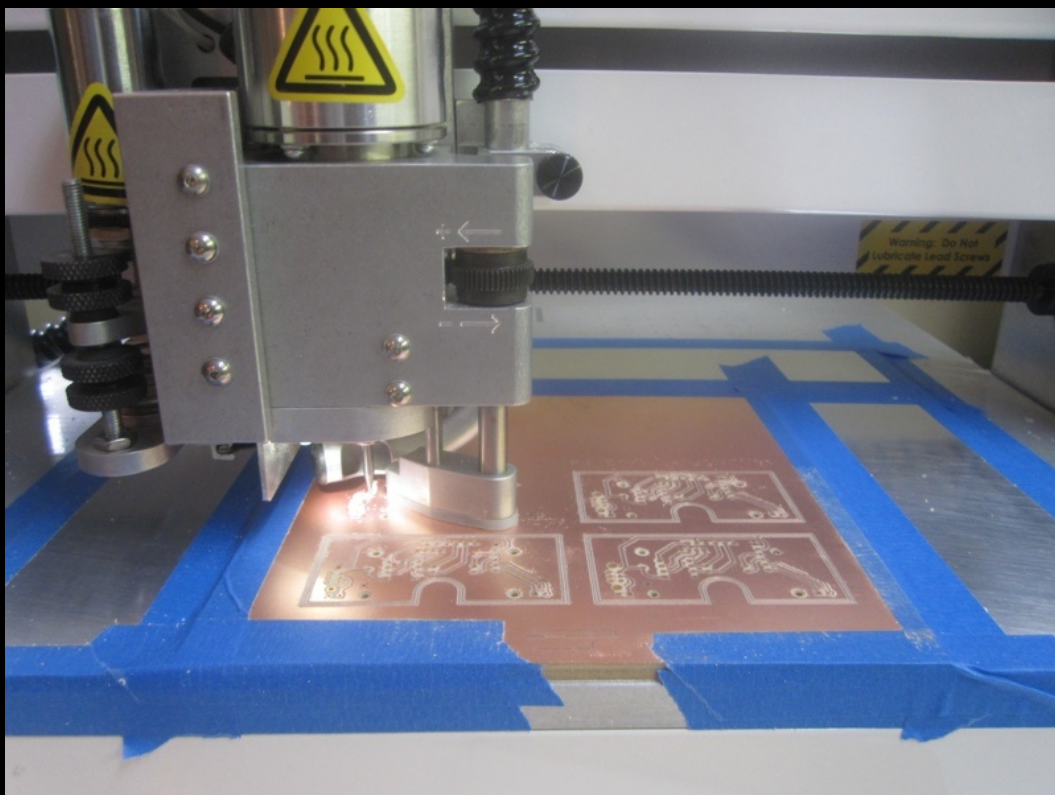
PIC12F675 (EMic 2-to-Elmo)



Before...



PIC12F675 (EMic 2-to-Elmo)



During...



PIC12F675 (EMic 2-to-Elmo)



After...



Emic 2: How to Get One



Production manufacturing in progress right here in Rocklin!



Available through Parallax (#30016) in mid-May



Full details soon @
www.grandideastudio.com/portfolio/emic-2-text-to-speech-module/



LRF-to-Game Boy Printer

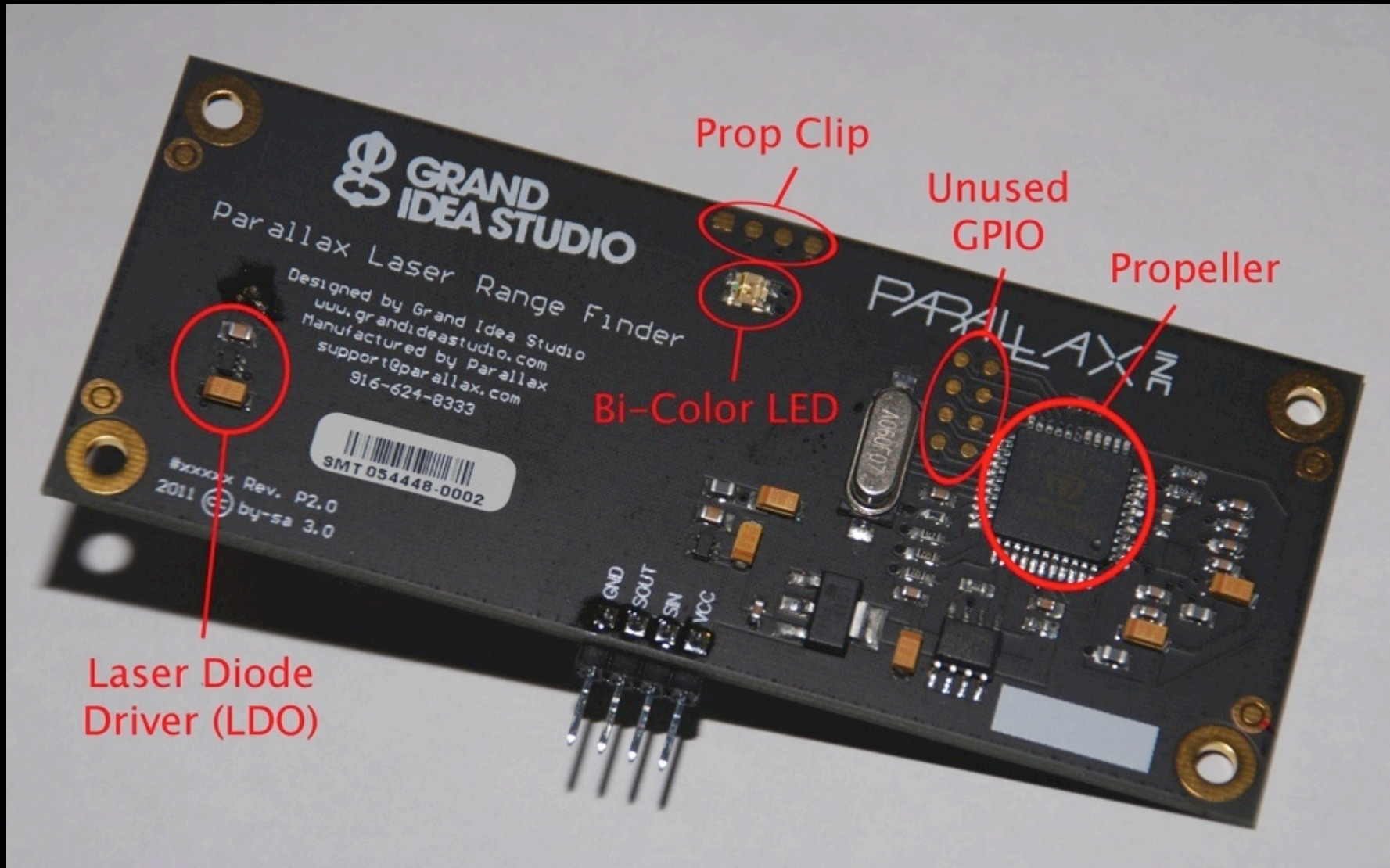
- Parallax Laser Range Finder module (#28044) meets old school Nintendo Game Boy Printer
- Inspired by furrtek's GBP reverse engineering
- Write-up @ <http://forums.parallax.com/showthread.php?136293>



LRF Module: Front



LRF Module: Back



LRF-to-GBP: Details

- LRF: 160 x 128 greyscale image @ 8bpp
- GBP: 160 x ∞ @ 2bpp
- Modified version of original LRF firmware
 - Only need camera interface, frame grabber, and serial communication functionality
 - LRF grabs single frame when button pressed
 - Frame processed and sent to GBP via SPI
- Created Game Boy Printer Interface object for Obex (Spin): <http://obex.parallax.com/objects/814/>



LRF-to-GBP: Image Processing

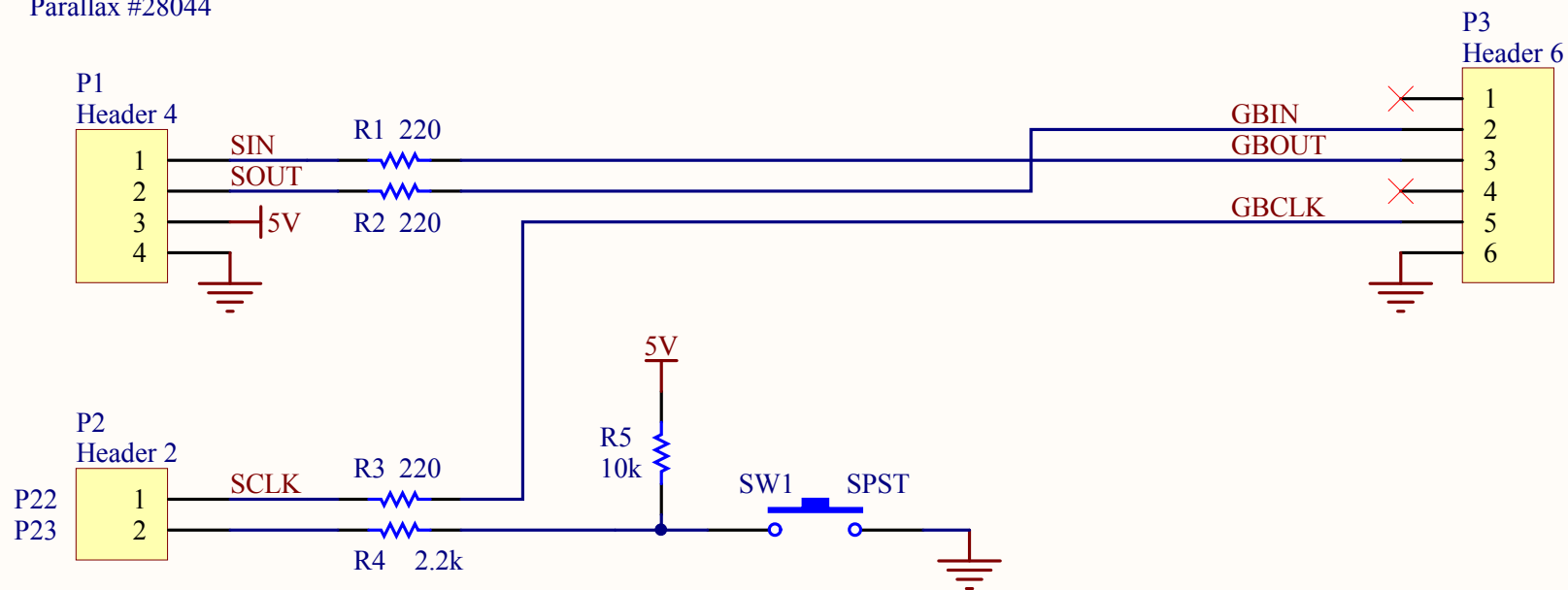
- Need to rearrange all the pixels and downsample
 - LRF frame stored in a linear format
 - GBP expects image data in a series of tiles (blocks)
- Each tile = 8 pixels * 8 pixels
- 20 tiles horizontal per band
- 2 bands per buffer
- 640 bytes per transaction



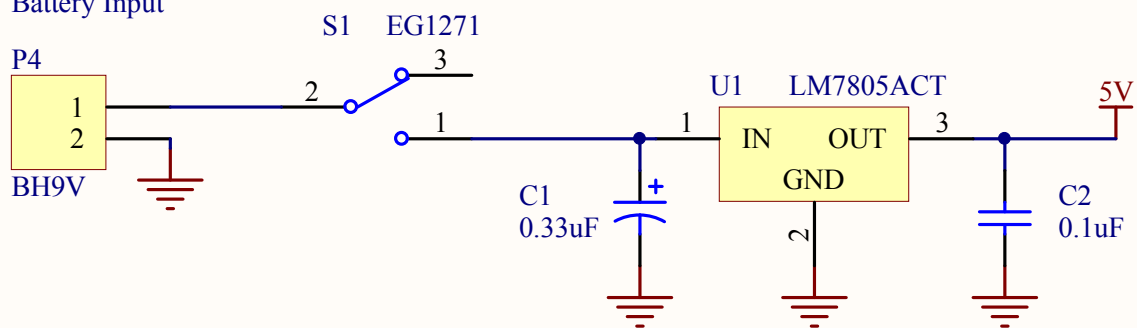
LRF-to-GBP: Schematic

Laser Range Finder Module
Parallax #28044

Gameboy Link Connector



Battery Input



LRF-to-GBP: Front



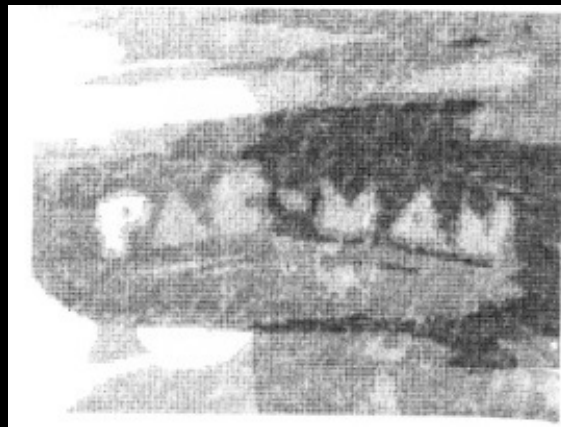
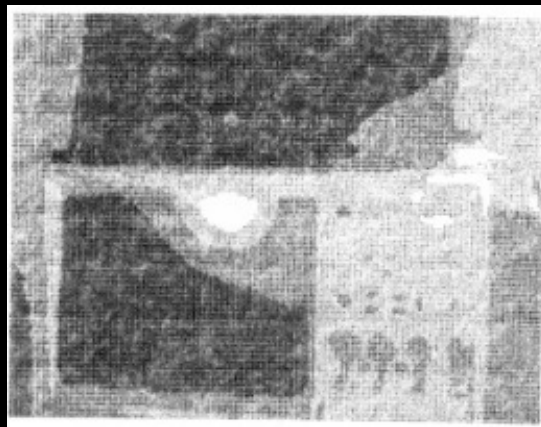
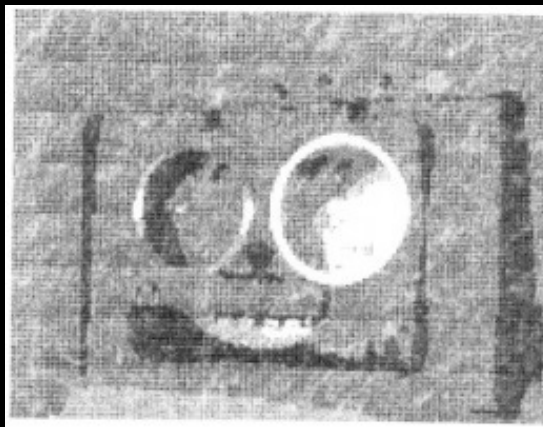
LRF-to-GBP: Back



LRF-to-GBP: Demonstration



RAF-to-GBP: Results



Take your own pictures during the expo!



THANK -U+GOODNITE
FROM PACSAT:KU-1

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MENU

MUTE
EXIT

VOLUME

CHANNEL

INPUT