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 S1V30120 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- (8Ω 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: PCB
Emic 2: Schematic (Main)

Title: Emic 2 - Speech M dule (#30016)

Date: 3/23/2012

Notes: RESISTORS ARE IN OHM +/- 5% AND CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE NOTED. SEE BOM FOR ACTUAL VOLTAGE AND SPECIFICATION.
Emic 2: Schematic (TTS)

NOTE: RESISTORS ARE IN OHMS +/- 5% AND CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
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...
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

635nm Laser Diode w/ APC
Arima APCD-635-02-C3-A

640x480 CMOS Camera
OmniVision OVM7690
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

www.atomicvpp.com/wpblog/2012/03/04/gameboy-printer-project/
Laser Range Finder Module
Parallax #28044

P1 Header 4
1 2 3 4
SIN R1 220
SOUT R2 220
5V

P2 Header 2
P22 P23
1 2
SCLK R3 220
2.2k

R4 220

GBIN
GBCLK
GBOUT

5V

SW1 SPST

R5 10k

5V

P3 Header 6
1 2 3 4 5 6

Battery Input
P4
1 2
BH9V

S1 EG1271

U1 LM7805ACT

IN OUT
GND

C1 0.33uF

C2 0.1uF

NOTE: RESISTORS ARE IN OHMS +/- 5
AND CAPACITORS ARE IN MICROFARADS, X7R UNLESS OTHERWISE NOTED. SEE BOM FOR ACTUAL VOLTAGE AND SPECIFICATION.
LRF-to-GBP: Front
LRF-to-GBP: Demonstration
LRF-to-GBP: Results

Take your own pictures during the expo!
THANK-U+GOODNITE
FROM PACSAT: KU-1
WWW.GRANDIDEASTUDIO.COM