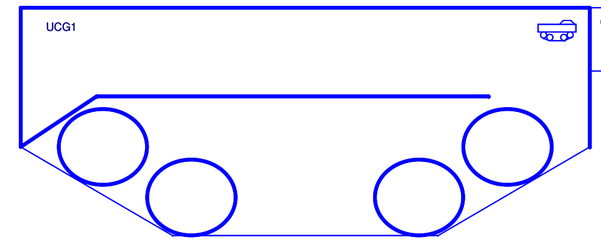
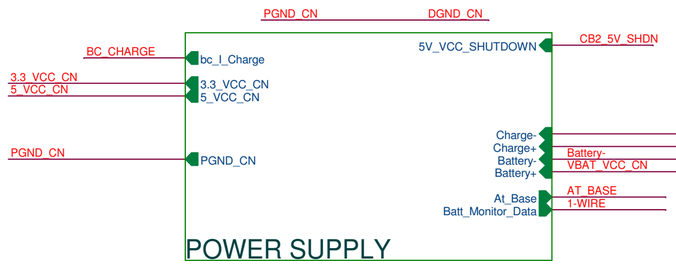
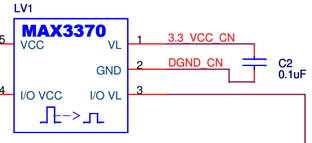
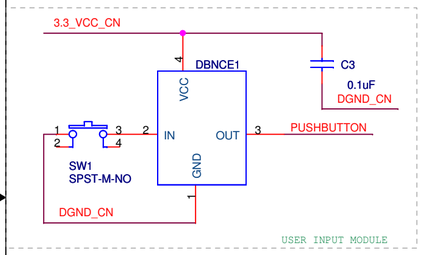
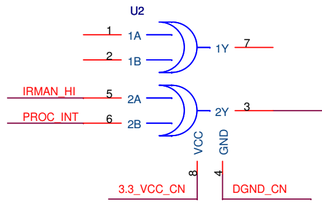


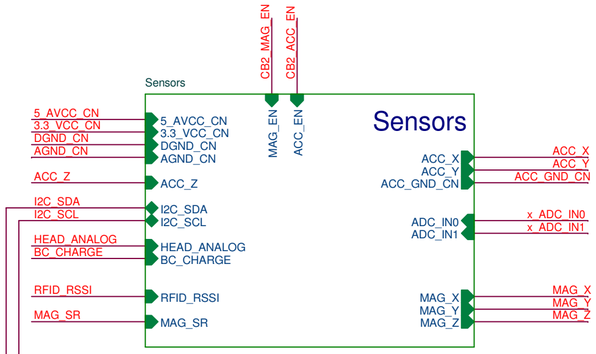
Actually, motors are wired opposite polarity from each other according to the color of the wires. Power (Red1, Black2), Ground (Black1, Red2).

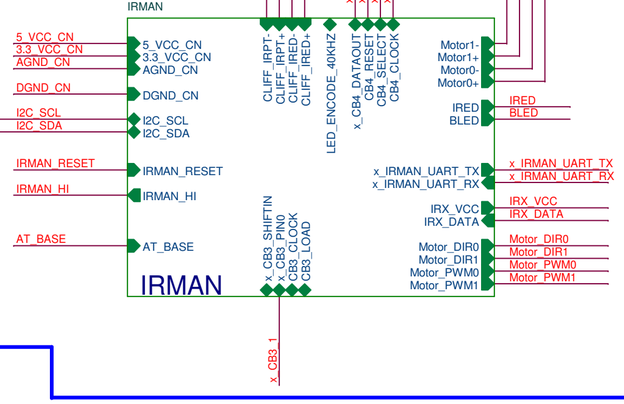


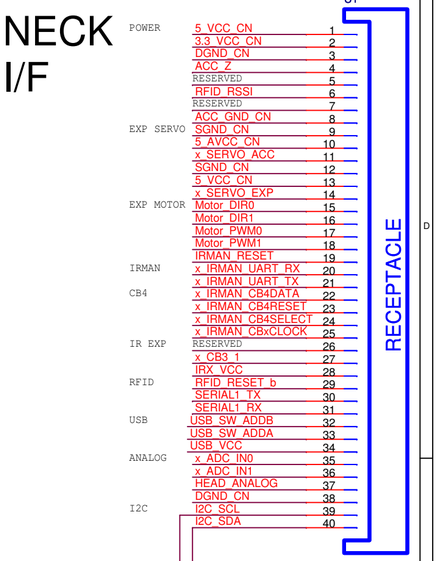




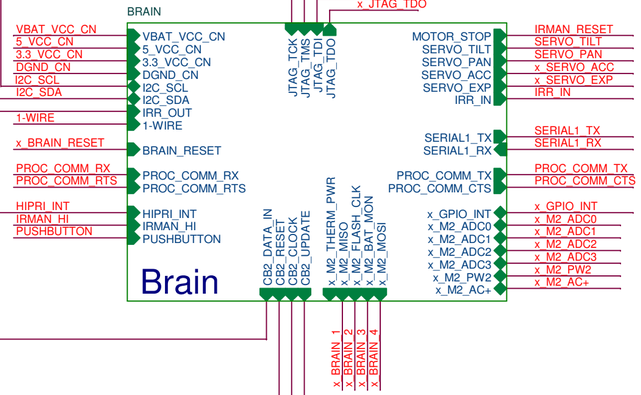


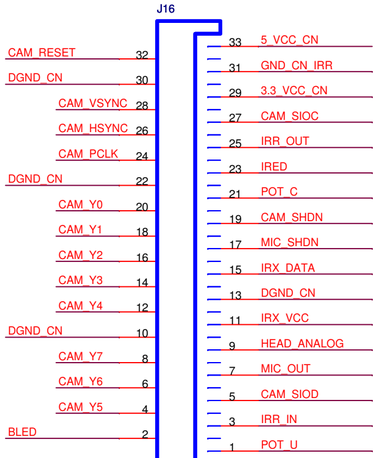


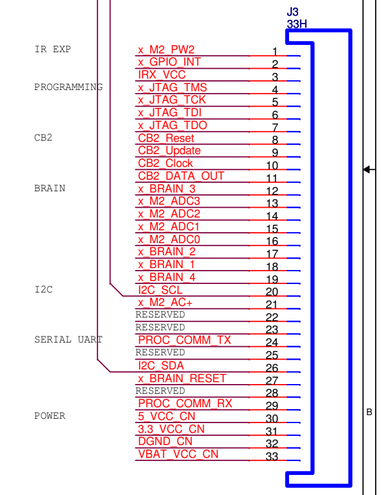


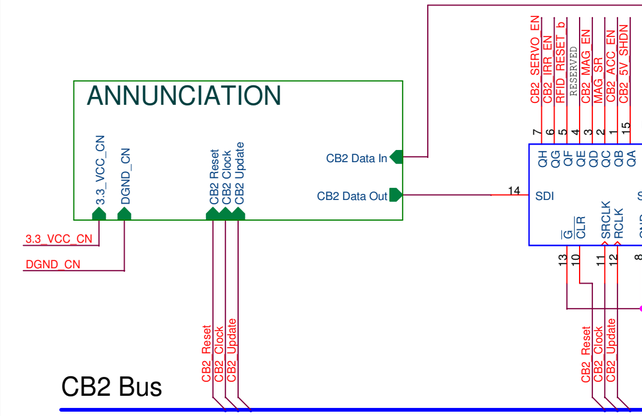


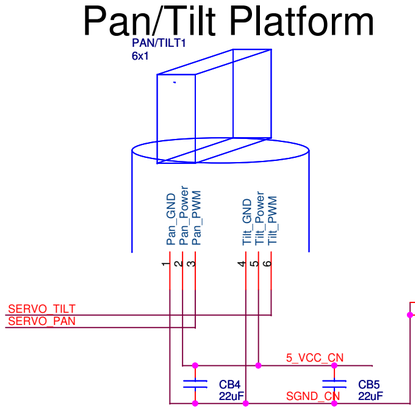
I2C BUS

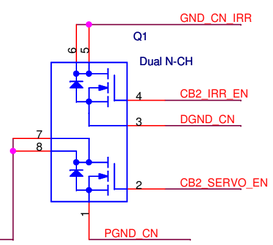


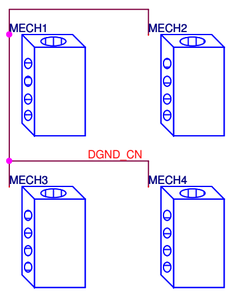


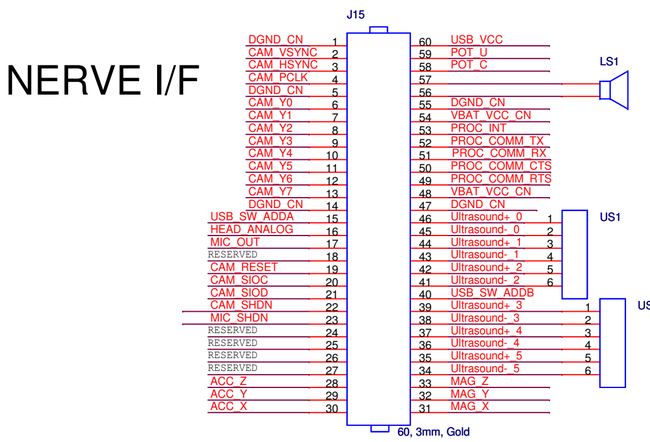












Nets with "x_" prefixes only terminate in the Expansion Headers

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Jonathan Friedman, GSR; David Lee, GSR
Networked Embedded Systems Laboratory (NESL)
University of California, Los Angeles (UCLA)

Project: Ragobot
Title: RAGOBOT PLATFORM
Description: Ragobot Deck Board

Size C | Rev B2.K

Date: Monday, April 18, 2005 | Sheet 1 of 6

Burning LEDs

Spec'd to limit to above-avg-typical from 3.3V rail. Still illuminates at full-scale from 3.1V rail.

R1 150 D1
R2 150 D2
R3 150 D3
R4 150 D4
R5 150 D5
R6 150 D6

Damage Indicator

RN1 47

LED BAR GRAPH 1

Cathode1 Cathode2 Cathode3 Cathode4 Cathode5 Cathode6 Cathode7 Cathode8 Cathode9 Cathode10
Anode1 Anode2 Anode3 Anode4 Anode5 Anode6 Anode7 Anode8 Anode9 Anode10

Pin1 LED in bar is GREEN

R7 47.5
R8 47.5

U6

U7

SDO VCC GND RCLK SRCLK CLR G SDI
QA QB QC QD QE QF QG QH

3.3_VCC_CN
DGND_CN
CB6 0.1uF
CB7 0.1uF

CB2 Reset
CB2 Update
CB2 Clock
CB2 Data In
CB2 Data Out

3.3_VCC_CN
DGND_CN

CB2_Reset
CB2_Clock
CB2_Update_Outputs

CB2 Bus

CB8 0.1uF

U8

Headlights

D7 D8 D9 D10

Spec'd to light in all three colors. Current divides when both lamps are on so spec'd for 20mA per single color and 10mA each dual.

R9 47.5
R10 47.5
R11 47.5
R12 47.5
DGND_CN

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Jonathan Friedman, GSR; David Lee, GSR
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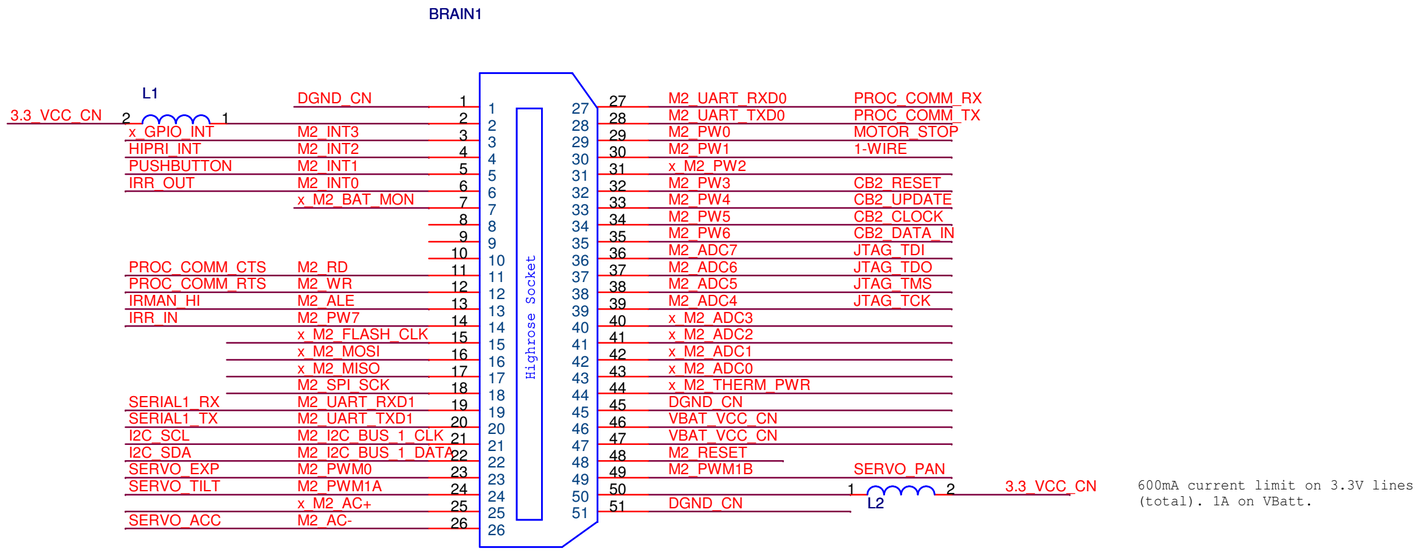
University of California, Los Angeles (UCLA)

Project: Ragobot
Title: Annuciation
Description: Visual Annunciators for the Ragobot Main Board

Size B | Rev B2.F
Date: Monday, April 18, 2005 | Sheet 2 of 6



INDEPENDENT INTERFACE

POWER DISTRIBUTION
- VBAT_VCC_CN
- 5_VCC_CN
- 3.3_VCC_CN
- DGND_CN

DIGITAL COMMUNICATIONS
- I2C_SCL
- I2C_SDA
- CB2_RESET
- CB2_UPDATE
- CB2_CLOCK
- CB2_DATA_IN
- PROC_COMM_RTS
- PROC_COMM_CTS
- PROC_COMM_RX
- PROC_COMM_TX
- SERIAL1_RX
- SERIAL1_TX
- PUSHBUTTON

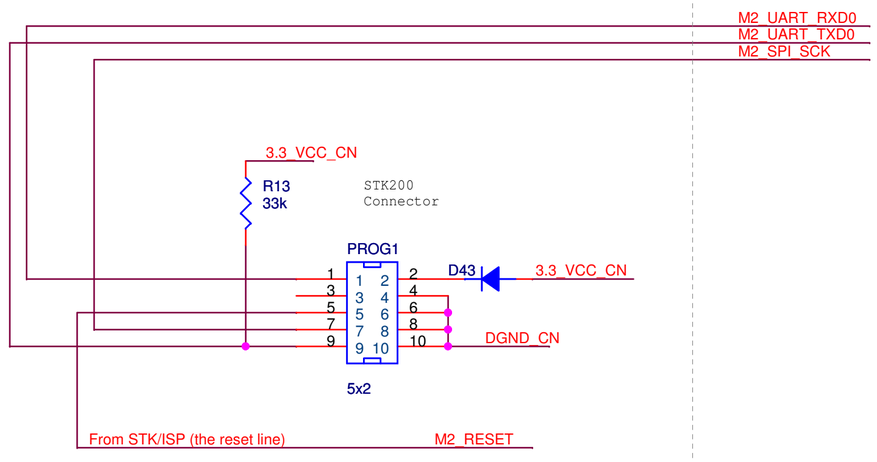
SERVO CONTROL
- SERVO_PAN
- SERVO_TILT
- SERVO_ACC
- SERVO_EXP

SENSORS
- IRR_OUT
- IRR_IN
- MOTOR_STOP
- IRMAN_HI
- HIPRI_INT
- x_GPIO_INT
- 1-WIRE

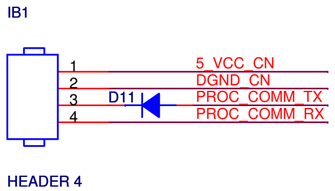
RESET
- M2_RESET
- BRAIN_RESET

MICA2 / UNCOMMITTED PORTS
- JTAG_TDI
- JTAG_TDO
- JTAG_TMS
- JTAG_TCK
- x_M2_MISO
- x_M2_FLASH_CLK
- x_M2_BAT_MON
- x_M2_MOSI
- x_M2_THERM_PWR
- x_M2_ADC0
- x_M2_ADC1
- x_M2_ADC2
- x_M2_ADC3
- x_M2_AC+
- x_M2_PW2

STK/ISP Module



iB (iBADGE) Interface



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David Lee, GSR; Jonathan Friedman, GSR
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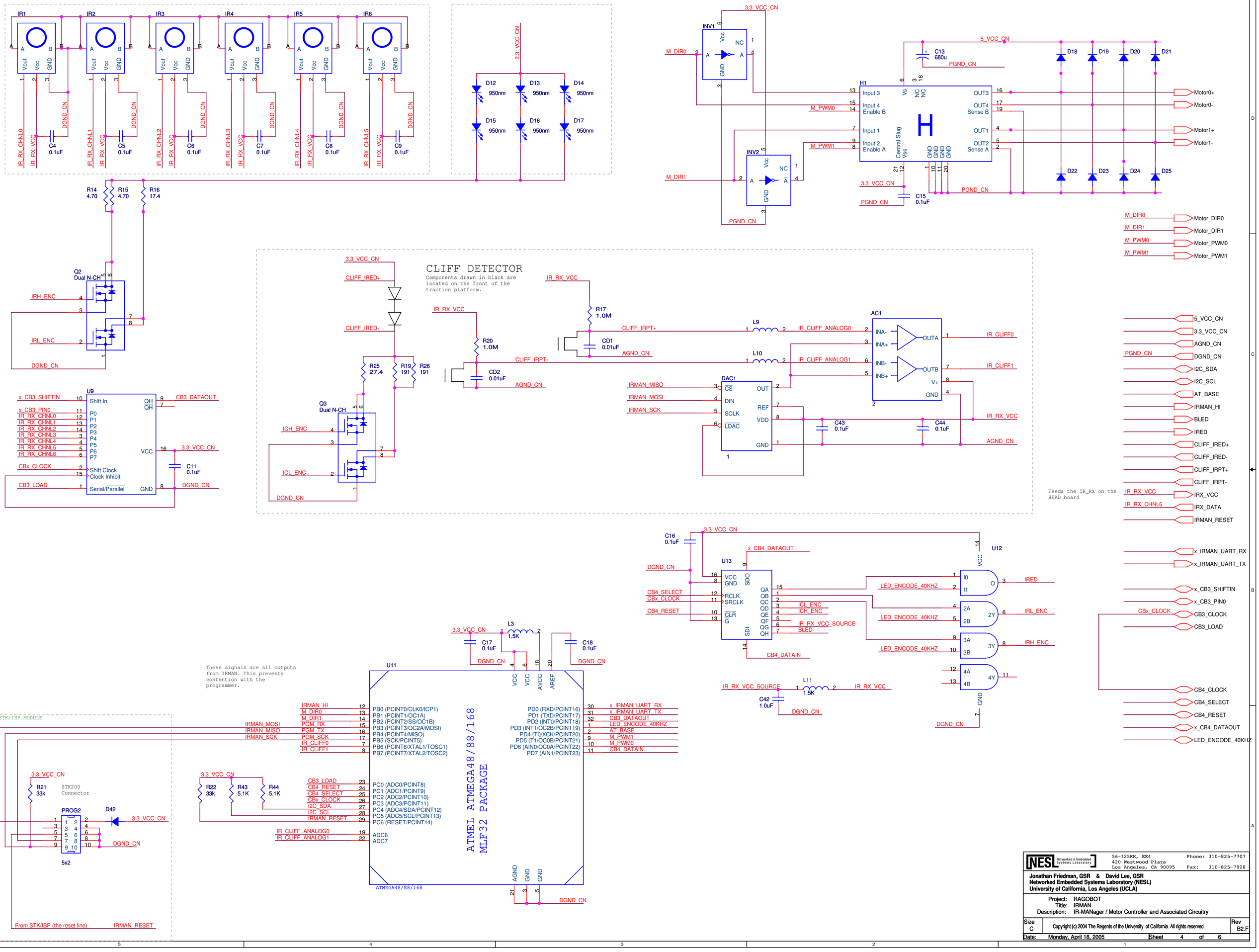
University of California, Los Angeles (UCLA)

Project: Ragobot
Title: Ragobot Brain IF
Description: Brain interface (signal abstraction)

Size B | Rev B2.C
Date: Sunday, April 17, 2005 | Sheet 3 of 6



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Jonathan Friedman, GSR & David Lee, GSR
Networked Embedded Systems Laboratory (NESL)
University of California, Los Angeles (UCLA)

Project: RAGOBOT
Title: IRMAN
Description: IR-MANager / Motor Controller and Associated Circuitry

Size C | Rev B2.F

Date: Monday, April 18, 2005 | Sheet 4 of 6

9VDC to 12VDC
Input from Wall

J5 1 DC_ADAPTER_INPUT+
3
2 DC_ADAPTER_INPUT-

z_bc_Charge+
bc_Charge-
PGND_CN

Battery+
Battery-
From Rover Base (direct connection to battery)
Charge+
Charge-
From Rover Base (direct connection to charging rails)

bc_I_Charge
At_Base
3.3_VCC_CN
5_VCC_CN
PGND_CN
Battery Monitor Data Bus
Batt_Monitor_Data
5V_SHUTDOWN
5V_VCC_SHUTDOWN

D26

In case user plugs into wall backwards... silly user! ;)
...still DC ONLY!

BC_R7 9.31k
BC_R8 5.1K
PGND_CN

BC_R6 133K
D30
z_bc_To_Load

Tuned for Ragobot size "A" battery assembly. Safe for all sizes.

bc_LDO
BC_R2 133K
BC_R3 9.31k
Q_GND_CN

PGND_CN
BC_C1 1.0uF
BC_R1 33.2
D27
CB9 0.1uF
BC_C2 1.0uF
BC_C3 1.0uF
PGND_CN
Limit to 4.2V/Cell
3.3_VCC_CN
BC_R4 33k

BC1
DCIN 1
REFIN 12
VCTL 15
ICTL 13
ACIN 10
ACOK 11
SHDN 8
ICHG 9
IINP 28
CSSP 27
CSSN 26
CELLS 17
LDO 2
BST 24
DLOV 22
DHI 25
LX 23
DLO 21
PGND 20
CSIP 19
CSIN 18
BATT 16
CCV 7
CCI 6
CCS 5
REF 4
CLS 3
GND 14
C_GND 29

BC_Q1_D
BC_Q1_G
BC_Q1_S
BC_Q2_D
BC_Q2_G
BC_Q2_S
Q4 Dual N-CH
BC_L1 10uH
BC_RS2 0.015
Battery+
BC_C4 22uF
PGND_CN

BC_R5 1k
BC_C8 0.01uF
BC_C9 0.01uF
CB10 0.1uF
BC_C7 1.0uF
Q_GND_CN

Connect ground planes together by attaching both to pin 29. Do not make the connection elsewhere.

Main Power Switch
SW2

vr_Power_in
VR_CIN1 22uF
VR_CS1 0.47uF
PGND_CN

VREG5
5V_SHUTDOWN
VR_C1 0.1uF
SHDN
3/5
REF
GND
V+
CS
EXT
OUT
VR_RSEN1 0.039

5.0V, 2A Regulated Output
L5
D28 22uH
C21 220uF
5_VCC_CN
Dual P FET1

VREG3
VR_CI1 10uF
VR_C2 0.1uF
VR_RSEN2 0.039

3.3V, 1A Regulated Output
VR_L1 15uH
VR_CO1 22uF
D29
3.3_VCC_CN

BM1
PGND_CN
RESERVED
Vad
Vdd
DQ
Vsens+
Vsens-
MONITOR
DNC
DNC
GND
Battery-
BM_RSENS1 0.039
CB11 0.1uF
BM_RFILT1 133K
BM_R1 5.1K
Battery Monitor Data Bus

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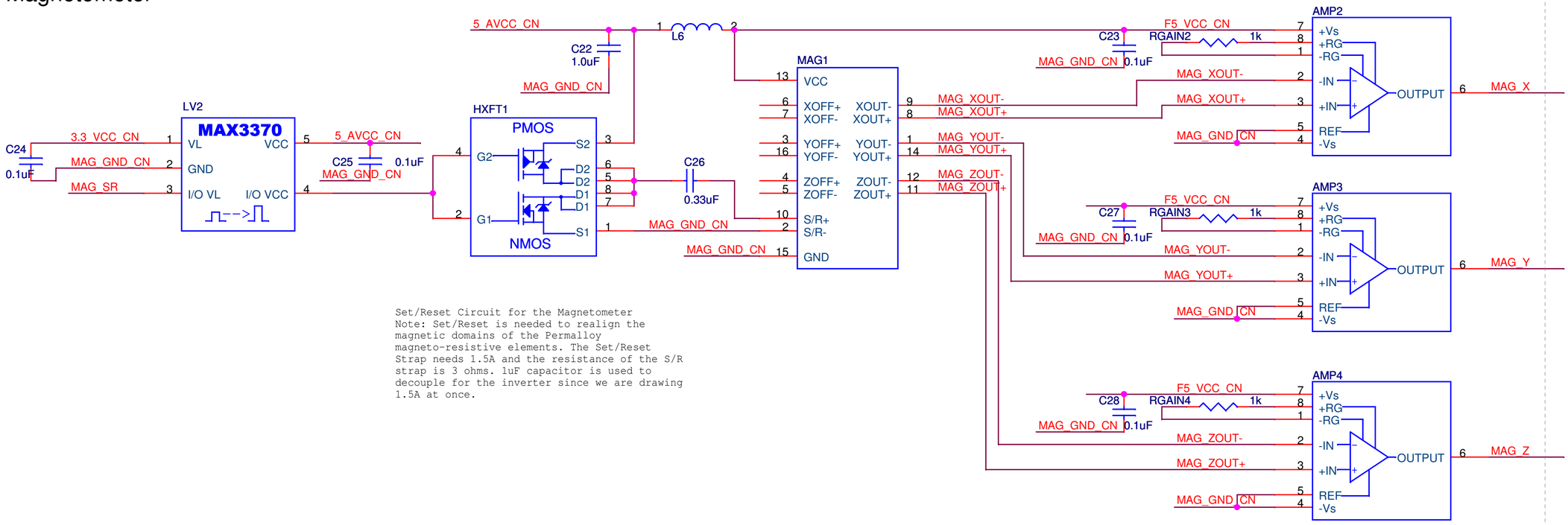
Jonathan Friedman, GSR; David Lee, GSR
Networked Embedded Systems Laboratory (NESL)
University of California, Los Angeles (UCLA)

Project: Ragobot
Title: Power Supply
Description: Power supply, power control, and battery charging

Size C | Rev B2.N

Date: Sunday, April 17, 2005 | Sheet 5 of 6

Magnetometer



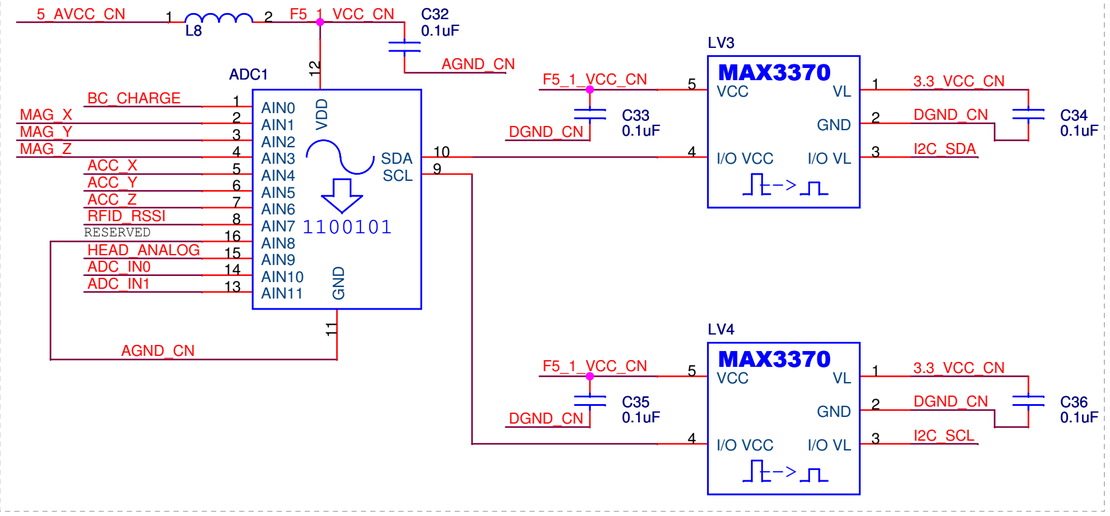
Set/Reset Circuit for the Magnetometer
Note: Set/Reset is needed to realign the magnetic domains of the Permalloy magneto-resistive elements. The Set/Reset Strap needs 1.5A and the resistance of the S/R strap is 3 ohms. 1uF capacitor is used to decouple for the inverter since we are drawing 1.5A at once.

NOTE TO SELF!: 5_AVCC and 5_VCC are electrically isolated on the schematic. Attachment point must be implemented in post process.

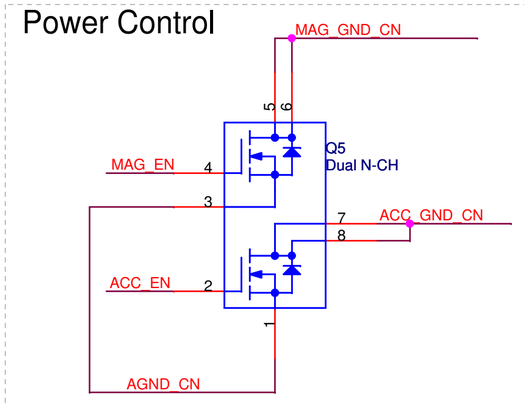
NOTE TO SELF!: AGND and DGND are electrically isolated on the schematic. Attachment point must be implemented in post process.

Accelerometer X and Y

ADC with I2C interface



Power Control



Hierarchical Block IO

SENSOR DATA
- MAG_X
- MAG_Y
- MAG_Z
- ACC_X
- ACC_Y
- ACC_Z
- ADC_IN0
- ADC_IN1
- BC_CHARGE
- HEAD_ANALOG
- RFID_RSSI

POWER DISTRIBUTION
- 5_AVCC_CN
- 3.3_VCC_CN
- DGND_CN
- AGND_CN

DIGITAL COMMUNICATIONS
- I2C_SDA
- I2C_SCL

SENSOR POWER & CONTROL
- ACC_GND_CN
- ACC_EN
- MAG_EN
- MAG_SR

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Project: Ragobot
Title: Sensors
Description: Sensors on the main Ragobot board

Size B | Rev F

Date: Thursday, April 14, 2005 | Sheet 6 of 6