

Appendix B:

Bill of Materials

ECE 492 - Spring 2016

[Accumulator](#)

[Accumulator](#)

[PacMan](#)

Accumulator BOM								
Referenc	Value	Supplier	Supplier P/N	Manufacturer	Manufacturer P/N	Description	Unit Cost	Accessory
J1	DT_4_POS	wirecare.com	DT04-4P-L012	Deutsch	Same	DT - 4 Pin Receptacle Gray Flange	7.97	
A1	PacMan							
B1	5V_FAN	Digikey	603-1284-ND	Delta Electronics	AFB0605MB	FAN AXIAL 60X15MM BALL 5VDC WIRE	12.08	Fan Grate (x2)
J5	DT_6_POS	wirecare.com	DT04-6P-CL09	Deutsch	Same	DT - 6 Pin Receptacle Reduced Dia. Seals	25.72	
P8	USB_PORT	Digikey	1195-3481-ND	Harting	9454521901	CONN ADAPT USB A FEMALE/FEMALE 2.0	21.65	
P9	CURRENT_SENSOR	GMW Associates	BBM-01	Ametes	BBM-01	Bus Bar Module DC Current Sensor	40.	
P22	CONN_01X16	Digikey	ED10502-ND	On Shore Technology Inc.	101-166	CONN SOCKET IDC 16POS W/KEY GOLD	0.36	
F1	FUSE	Zoro	G3475534	MERSEN/FERRAZ SHAWMUT	A3T200	Fuse 200 Amp 300VAC/160DC V Fast Ser A3T	29.02	
P3	ITT_CANNON_CONN	Newark	44W4365	ITT Cannon	NPS-N-BL-T4	PANEL SOURCE NEUTRAL BLUE 400A (Female)	50.23	
P4	ITT_CANNON_CONN	Newark	44W4352	ITT Cannon	NLS-3-GY-S120-M40	LINE SOURCE LINE 3 GREY 400A (Male)	52.89	
F2	FUSE	Digikey	F5984-ND	Littlefuse Inc	FHAC0002LXN	FUSE HOLDER BLADE 30A IN LINE	4.79	25 A Fuse
F3	FUSE	Digikey	F5984-ND	Littlefuse Inc	FHAC0002LXN	FUSE HOLDER BLADE 30A IN LINE	4.79	25 A Fuse
P14	CONN_01X04	Digikey	556879-4-ND	TE Connectivity AMP Connector	556879-4	CONN HSG PLUG 4POS 11: 18MM BLACK	4.83	
J2	ANDERSON POWERPOL	Mouser	879-1470G1	Anderson Power Products	1470G1	PP PAK 2-4P HSG SNAP-IN RECEPT	2.65	Retaining Pin: Mouser P/N 879-110G9
P12	CONN_01X10	Digikey	A111927-ND	TE Connectivity AMP Connector	1-1586018-0	CONN PLUG 10POS DUAL PANEL MT	0.27	Pin: Digikey P/N A100459TR-ND
P13	CONN_01X10	Digikey	A30594-ND	TE Connectivity AMP Connector	1-794954-0	CONN RECEPT 10POS FREE HANGING	0.27	Pin: Digikey P/N A99268TR-ND
P15	CONN_01X02	Digikey	WM2900-ND	Molex	50579402	CONN HOUSING 2POS .100 W/LATCH	0.26	
P18	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.53	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P16	CONN_01X02	Digikey	A30590-ND	TE Connectivity AMP Connector	794954-2	CONN RECEPT 2POS FREE HANGING	0.15	Pin: Digikey P/N A30638-ND
P23	CONN_01X10	Digikey	A111927-ND	TE Connectivity AMP Connector	1-1586018-0	CONN PLUG 10POS DUAL PANEL MT	0.27	Pin: Digikey P/N A100459TR-ND
P24	CONN_01X10	Digikey	A30594-ND	TE Connectivity AMP Connector	1-794954-0	CONN RECEPT 10POS FREE HANGING	0.27	Pin: Digikey P/N A99268TR-ND
P17	CONN_01X02	Digikey	A30654-ND	TE Connectivity AMP Connector	1586000-2	CONN PLUG 2POS FREE HANGING	0.12	Pin: Digikey P/N A30646-ND
A2	CTRL_PNL							
P25	CONN_01X16	Digikey	ED10502-ND	On Shore Technology Inc	101-166	CONN SOCKET IDC 16POS W/KEY GOLD	0.36	
U1	LCD_4x20	DFRobot	DFR0154	DFRobot	Same	I2C/TWI LCD2004 Module	23.55	
P2	10_CRIMP_CONN	Digikey	A27284CT-ND	TE Connectivity AMP Connector	2-36161-2	CONN RING 10-12 AWG #10 PIDG	0.5	
P1	00_CRIMP_CONN	Mouser	571-160001	TE Connectivity	160001	Terminals TERM SOLIS R 2/0 M10	3.92	
RLY1	AIR	Gigavac	GX14CB	Same	Same	AIR	UNKN	
P19	TAP_CONN	Digikey	920074-07-ND	3M	558	CONN TAP 22-16 AWG RED	0.59	
P20	TAP_CONN	Digikey	920074-07-ND	3M	558	CONN TAP 22-16 AWG RED	0.59	
P21	CONN_01X04	Digikey	WM2902-ND	Molex	50579404	CONN HOUSING 4POS .100 W/LATCH	0.27	Pin: Digikey P/N WM2562-ND
P26	CONN_01X04	Digikey	WM2902-ND	Molex	50579404	CONN HOUSING 4POS .100 W/LATCH	0.27	Pin: Digikey P/N WM2562-ND
J4	DT_4_POS	wirecare.com	DT04-4P-L012	Deutsch	Same	DT - 4 Pin Receptacle Gray Flange	7.97	
J3	DT_6_POS	wirecare.com	DT04-6P-CL09	Deutsch	Same	DT - 6 Pin Receptacle Reduced Dia. Seals	25.72	
P10	30A_PLUG	Mouser	879-1460G1	Anderson Power Products	1460G1	PP PAK 2-4P HSG-PLUG W/LATCH	1.7	
P11	30A_RECPT	Mouser	879-1461G1	Anderson Power Products	1461G1	PP PAK 2-4P HSG-PLUG NO LATCH	1.54	
P5	1317_BLACK	Mouser	879-1327G6FP	Anderson Power Products	1327G6FP	PP15/45 FINGERPROOF HOUSING ONLY, BLAC	0.85	Pin: Mouser P/N 879-261G2-LPBK
P6	1327_RED	Mouser	879-1327FP	Anderson Power Products	1327FP	PP15/45 FINGERPROOF HOUSING ONLY, RED	0.79	Pin: Mouser P/N 879-261G2-LPBK
P7	4827_BLACK	Mouser	879-4827G6	Anderson Power Products	4827G6	PPMX 2-PIECE BLACK HOUSING ONLY	0.77	Pin: Mouser P/N 879-4802G3 and Mouser P/N 879-4803G3
A6	AMS							
A3	AMS							
A5	AMS							
A4	AMS							
A7	AMS							
A8	AMS							
A9	AMS							
CELL1	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	
CELL2	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	
CELL3	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	
CELL4	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	
CELL5	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	
CELL7	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	
P33	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P32	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P31	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P30	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P29	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P28	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P27	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P34	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P35	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P36	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P37	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P38	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
P39	CONN_01X06	Mouser	538-50-57-970	Molex	50-57-9706	6 pin connector	0.47	Pin: Mouser P/N 538-16-02-0096 Drawer: Mouser P/N 538-73838-0006
CELL6	Cell	AA Portable Power Cor	LFP-G60	AA Portable Battery Corp	SAME	LiFePO4 Prismatic Module: 3.2V 60 Ah	102.3	

PacMan BOM							
Referenc	Value	Supplier	Supplier P/N	Manufacturer	Manufacturer P/N	Description	Unit Cost
C2	0.1u						
X1	10MHz	Digikey	887-1741-1-ND	TXC Corporation	7A-10.000MAAE-T	10MHz SMD Crystal	0.72
C1	10p						
C4	10p						
C6	0.1u						
SW1	RESET	Digikey	CKN9363CT-ND	C&K Components	1.14100.5030000	SWITCH PUSH SPST-NO 0.1A 42V	2.43
R5	10k						
C3	0.1u						
C5	0.1u						
R6	1k						
R7	1k						
D1	POWER					0603 LED (BLUE)	
D2	FAULT					0603 LED (RED)	
U1	AT90CAN128-M	Digikey	AT90CAN128-16AURCT-ND	Atmel	AT90CAN128-16AUR	IC MCU 8BIT 128KB FLASH 64TQFP	10.4
U2	ADM6320	Digikey	ADM6320CY29ARJZ-R7CT-N	Analog Devices	ADM6320CY29ARJZ-R	External Watchdog IC 2.9V 1600mS 140mS	1.52
R1	10k						
R2	10k						
R34	10k						
D3	SPARE					0603 LED (BLUE)	
R8	1k						
U9	NCP1117ST33T3G	Digikey	NCP1117ST33T3GOSCT-ND	ON Semiconductor	NCP1117ST33T3G	IC REG LDO 3.3V 1A SOT223	0.49
C16	220u	Digikey	493-6214-1-ND	Nichicon	UUR1C221MCL6GS	SMD 16volts 220uF 20% 85C 6.3X7.7	0.41
C18	0.1u						
U8	SI8600	Digikey	SI8600AC-B-ISR-ND	Silicon Labs	SI8600AC-B-IS	3.75kV Bidirect I2C Isolator 1.7MHz	2.96
C13	0.1u						
C17	0.1u						
U3	PCF8574A	Digikey	568-1074-1-ND	NXP Semiconductors	PCF8574AT3518	IC I/O EXPANDER I2C 8B 16SOIC	1.22
U6	LTC3638	Digikey	LTC3638EMSE#PBF-ND	Linear Technology	LTC3638EMSE#PBF	IC REG BUCK ADJ 0.25A 16MSOP	7.79
C11	10u	Digikey	490-1891-1-ND	Murata Electronics	GRM32DF51H106ZA01	CAP CER 10UF 50V Y5V 1210	0.61
L1	220u	Digikey	445-173047-1-ND	TDK Corporation	VLS6045EX-221M	FIXED IND 220UH 500MA 1.15 MOHM	0.52
D6	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
C15	10u	Digikey	490-1891-1-ND	Murata Electronics	GRM32DF51H106ZA01	CAP CER 10UF 50V Y5V 1210	0.61
C9	10u	Digikey	490-1891-1-ND	Murata Electronics	GRM32DF51H106ZA01	CAP CER 10UF 50V Y5V 1210	0.61
C12	1u						
R20	10k						
R19	10k						
C8	0.1u						
R13	1M 1%						
R14	300K 1%						
R17	115K 1%						
R16	10K 1%						
C10	220u	Digikey	493-9426-1-ND	Nichion	UCW1H221MNL1GS	CAP ALUM 220UF 20% 50V SMD	0.79
D5	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
T1	WURTH_750311564	Digikey	1297-1132-1-ND	Würth Electronics	750313441	TRANS FLYBACK LT8302	4.55
R15	113K 1%						
D7	PTZTE2533B	Digikey	PTZTE2533BCT-ND	Rohm Semiconductor	PTZTE2533B	DIODE ZENER 35V 1W PMDS	0.45
C14	220p						
R18	10K						
D8	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
D9	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
U7	LT8302	Digikey	LT8302ES8E#PBF-ND	Linear Technology	LT8302ES8E#PBF	IC REG FLYBCK INV ISO 3.6A 8SOIC	7.41
R10	10k						
R30	0 1%						
R32	10M 1%						
R31	0 1%						
C22	0.1u						
C23	0.1u						
U5	ADS1115	Digikey	296-38849-1-ND	Texas Instruments	ADS1115IDGSR	IC ADC 16BIT 860SPS LP 10MSOP	5.65
C24	0.1u	Digikey	?				

D20	NZH5V1B	Digikey	568-6370-1-ND	NXP Semiconductors	NZH5V1B	DIODE ZENER 5.1V 500MW SOD123F	0.2
U4	INA_226	Digikey	296-29034-1-ND	Texas Instruments	INA226AIDGSR		3.44
R3	0.001 1%	Digikey	CSNL1206FT1L00CT-ND	Stackpole Electronics	CSNL1206FT1L00	RES SMD 0.001 OHM 1% 1W 1206	0.65
F1	FUSE	Digikey	507-1077-1-ND	Bel Fuse Inc	C1Q 1	FUSE BOARD MOUNT 1A 125VAC 63VDC	0.31
Q4	RRR015P03TL	Digikey	RRR015P03TLCT-ND	Rohm Semiconductor	RRR015P03TL	MOSFET P-CH 30V 1.5A TSMT3	0.43
R11	10k						
D12	CHARGE					0603 LED (GREEN)	
R23	1k						
D18	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
Q1	RRR015P03TL	Digikey	RRR015P03TLCT-ND	Rohm Semiconductor	RRR015P03TL	MOSFET P-CH 30V 1.5A TSMT3	0.43
D19	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
R37	10k						
R38	10k						
RLY1	G5LE-1A4 DC3	Digikey	Z3697-ND	Omron	G5LE-1A4 DC3	RELAY GEN PURPOSE SPST 10A 3V	1.43
D21	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
Q3	RRR015P03TL	Digikey	RRR015P03TLCT-ND	Rohm Semiconductor	RRR015P03TL	MOSFET P-CH 30V 1.5A TSMT3	0.43
Q2	RRR015P03TL	Digikey	RRR015P03TLCT-ND	Rohm Semiconductor	RRR015P03TL	MOSFET P-CH 30V 1.5A TSMT3	0.43
U10	SN74LVC2G06	Digikey	296-13493-1-ND	Texas Instruments	SN74LVC2G06DCKR	IC INVERTER DUAL 1INPUT SC706	0.54
R4	1k						
U13	TLP2361	Digikey	TLP2361(V4-TPLECT-ND	Toshiba Semiconductor and Storage	TLP2361(V4-TPL	OPTOISO 3.75KV PSH PULL SO6-5	1.14
C7	0.1u						
R9	10k						
RLY2	T9AS1D12-5	Digikey	PB1014-ND	TE Connectivity Potter & Brumfield Relay	T9AS1D12-5	RELAY GEN PURPOSE SPST 30A 5V	4.22
U11	MCP2551-I/SN	Digikey	MCP2551-I/SN-ND	Microchip	MCP2551-I/SN	CAN Interface IC	1.02
R25		120					
R24	1k						
C19	0.1u						
C20	0.1u						
U12	FT232RL	Digikey	768-1007-1-ND	FTDI	FT232RL-REEL	IC USB FS SERIAL UART 28-SSOP	4.5
C21	0.1u						
D15	SK310A-LTP	Digikey	SK310A-LTPMSCT-ND	Micro Commercial Components (MMC)	SK310A-LTP	Schottky Diodes & Rectifiers DIODE SCHOTTKY 100V 3A DO214AC	0.57
J1	USB	Digikey	A114945-ND	TE Connectivity	1734346-1	USB Connectors B Blk 4pos R/A SMT	1.36
P5	JTAG	Digikey	609-4054-ND	FCI	20021521-00010T1LF	Headers & Wire Housings 10P STRT 4WALL GLDFL	1.1
P3	EXT I2C	Digikey	WM1344-ND	Molex	15-91-2065	Headers & Wire Housings 2.54 WIRE/BOARD HDR Right Angle 6 CKT	4.2
P4	GPIO	Digikey	3M11931-ND	3M	30316-6002HB	Headers & Wire Housings 26P STRT 4WALL GLDFL	0.78
J2	BACKPLANE CONNECTO	Digikey	5237FE-ND	Norcomp Inc	171-037-213R011	D-Sub Connector Receptacle Female Sockets 37 Position Through Hole Sol	3.88
R35		100					
R36		100					
P2	CDETECT	Digikey	WM1340-ND	Molex	15-91-2025	Headers 2.54 WIRE/BOARD HDR Right Angle 2 CKT	2.61
J3	RJ12	Digikey	WM3789CT-ND	Molex LLC	855135002	CONN MOD JACK 6P6C VERT UNSHLD	1.16
P1	POWER	Digikey	A113982-ND	TE Connectivity AMP Connectors	556881-4	CONN RCPT 4POS 11.18MM PCB SLDR	8.66
R12		100					
R21		100					
P6	LDETECT	Digikey	WM1340-ND	Molex	15-91-2025	Headers 2.54 WIRE/BOARD HDR Right Angle 2 CKT	2.61