

Programming/Interrupt(subsheet)

This subsheet encapsulates devices such as the USB–serial converter for programming, SD–card adaptor for initialization of the system as well as the quad AND gate used to drive an interrupt to detect keypresses by the user.

Battery Low Interrupt

Programming signals

BLI
RST
OSC1
AREF
RX
TX

SD Card

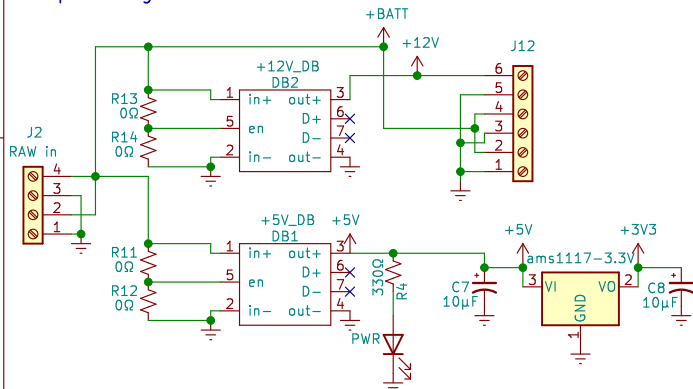
D53_SS
D52_SCK
D51_MOSI
D50_MISO

Keypad signals

ROW4 D9 18
ROW3 D8 17
ROW2 D7 16
ROW1 D6 15
COL3 D5 5
COL2 D4 1
COL1 D3 7
Interrupt D2 6

Power rails:

We receive unregulated 14V from the solar panels and buck it down to 12V for use with the solenoids, 5V for the MCU and other IC's and 3.3V for the USB–Serial converter. The unregulated voltage from the panels is also sent to each locker for it to be regulated down to 5V to charge connected phones. This mitigates the need of a very high current capable regulator.



Audio and visual innunciators to alert users. LCD will be used to show the user the locker they are working with and the amplifier will be connected to a speaker that will be used in states where the user needs to be alerted such as a door left open for a predetermined length of time.

Engineer: Aditya Sehgal

SlugCharge

Sheet: /

File: UI.kicad_sch

Title: SlugCharge Motherboard

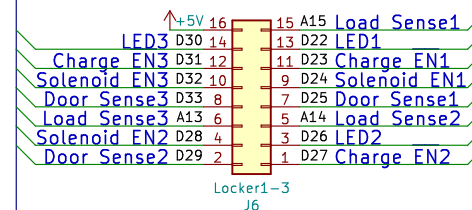
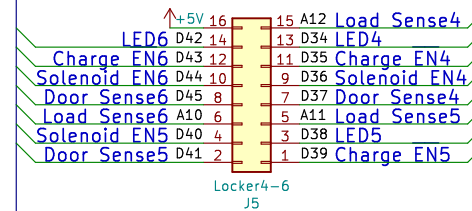
Size: A4 Date: 2020–05–23

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Rev: 4.1

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IDC connectors used to connect each locker to the motherboard. The signals are sent in groups of 3 lockers, and later decoded on the PCB for each locker.

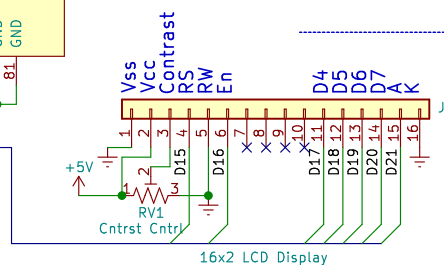
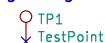


Mounting Holes:

M2 screws, one on each corner provided to mount the PCB inside the station.



TP -> Place holder for SlugCharge Logo



J10 Speaker

+5V

PCM Audio

DB3 PAM8403-DB

Lin CMN Rin

Rout- Rout+ Lout+ Lout-

Vcc GND

D3 1N4004

D4 1N4004

R5 330Ω

D13

X27 PH7

X28 PC3

X29 PG4

X30 PL0

X31 PL1

X32 PL2

X33 PL3

X34 PD0

X35 PD1

X36 PD2

X37 PD3

X38 PD4

X39 PD5

X40 PD6

X41 PD7

X42 PD8

X43 PD9

X44 PD10

X45 PD11

X46 PD12

X47 PD13

X48 PD14

X49 PD15

X50 PD16

X51 PD17

X52 PD18

X53 PD19

X54 PD20

X55 PD21

X56 PD22

X57 PD23

X58 PD24

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X145 PD111

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X148 PD114

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X215 PD181

X216 PD182

X217 PD183

X218 PD184

X219 PD185

X220 PD186

X221 PD187

X222 PD188

X223 PD189

X224 PD190

X225 PD191

X226 PD192

X227 PD193

X228 PD194

X229 PD195

X230 PD196

X231 PD197

X232 PD198

X233 PD199

X234 PD200

X235 PD201

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X237 PD203

X238 PD204

X239 PD205

X240 PD206

X241 PD207

X242 PD208

X243 PD209

X244 PD210

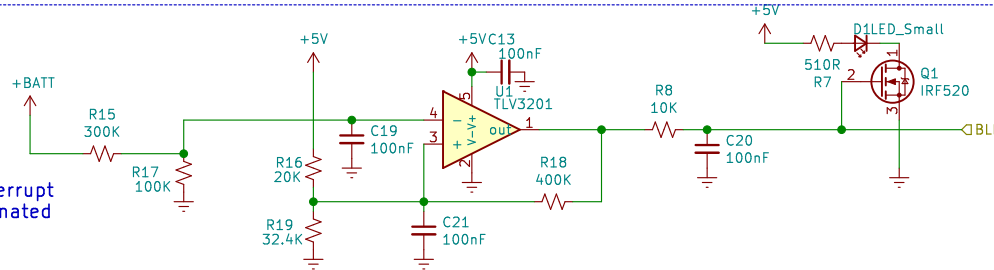
X245 PD211

X246 PD212

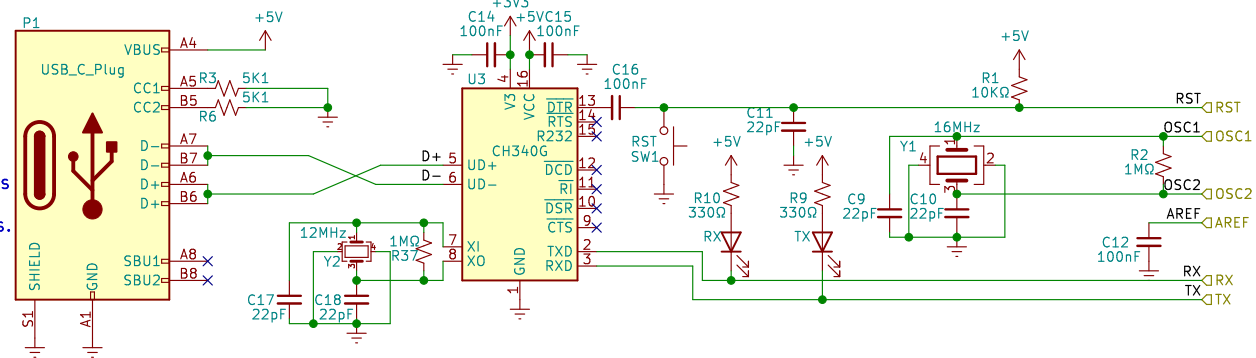
X247 PD213

X248 PD214

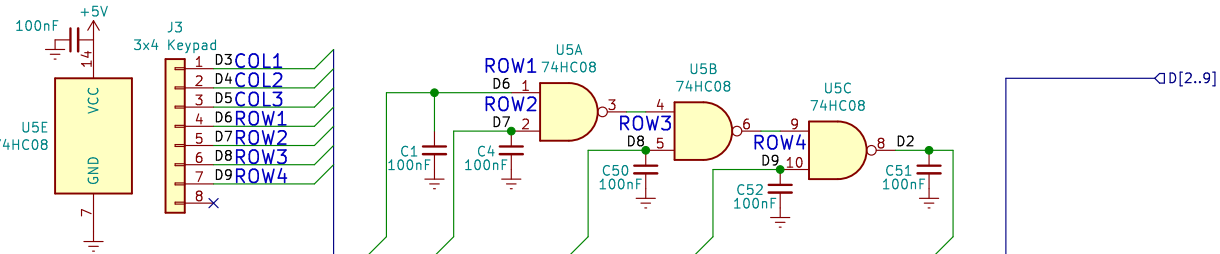
Low battery detection interrupt:
Using a TLV3201 comparator, we deduce if and when the voltage of the battery drops below 12.6V, below which the system will be shut down to preserve the lifespan of the battery until it has recharged sufficiently. This circuit drives an interrupt such that all processes can be terminated to prevent any potential damage.



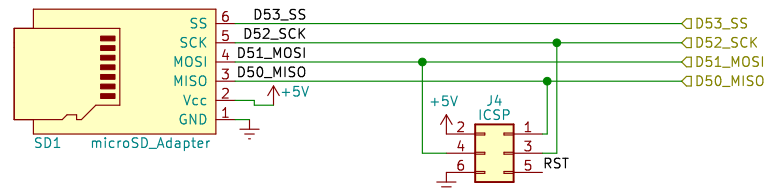
A USB to serial interface has been provided on board for easy re-programming of the MCU in case updates need to be made on the field. An ICSP header (J4) is also provided as a failsafe in case the USB-serial converter fails.



Common interrupt for keypad presses. The series AND gates are used to raise an interrupt to the MCU whenever any key on the numpad is pressed in order to wake the station.



SD card is used to store state of each locker as a fail safe. Everytime the station starts up from a "dead" state, it will self-initialize via the data on the SD card to restore any previously occupied lockers



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