LED colors:
white: power
green/blue: serial data RxD/TxD
yellow/orange: I/O
red: error

USB: only needed if not connected to Central Unit

from Central Unit Board

USB-C PC/Tablet

+3V3
FC-DA1608BK-470H10
B5819W_C8598

USBC
TYPE-C-31-M-12

CN3
A2541WV-5P

RXD1
FC-D1608UGK-520D10

R89 1K
R106 1K

TXD1
D25

R108
1K

H10
A2541WV-2X4P
+5V

WorkSwitch
SteerSwitch
DTR_SC
RTS_SC

GND   GND
B1

A12

+5V
R46
5.1K

C57
1uF

C59
100nF

U23
CH340B

+5V

1 GND   VCC 16
2 TXD   TNOW 15
3 RXD   RTS# 14
4 V3   DTR# 13
5 UD+   DCD# 12
6 UD-   RI# 11
7 RST#   DSR# 10
8 NC.   CTS# 9

+3V3

C58
100nF

R83
1K

R61
10K

_Reset_SC

TxD_SC
RxD_SC

R107

GPIO, e. g. Serial

A9   VBUS   VBUS B4
A8   SBU1   CC2   B5
A7   DN1   DP2   B6
A6   DP1   DN2   B7
A5   CC1   SBU2 B8
A4   VBUS   VBUS B9

R53
5.1K

USB_SC_P
USB_SC_N

USBoff

WORK
SPDT SWITCH

WorkSwitch

+5V

A1   GND   GND   B12

USBOFF

USBoff

A2541WV-2P

R58 10K   Q18
BC846AMTF

EN_SC

STEER
SPDT SWITCH

SteerSwitch

+3V3

R33
10K

sendRS485

RO VCC
RE# B
DE   A
DI GND

U5

RS485

A2541WV-2P

RTS_SC
DTR_SC

BC846AMTF
Q19

R59 10K

GPIO0

KY3485LEEN

+3V3 C25
100nF

Light guides for LEDs: Mentor 1293.1100 e. g.

+3V3

R45   R44
5.1K   5.1K

SCL
SDA

DP1

CLK
DIO
GND
+5V

Atmel

+3V3

C75
1uF

C74
1uF

U26
ATMEGA328P-AU

+5V

B5819W_C8598
D15

TM1637 7-SEGMET 4-DIGIT 0.56"
e. g. https://de.aliexpress.com/item/32843855386.html

D3/Sec2
D4/Sec3

1 (PCINT19/OC2B/INT1)PD3   PD2(INT0/PCINT18) 32 D2/Sec1 or speed pulse
2 (PCINT20/XCK/T0)PD4   PD1(TXD/PCINT17) 31 TxD_SC
  GND   PD0(RXD/PCINT16) 30 RxD_SC
4 VCC   PC6(RESET#/PCINT14) 29 _Reset_SC
  GND   PC5(ADC5/SCL/PCINT13) 28 SCL
6 VCC   PC4(ADC4/SDA/PCINT12) 27 SDA
                            PC3(ADC3/PCINT11) 26 A3/LeftRight
X3
16MHz

(PCINT6/XTAL1/TOSC1)PB6   PC2(ADC2/PCINT10) 25 A2/UpDown
(PCINT7/XTAL2/TOSC2)PB7   PC1(ADC1/PCINT9) 24 A1/Sensor2

D5/Sec4   9 (PCINT21/OC0B/T1)PD5   PC0(ADC0/PCINT8) 23 sendRS485
D6/Sec5 10 (PCINT22/OC0A/AIN0)PD6   22 A7/Sensor1
D7/Sec6 11 (PCINT23/AIN1)PD7   ADC7   21
D8/Sec7 12 (PCINT0/CLKO/ICP1)PB0   GND   20

C77
22pF

C76
22pF

D9/Sec8 13 (PCINT1/OC1A)PB1   AREF   19 A6/Main
D10/nCS 14 (PCINT2/SS#/OC1B)PB2   ADC6   18
D11/MOSI 15 (PCINT3/OC2A/MOSI)PB3   AVCC
D12/MISO 16 (PCINT4/MISO)PB4   PB5(SCK/PCINT5) 17 D13/SCK

+3V3
L1
600

C73
100nF

µ C: ESP32

...or...

https://github.com/mtz8302/AOG_SectionControl_ESP32

Initial programming:
https://www.arduino.cc/en/Tutorial/BuiltInExamples/ArduinoISP

R63   C13
150K 100nF

C12
1uF

U6

+3V3

R50
R52
10K

R51

GND   GND 39
       GND 38
VDD33   37
EN   IO23 36 D11/MOSI
nUSmiddle   SCL
A6/Main TXD0 35 _TxD_SC
A1/Sensor2 RXD0 34 _RxD_SC
A7/Sensor1 RXD0 33 SDA
A2/UpDown IO34 32
A3/LeftRight IO35 31 NC
D9/Sec8 IO32 30 D12/MISO
D8/Sec7 IO33 29 D13/SCK
D7/Sec6 IO25 28 D10/nCS
D6/Sec5 IO26 27 D2/Sec1 or speed pulse
        IO27 26 D3/Sec2
        IO14 25 D4/Sec3
        IO12 24 GPIO0
D5/Sec4 GND 23 nUSright
        IO13
        SD2
        SD3
        CMD CLK

EN_SC

GPIO0   R54
        R55
        10K
USleft

Q16
Q15
Q14

USmiddle

R56
10K
USright

BC846

PRGBOOT
A2541WV-7P
+3V3

D13/SCK
D12/MISO
D11/MOSI
D10/nCS
_Reset_SC

WIFI
R60   1K
FC-DA1608BK-470H10
+5V
Q20
2N7002

+5V
R57
1K

ESP32-WROOM-32U(16MB)

Q17
2N7002

TITLE:
µ C and communication

REV: 1.1

Company https://github.com/gormr
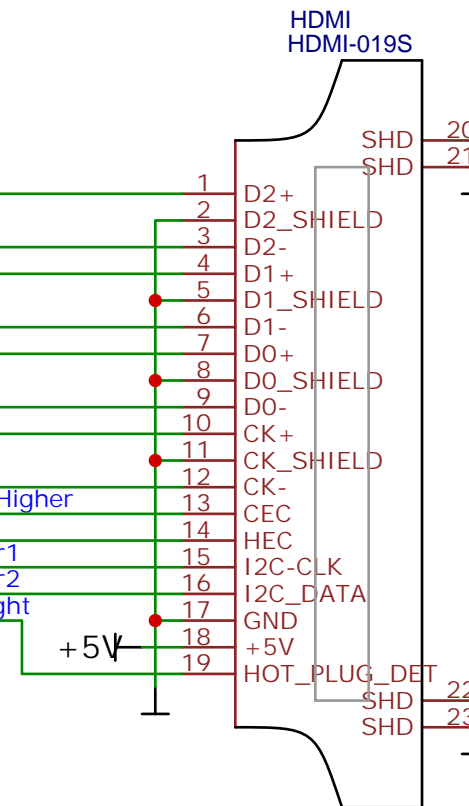
Sheet: 1/4

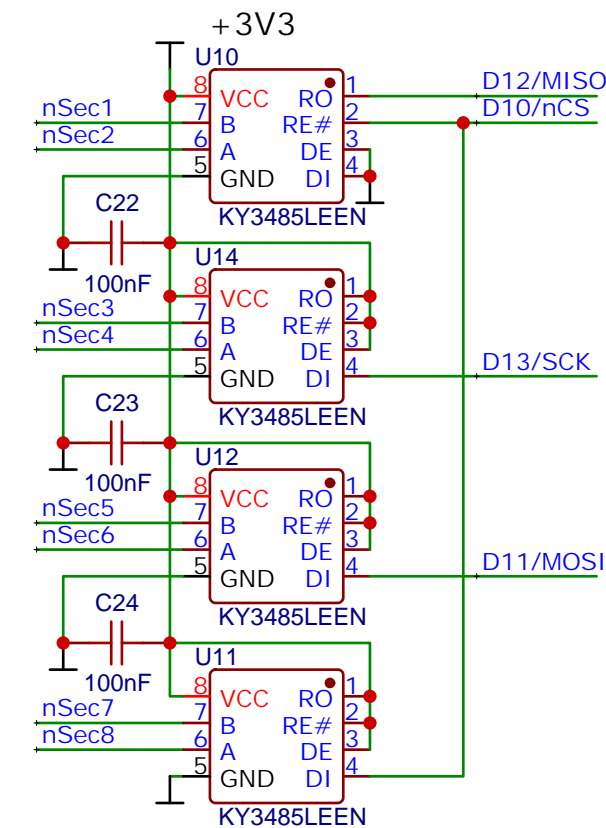Date: 2021-09-19   Drawn By: GoRoNb

EasyEDA

General options

Piggyback
- socket @ U5

Cable connection
- HDMI1

SPDT SWITCH
ALL_ON
+3V3

R32 1K
A6/Main

auto-off-on switching @ SW1..8:
latching SPDT rocker switch on-off-on,
JP6 open
auto-off switching @ SW1..8:
latching SPST rocker switch on-off,
SW0 not mounted

R31 1K
C16 10nF
SPEED_
A2541WV-2P
MAINLED
FC-D1608UGK-520D10
Q13
BC846

close if speed sensor is connected

SW1 SPDT SWITCH
R72 1K
D2/Sec1
or speed pulse
SECT0/SPEED
FC-D1608UGK-520D10
Q1 BC846
R73 150K   R66 15K   C35 10nF   R1 1K

SW2 SPDT SWITCH
R3 1K
D3/Sec2
SECTION1
FC-D1608UGK-520D10
Q2 BC846
R4 150K   R67 15K   C1 10nF   R2 1K

SW3 SPDT SWITCH
R6 1K
D4/Sec3
SECTION2
FC-D1608UGK-520D10
Q3 BC846
R7 150K   R68 15K   C2 10nF   R5 1K

SW4 SPDT SWITCH
R12 1K
D5/Sec4
SECTION3
FC-D1608UGK-520D10
Q5 BC846
R11 150K   R69 15K   C4 10nF   R13 1K

SW5 SPDT SWITCH
R9 1K
D6/Sec5
SECTION4
FC-D1608UGK-520D10
Q4 BC846
R8 150K   R85 15K   C3 10nF   R10 1K

SW6 SPDT SWITCH
R18 1K
D7/Sec6
SECTION5
FC-D1608UGK-520D10
Q7 BC846
R17 150K   R86 15K   C6 10nF   R19 1K

SW7 SPDT SWITCH
R15 1K
D8/Sec7
SECTION6
FC-D1608UGK-520D10
Q6 BC846
R14 150K   R87 15K   C5 10nF   R16 1K

SW8 SPDT SWITCH
R24 1K
D9/Sec8
SECTION7
FC-D1608UGK-520D10
Q9 BC846
R23 150K   R88 15K   C8 10nF   R25 1K

R27 1K
A2/UpDown
PRESS
+3V3
SPDT SWITCH
(temporary SPDT rocker switch (on)-off-(on))

R21 1K
A3/LeftRight
SLOPE_
+3V3
SPDT SWITCH
(temporary SPDT rocker switch (on)-off-(on))

R22 1K
A1/Sensor2
C10 10nF
R28 1K
Q11 BC846
SENSOR1
FC-D1608UGK-520D10

R29 1K
A7/Sensor1
C11 10nF
R30 1K
Q12 BC846
SENSOR2
FC-D1608UGK-520D10

JP7
+5V
R34 1K

JP8
+5V
R35 1K

HDMI
HDMI-019S

R36 1K   nSec1   1 D2+   SHD 20
R37 1K   2 D2_SHIELD SHD 21
R38 1K   nSec2   3 D2-
         nSec3   4 D1+
R39 1K   5 D1_SHIELD
R40 1K   nSec4   6 D1-
         nSec5   7 D0+
R42 1K   8 D0_SHIELD
R41 1K   nSec6   9 D0-
         nSec7   10 CK+
R43 1K   11 CK_SHIELD
R20 1K   nSec8   12 CK-
         nLowerHigher 13 CEC
         nMain   14 HEC
         nSensor1   15 I2C-CLK
R26 1K   nSensor2   16 I2C_DATA
         nLeftRight 17 GND
                     18 +5V
         +5V   19 HOT_PLUG_DET   SHD 22
                                        SHD 23

Option for 48-PWM satellite
instead of R36..43

+3V3

U10 KY3485LEEN
nSec1 B
nSec2 A
       VCC RO   D12/MISO
       RE#   D10/nCS
       DE
GND   DI
C22

U14 KY3485LEEN
nSec3 B
nSec4 A
       VCC RO
       RE# D13/SCK
       DE
GND   DI
C23 100nF

U12 KY3485LEEN
nSec5 B
nSec6 A
       VCC RO
       RE#
       DE   D11/MOSI
GND   DI
C24 100nF

U11 KY3485LEEN
nSec7 B
nSec8 A
       VCC RO
       RE#
       DE
GND   DI
100nF

TITLE: Machine Section Control
REV: 1.0
Company: https://github.com/gormr
Sheet: 2/4
Date: 2021-09-19
Drawn By: GoRoNb
EasyEDA

Machine Section Control
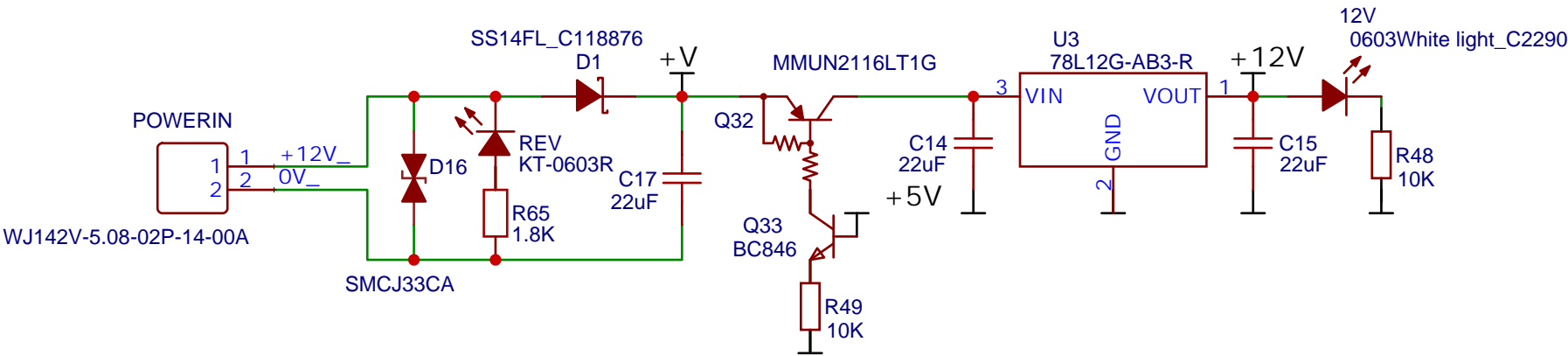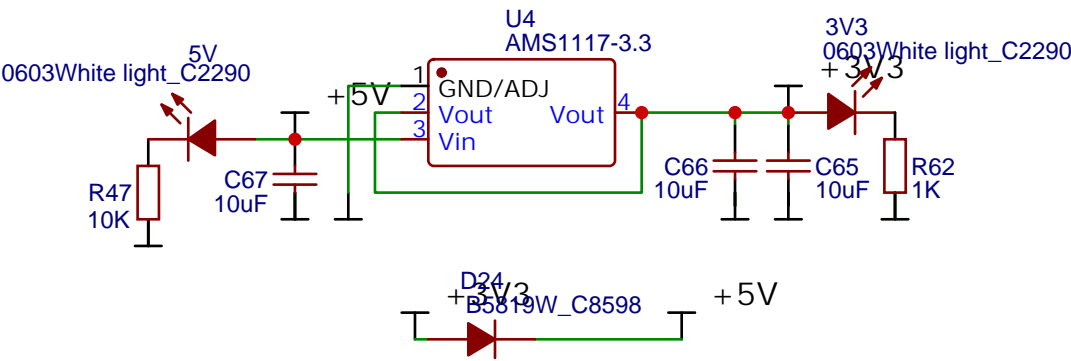
Valve (on/off)
open

Motor (+/- swap)
closed

Hongfa: HF115F/012-2ZS4..
NingboForward: NT752CS8DC12V0.415.0..
Panasonic: JW2SN-DC12V (too high for rocker switches)

Schematic Diagram

REL1 / SECTION0.
REL2 / SECTION1.
REL3 / SECTION2.
REL4 / SECTION3.
REL5 / SECTION4.
REL6 / SECTION5.
REL7 / SECTION6.
REL8 / SECTION7.

REL A2541WV-2P
Close if relay or N-switching speed sensor

U1 LM393DR2G
U2 LM393DR2G

REL10 / PRESSURE
REL11 / SLOPE
REL12
REL13
REL9 / VALVEMAIN

Sensors Connector

US1 WJ250B-3.50-4P — USpulse / USleft
US2 WJ250B-3.50-4P — USpulse / USmiddle
US3 WJ250B-3.50-4P — USpulse / USright

Slope sensors: Best Sensor, DYP-A02YYxx-1.0, e. g. via Aliexpress

SENS1 WJ250B-3.50-4P — nSensor1 — normally pressure sensor
SENS2 WJ250B-3.50-4P — nSensor2 — normally flow sensor
SPEED WJ250B-3.50-4P — nSec1 / 0V_ / Sec1 / +12V_ — optional speed sensor (7 sections max)

WJ142V-5.08-02P-14-00A
MMUN2116LT1G   1N4148WS T4

TITLE: Machine Section Control
REV: 1.0
Company: https://github.com/gormr
Sheet: 3/4
Date: 2021-09-19
Drawn By: GoRoNb
EasyEDA

Switch Mode Power Supply Batt => 5V
(needed for Ethernet and Wifi only)

ON2
A2541WV-2P

+V
R251
1.3

C250
22uF
C258
1uF

+Vin
EN_1.24
SS
+Vin

R252
1M
R253
150K

R254
100k
R255

C251
4.7nF
C252
4.7nF
C253
33pF

U250
TPS54331DR

2 VIN
3 EN
4 SS
6 COMP

PH 8
BOOT 1
VSENSE 5
GND 7

SW!
C254
100nF

D251
SS34_C8678

L250
6.8uH

+5V

C255
22uF
C256
22uF
C257
22uF

R256
10K
R257
1.8K

0V
R64
1.3

ON1
A2541WV-2P

FB_.8V
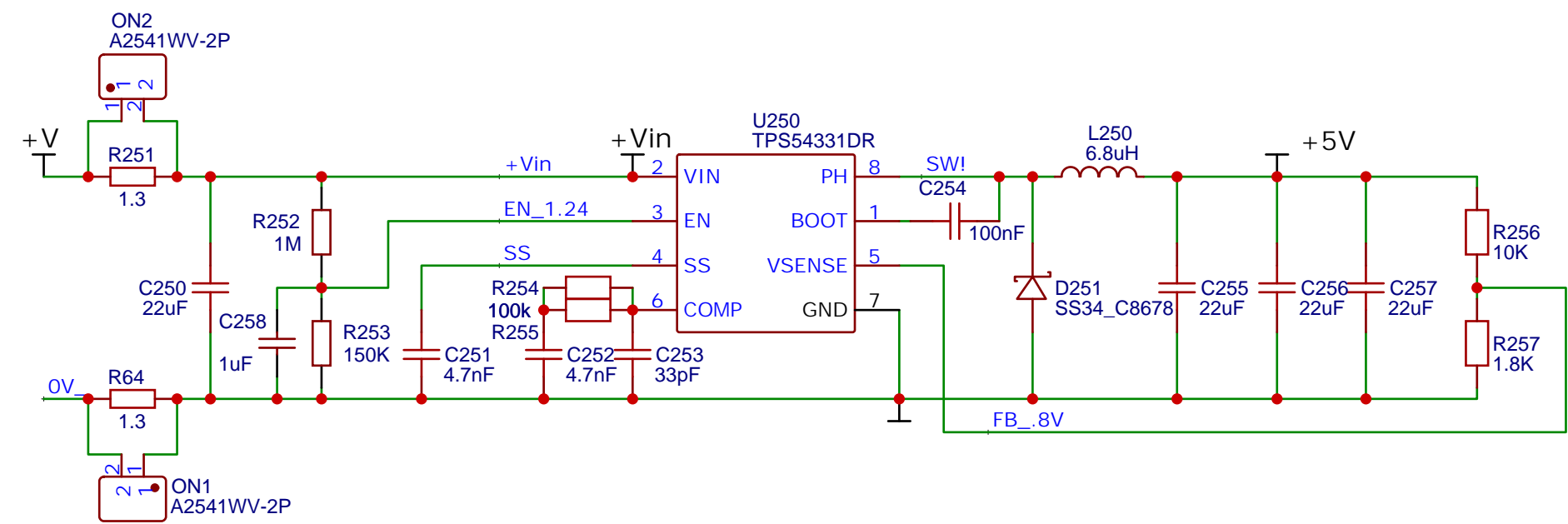
Power Supply 5V => 3V3
only needed for ESP32

5V
0603White light_C2290

U4
AMS1117-3.3

3V3
0603White light_C2290

+5V
1 GND/ADJ
2 Vout
3 Vin
Vout 4

+3V3

R47
10K
C67
10uF

C66
10uF
C65
10uF
R62
1K

D24/3
B5819W_C8598
+5V

POWERIN

1 +12V_
2 0V_

WJ142V-5.08-02P-14-00A

SS14FL_C118876
D1

D16
SMCJ33CA

REV
KT-0603R
R65
1.8K
C17
22uF

+V

Q32
MMUN2116LT1G

Q33
BC846

R49
10K

+5V

U3
78L12G-AB3-R

3 VIN
GND 2
VOUT 1

C14
22uF

+12V
C15
22uF

12V
0603White light_C2290

R48
10K

TITLE:
Power Supply
REV: 1.0
Company https://github.com/gormr
Sheet: 4/4
Date: 2021-09-18   Drawn By: GoRoNb

EasyEDA