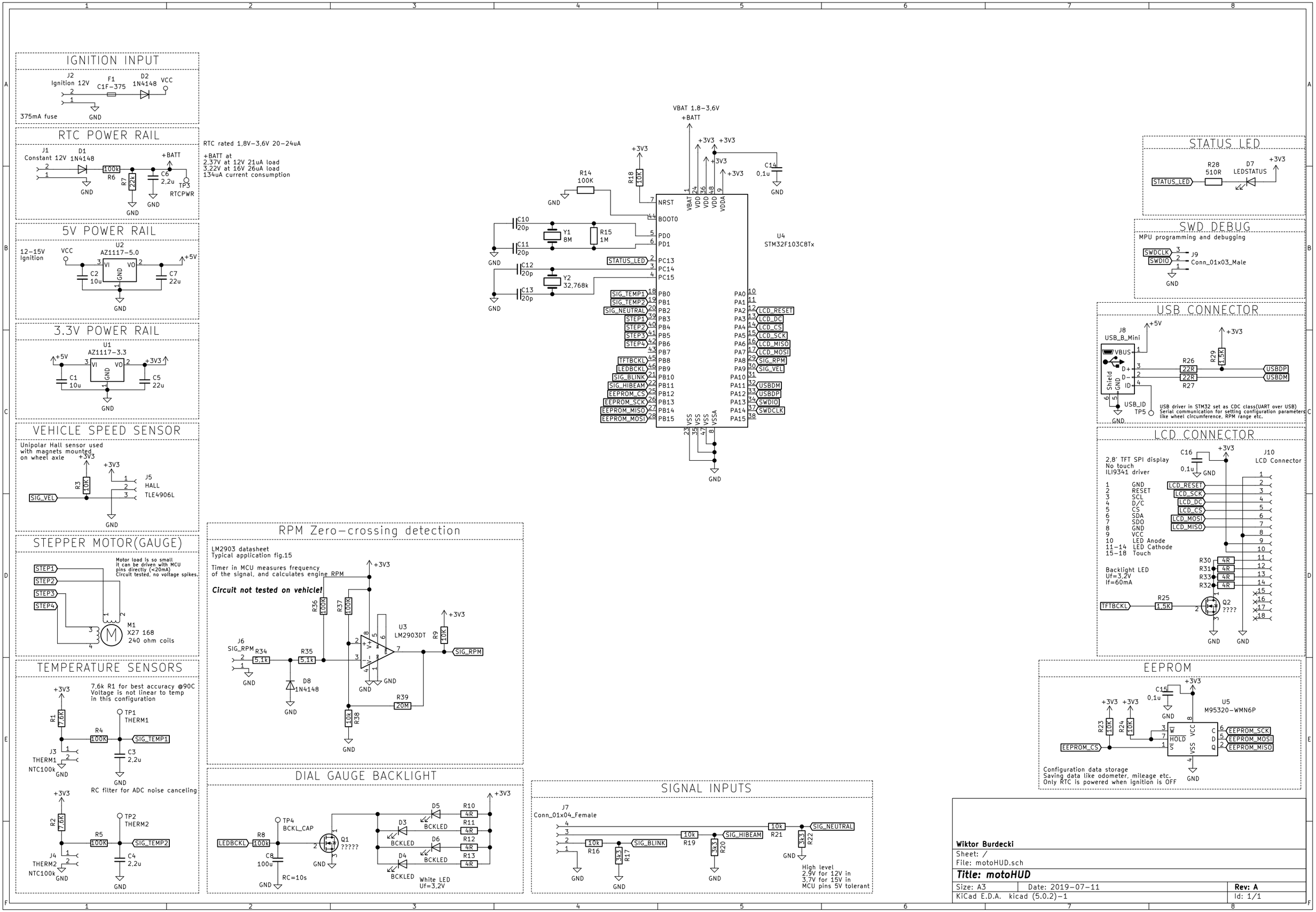
IGNITION INPUT
J2
Ignition 12V
F1
C1F-375
D2
1N4148
VCC
375mA fuse
GND
RTC POWER RAIL
RTC rated 1,8V-3,6V 20-24uA
+BATT at
2,37V at 12V 21uA load
3,22V at 16V 26uA load
134uA current consumption
J1
Constant 12V
D1
1N4148
100k
R6
R7
22k
C6
2,2u
+BATT
TP3
RTCPWR
5V POWER RAIL
12-15V
Ignition
VCC
U2
AZ1117-5.0
VI
VO
GND
C2
10u
C7
22u
+5V
3.3V POWER RAIL
U1
AZ1117-3.3
+5V
+3V3
C1
10u
C5
22u
VEHICLE SPEED SENSOR
Unipolar Hall sensor used
with magnets mounted
on wheel axle
+3V3
R3
10K
SIG_VEL
J5
HALL
TLE4906L
STEPPER MOTOR(GAUGE)
Motor load is so small
it can be driven with MCU
pins directly (<20mA)
Circuit tested, no voltage spikes.
STEP1
STEP2
STEP3
STEP4
M1
X27 168
240 ohm coils
TEMPERATURE SENSORS
7,6k R1 for best accuracy @90C
Voltage is not linear to temp
in this configuration
R1
7,6K
R4
100K
TP1
THERM1
SIG_TEMP1
J3
THERM1
NTC100k
C3
2,2u
RC filter for ADC noise canceling
R2
7,6K
R5
100K
TP2
THERM2
SIG_TEMP2
J4
THERM2
NTC100k
C4
2,2u
RPM Zero-crossing detection
LM2903 datasheet
Typical application fig.15
Timer in MCU measures frequency
of the signal, and calculates engine RPM
Circuit not tested on vehicle!
R36
100K
R37
100K
U3
LM2903DT
R9
10K
SIG_RPM
J6
SIG_RPM
R34
5,1k
R35
5,1k
D8
1N4148
R39
20M
R38
10k
DIAL GAUGE BACKLIGHT
TP4
BCKL_CAP
R8
100k
LEDBCKL
C8
100u
RC=10s
Q1
?????
D5
D3
D6
D4
BCKLED
R10
R11
R12
R13
4R
White LED
Uf=3,2V
VBAT 1.8-3,6V
+BATT
+3V3
R14
100K
R18
10K
C14
0,1u
C10
20p
C11
20p
C12
20p
C13
20p
Y1
8M
R15
1M
Y2
32,768k
NRST
BOOT0
PD0
PD1
PC13
PC14
PC15
STATUS_LED
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PB8
PB9
PB10
PB11
PB12
PB13
PB14
PB15
SIG_TEMP1
SIG_TEMP2
SIG_NEUTRAL
STEP1
STEP2
STEP3
STEP4
TFTBCKL
LEDBCKL
SIG_BLINK
SIG_HIBEAM
EEPROM_CS
EEPROM_SCK
EEPROM_MISO
EEPROM_MOSI
U4
STM32F103C8Tx
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PA8
PA9
PA10
PA11
PA12
PA13
PA14
PA15
LCD_RESET
LCD_DC
LCD_CS
LCD_SCK
LCD_MISO
LCD_MOSI
SIG_RPM
SIG_VEL
USBDM
USBDP
SWDIO
SWDCLK
VBAT
VDD
VDDA
VSS
VSSA
SIGNAL INPUTS
J7
Conn_01x04_Female
10k
R16
3k3
R17
10k
R19
3k3
R20
10k
R21
3k3
R22
SIG_BLINK
SIG_HIBEAM
SIG_NEUTRAL
High level
2,9V for 12V in
3,7V for 15V in
MCU pins 5V tolerant
STATUS LED
R28
510R
D7
LEDSTATUS
SWD DEBUG
MPU programming and debugging
SWDCLK
SWDIO
J9
Conn_01x03_Male
USB CONNECTOR
J8
USB_B_Mini
VBUS
D+
D-
ID
Shield
GND
R26
22R
R27
22R
R29
1,5K
USBDP
USBDM
USB_ID
TP5
USB driver in STM32 set as CDC class(UART over USB)
Serial communication for setting configuration parameters
like wheel circumference, RPM range etc.
LCD CONNECTOR
2,8' TFT SPI display
No touch
ILI9341 driver
C16
0,1u
J10
LCD Connector
1 GND
2 RESET
3 SCL
4 D/C
5 CS
6 SDA
7 SDO
8 GND
9 VCC
10 LED Anode
11-14 LED Cathode
15-18 Touch
LCD_RESET
LCD_SCK
LCD_DC
LCD_CS
LCD_MOSI
LCD_MISO
Backlight LED
Uf=3,2V
If=60mA
R30
R31
R33
R32
4R
TFTBCKL
R25
1,5K
Q2
????
EEPROM
C15
0,1u
U5
M95320-WMN6P
R23
10K
R24
10K
EEPROM_CS
W
HOLD
S
VCC
VSS
C
D
Q
EEPROM_SCK
EEPROM_MOSI
EEPROM_MISO
Configuration data storage
Saving data like odometer, mileage etc.
Only RTC is powered when ignition is OFF
Wiktor Burdecki
Sheet: /
File: motoHUD.sch
Title: motoHUD
Size: A3
Date: 2019-07-11
Rev: A
KiCad E.D.A. kicad (5.0.2)-1
Id: 1/1