Cullinan V1.1 Hardware User Guide

(Version: A0)

2018/12/15

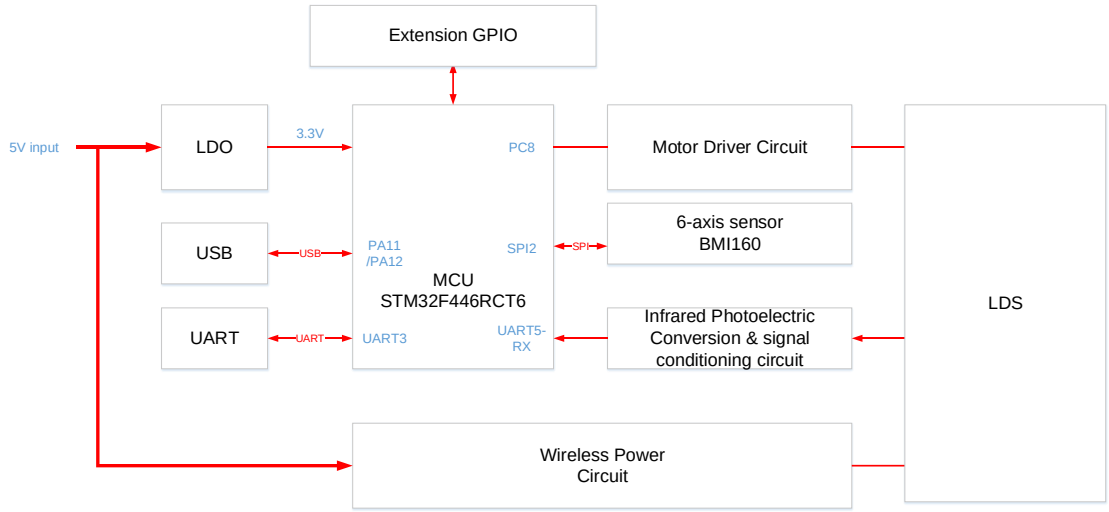
Version	Date	Change
A0	2018/12/15	Initial version

1. Overview

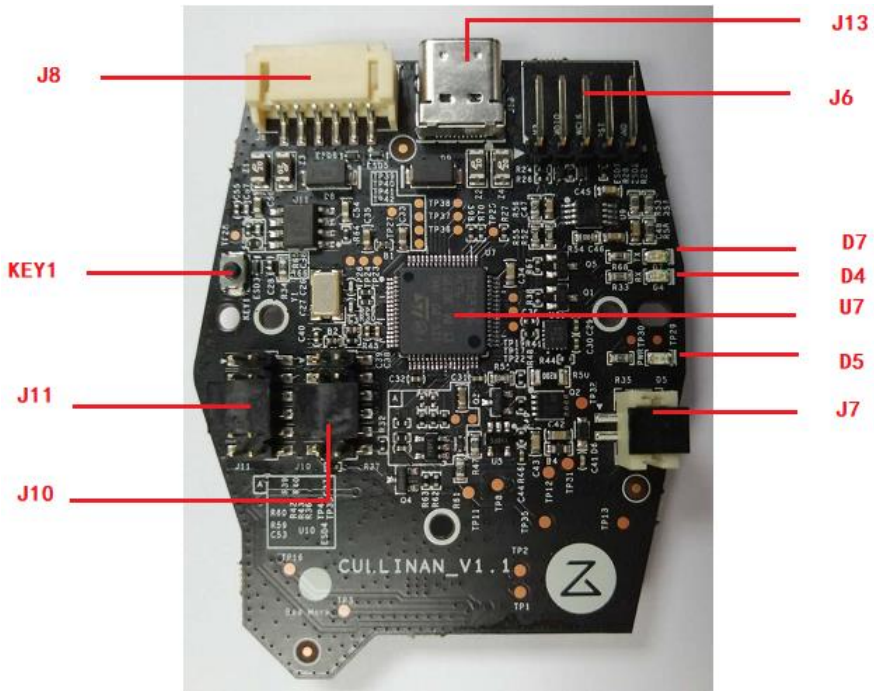
1.1. Features

Cullinan V1.1 circuit module is part of Cullinan LDS demo. STM32F446RCT6 is the main controller of this module. By programming MCU, you can control and adjust the speed of the LDS motor, get the distance information from LDS, get the 6-axis sensor information from BMI160. Most of the GPIOs of MCU are distributed by 2mm pitch connector and test point.

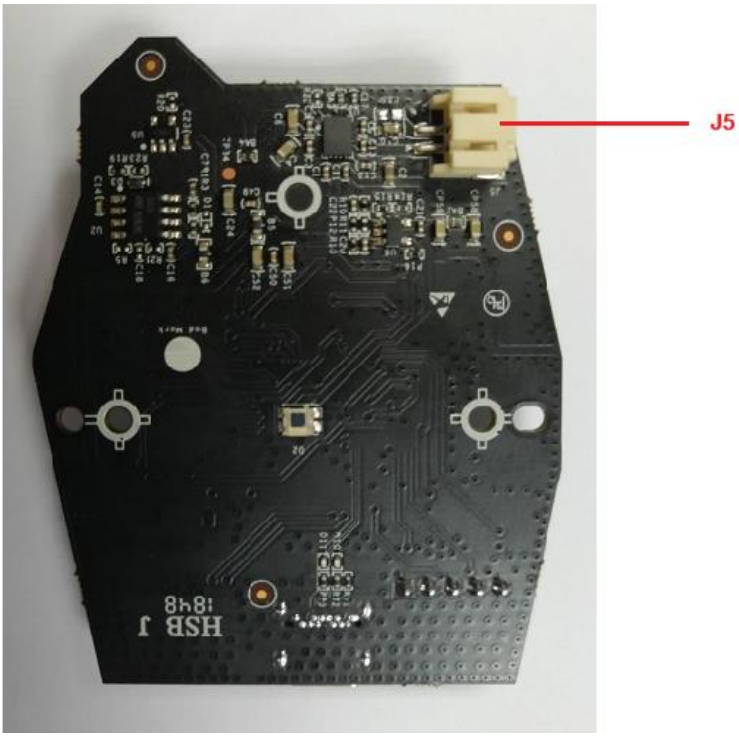
1.2. Block Diagram



1.3. Top Side



1.4. Bottom Side



Position	Description

J5	LDS wireless power interface
J6	SWD Interface
J7	LDS motor control interface
J8	UART and power interface
J10	MCU GPIO connector 1
J11	MCU GPIO connector 2
J13	USB Interface
U7	MCU （STM32F446RCT6）
KEY1	Reset button
D4	UART RX indicator (PC point of view)
D5	Power indicator
D7	UART TX indicator (PC point of view)

2. External interface

J6 SWD Interface

SWD interface support STlink/Jlink and other debug tools.
The pin assignment of this interface is:

1	3.3V
2	SWDIO
3	SWDCLK
4	RESET
5	GND

J8 UART and power interface

This interface is for power input and debug UART interface. A cable is provided in the box, which can be connected to this interface.

The pin assignment of this interface is:

1	UART RX (3.3V CMOS, To UART3_TX in MCU)
2	UART TX (3.3V CMOS, To UART3_RX in MCU)

3	GND
4	GND
5*	5V Input
6	5V Input

(*) : 2A fused for 5V input

The pin assignment of the cable:

Color	Signal	Connect to J8
Red	5V input	5,6
Black	GND	3,4
White	UART TX (3.3V CMOS, To UART3_RX in MCU)	2
Blue	UART RX (3.3V CMOS, To UART3_TX in MCU)	1

J10 MCU GPIO connector 1

This interface is for GPIO extension.

The pin assignment of this interface is:

1*	3.3V
2	GND
3	PA0
4	PA5
5	PA1
6	PA6
7	PA3
8	PA7
9	PA4
10	PA8
11 & 12	BOOT Mode jumper Short: Boot from main flash memory Open: Boot from system memory

J11 MCU GPIO connector 2

This interface is for GPIO extension.

The pin assignment of this interface is:

1 & 2*	3.3V
3	PC0
4	PC4
5	PC1
6	PC5
7	PC2
8	PC6
9	PC3
10	UART5_TX(PD2)
11 & 12	GND

(*) : 3.3V can only support for pull-up or pull-down use. Do not use these pins to power other components. The overall load of 3.3V in J10 and J11 cannot exceed 300mA.

J13 USB Interface

J13 is a USB type C interface, but it only support USB2.0 full speed (USB1.1), device mode. Board can be powered from this interface. This interface is usually act as a virtual serial port.

3. Testpoint list for extension

Test point	Signals	Test point	Signals

TP17	PA9	TP22	PC7
TP19	PA10	TP23	PC13
TP25	PA15	TP24	PC14
TP36	PB3	TP26	PC15
TP37	PB4	TP28	3.3V
TP38	PB5	TP30	
TP39	PB6	TP27	GND
TP40	PB7	TP29	
TP41	PB8		
TP42	PB9		
TP43	PB10		