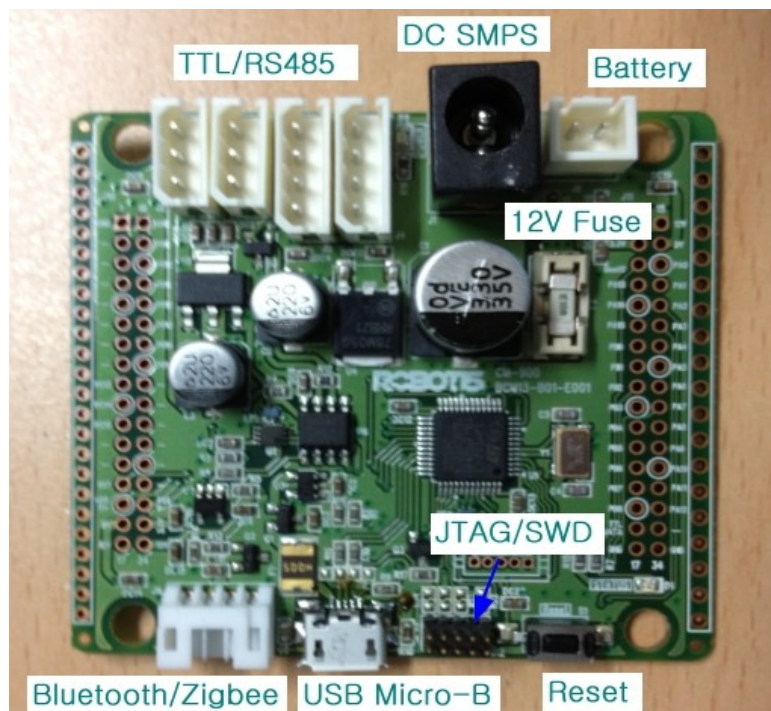


1. Overview

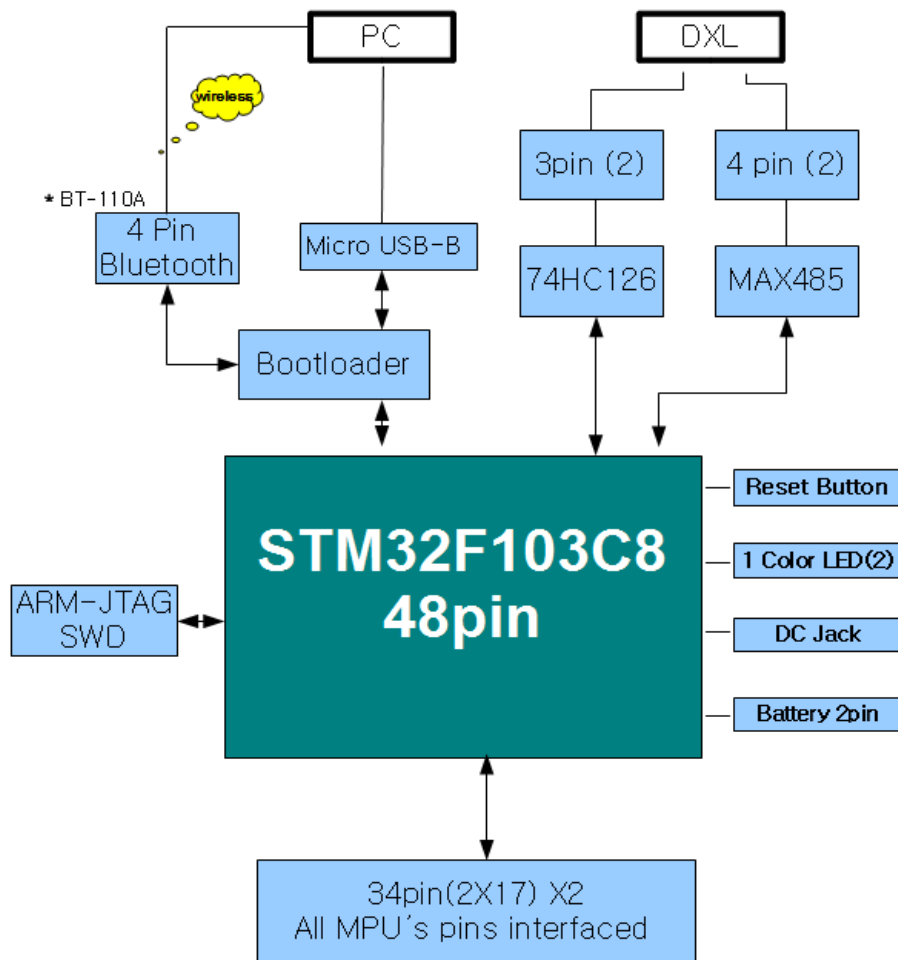
- The CM-900 is a microcontroller board based on the STM32F103C8([datasheet](#)), medium-density performance line ARM-based 32-bit MCU with 64KB Flash. It has 37 digital I/O pins (of which composed as 16 Timer unit, 10 as analog input), a 72 MHz maximum frequency(1.25 DMIPS/MHz), a micro USB connection, a power jack, an ARM-JTAG SWD(Serial-Wire Debug), I2C , USART, CAN interface, DMA controller and a reset button. It contains everything needed to support the robot system, simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2. Specification summary



CPU	STM32F103C8
Op Voltage	SMPS 12V(USB 5V)
Digital I/O pins	37
Timer	7
ADC	2
Flash Memory	64Kbytes
SRAM	20Kbytes
Clock Speed	72MHz
USB	1(2.0 full-speed interface)
CAN	1(2.0B Active)
USART	3
I2C	2
Debug Port	SWD & JTAG
Low Power	Sleep, Stop and Standby modes
DMA	7-channel

3. Blockdiagram



4. Power Source

- The CM-900 can be powered by the micro USB connection(5V) or with an AC-DC 12V SMPS power supply. The power source is selected automatically. If both power source 12V SMPS(or battery) and USB 5V are connected to the board, 12V SMPS will be selected as main power source and USB 5V is break the connection automatically. But if you want to use a dynamixel, you have to provide the power source as 12V SMPS power supply(or 12V battery)

12V	Used for Dynamixel or high voltage devices
5V	Used for the 3.3V regulator and other components on the board
3.3V	Used for the STM32F103C8 Microcontroller
GND	Ground pins

5. Input and Output

- 37 I/Os, all mappable on 16 external interrupt vectors and almost all 5V tollerant.

- 2 x 12-bit, 1us A/D converters(up to 16 channels), it has ranges from 0 to 3.6V and dual-sample and hold capability and internal temperature sensor.
- Three 16-bit timers, each with up to 4 IC/OC/PWM or pulse counter and quadrature(incremental) encoder input. 16-bit, motor control PWM timer with dead-time generation and emergency stop. It also has 2 watchdog timers(independent and window) and systick timer(24-bit downcounter)

6. Communication

- Up to 2 x I2C interfaces(SMBus/PMBus)
- Up to 3 USARTs(ISO 816 interface, LIN, IrDA capability, modem control)
- Up to 2 SPIs(18 Mbit/s)
- CAN interace(2.0B Active)
- USB 2.0 full-speed interface
- TTL/RS485 Network for all DYNAMIXEL series.

7. DMA

- 7-channel DMA controller can be supported for peripherals(ADC, SPIs, I2Cs and USARTs)

8. Programming

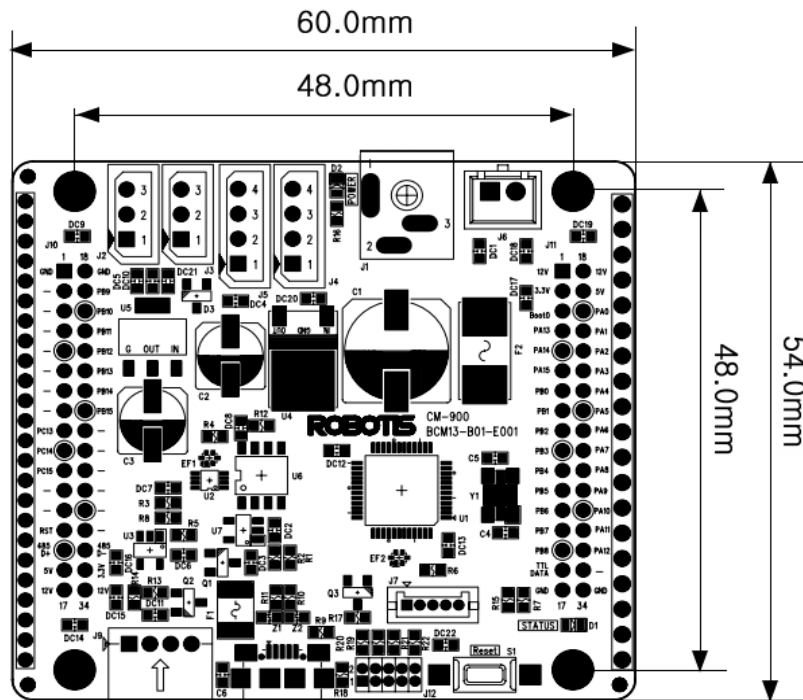
- The CM-900 provides powerful and easy way to download a firmware for user. It is enabled by the bootloader included USB Virtual CDC driver. On Windows, a.inf file is required. It is simply appear as serial communication over USB and can be possible to download a binary file programmed without an external hardware programmer.
- The CM-900 provides another simple way to download your codes by bluetooth module(Option: BT-110A) which can be inserted to embeded 4-pin connector on the board. A firmware binary file programmed can be transfered from host computer to the board by bluetooth SPP(Serial Port Profile).
- Above 2 methods are implemented to CM-900 Integrated Development Evironment(IDE) tool based Eclipse IDE. So you can edit your codes and compile and download it to the board in one software tool.
- When embeded bootloader can not work properly, JTAG-SWD(Serial-Wire Debug) port is also provided to restore the original bootloader or to bypass it.

9. USB Overcurrent Protection

- The CM-900 has a resettable polyfuse that protect your computer's USB port from short and overcurrent. If over the maximum USB current(500mA) is applied to CM-900, the connection will be cut off automatically until the problem is resolved.

10. Board Dimension

- Although included all features needed to make robot system, the board size is quite a small. The length and width of the CM-900 board is 60.0 mm and 54.0 mm respectively and it's thickness is 1.6 mm. The specified dimensions are described as follows.



Layout

