



# VTI1E2 – APLIKASI MIKROKONTROLER dan ANTARMUKA<sup>©</sup> SEMESTER GANJIL – KURIKULUM 2020

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**VTI2D3**

# **Aplikasi Mikrokontroler dan Antarmuka**

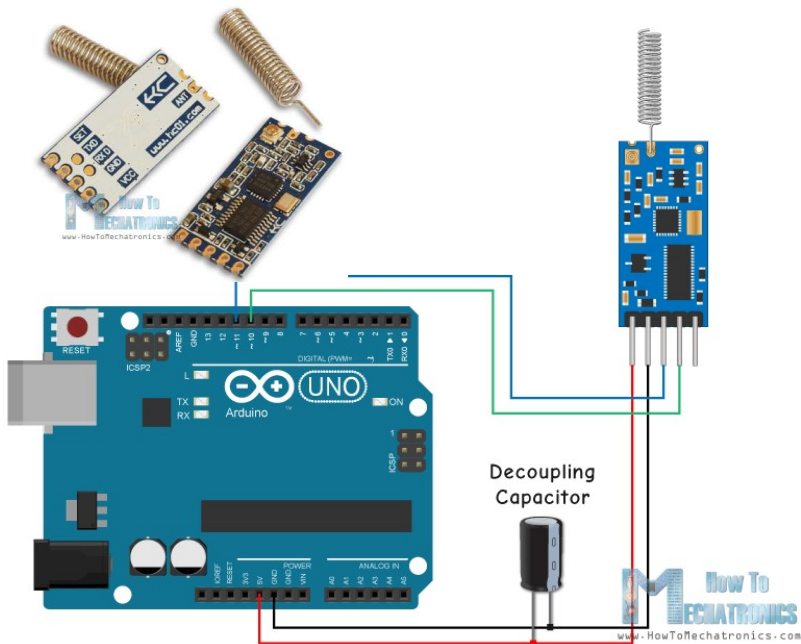
Materi ke-10: Antarmuka Mikrokontroler untuk Komunikasi Nirkabel-I

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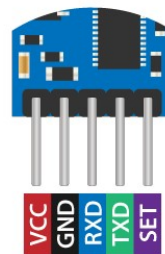
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1. Komunikasi serial nirkabel
2. Komunikasi Bluetooth
3. Komunikasi RF/OWC
4. Komunikasi LoRa
5. Komunikasi WiFi

- ▶ Wireless RS232 modules



HC-12 Pinout

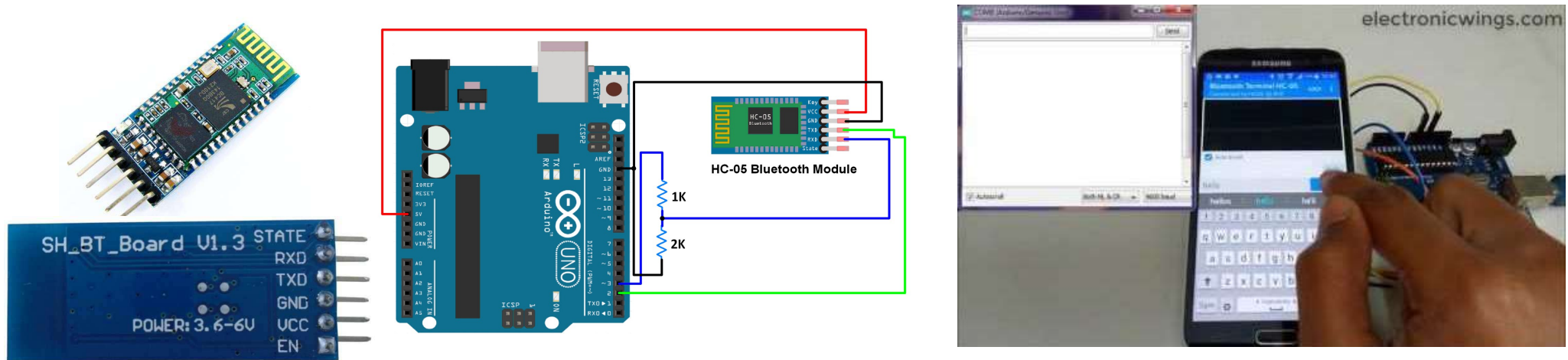


## HC-12 Wireless Communication Module

- ▶ the HC-12 wireless serial port communication module. Here are some specification:
- Its wireless working frequency band is from 433.4 MHz to 473.0 MHz
- It has a total of 100 channels with a stepping of 400 KHz between each channel
- Transmitting power is from -1dBm (0.79mW) to 20dBm (100mW)
- Receiving sensitivity is from -117dBm (0.019pW) to -100dBm (10pW).

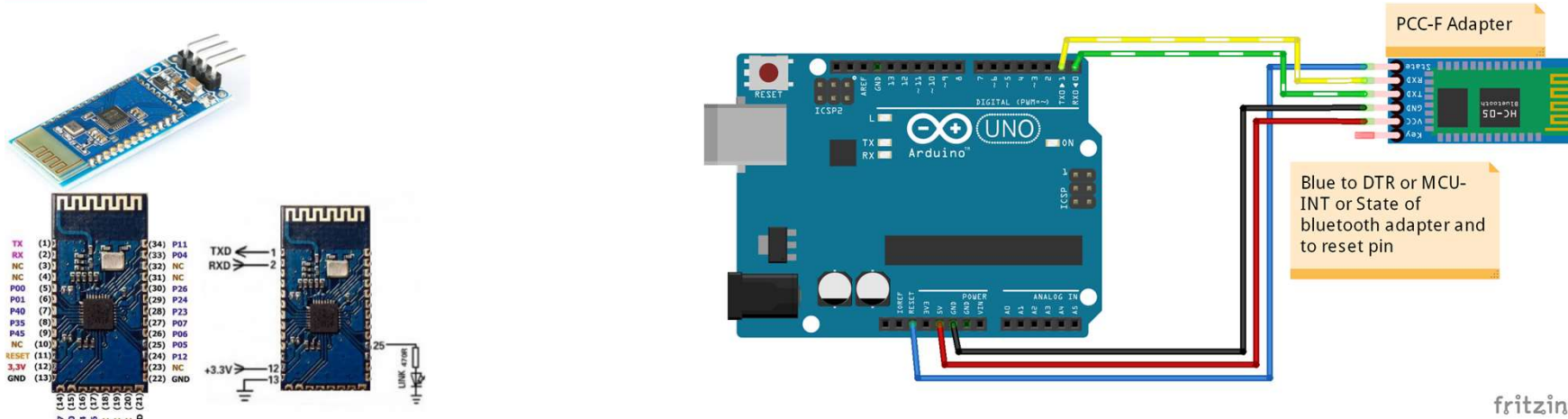
▶ <https://howtomechatronics.com/tutorials/arduino/arduino-and-hc-12-long-range-wireless-communication-module/>

# Komunikasi Bluetooth SPP (Serial Port Protocol)



- HC-05 is a Bluetooth device used for wireless communication with Bluetooth enabled devices (like smartphone). It communicates with microcontrollers using serial communication (USART).
- Default settings of HC-05 Bluetooth module can be changed using certain AT commands.
- As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, there is no need to shift TX voltage level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.
- Reference: <https://www.electronicwings.com/arduino/hc-05-bluetooth-module-interfacing-with-arduino-uno>

# Komunikasi Bluetooth SPP-C



SPP-C Bluetooth Serial Adapter Module Replace for HC-05/  
HC-06 Slave

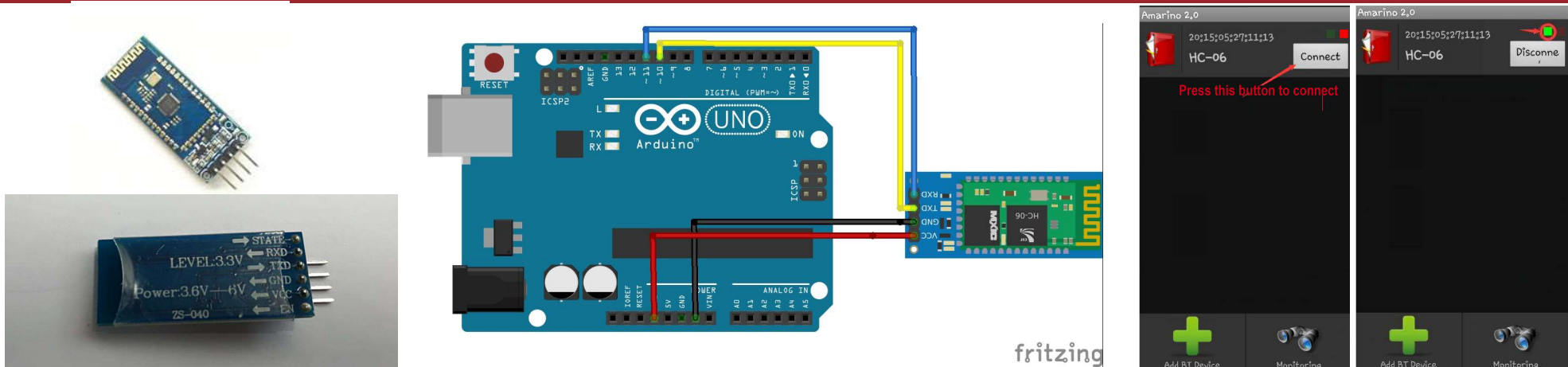
Features:

- Operating Frequency Band 2.4 GHz - 2.48 GHz unlicensed ISM Band
- Bluetooth Specification V2.1+EDR
- Output Power Class: Class 2
- Operating Voltage: 3.3V

- Host Interface UART
- Dimension: 27mm (L) x 13 mm (W) x 2 mm (H)
- Storage temperature -40C +150C
- Supply voltage: VBAT -0.4V 5.6V
- Recommended Operating Conditions
- Operating Temperature Range -40C +150C
- Guaranteed RF Performance Range (a) -40C +150C

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# Komunikasi Bluetooth (Slave)



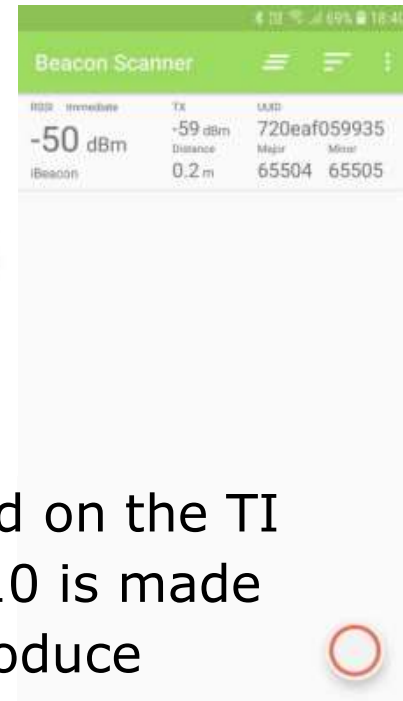
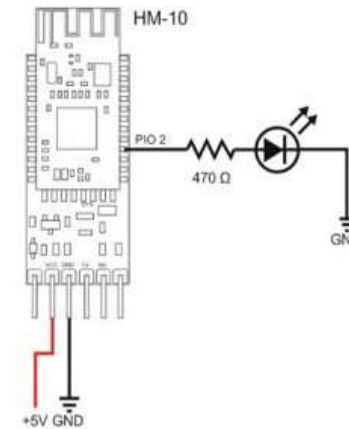
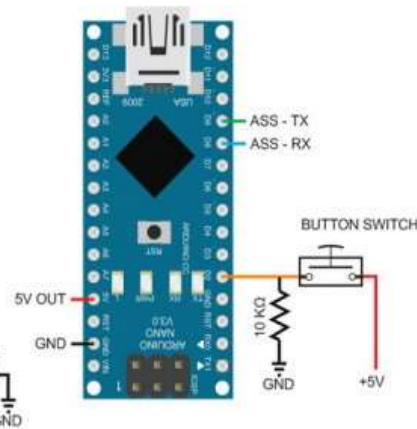
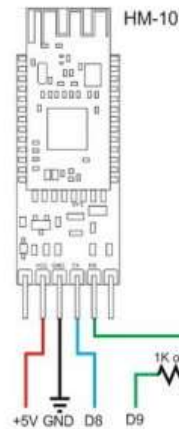
- ▶ The HC-06 is a class 2 slave Bluetooth module designed for transparent wireless serial communication. Once it is paired to a master Bluetooth device such as PC, smart phones and tablet, its operation becomes transparent to the user. All data received through the serial input is immediately transmitted over the air. When the module receives wireless data, it is sent out through the serial interface exactly as it is received. No user code specific to the Bluetooth module is needed at all in the user microcontroller program.
- ▶ The module has two modes of operation, Command Mode where we can send AT commands to it and Data Mode where it transmits and receives data to and from another Bluetooth module. By default the device was in Command mode and needs to pair with some device to get it into data mode.
- ▶ Reference: <https://osoyoo.com/2017/10/25/arduino-lesson-hc-06/>



# Komunikasi Bluetooth LE 4.0



HM-10S



- ▶ The HM-10 is a small 3.3v SMD Bluetooth 4.0 BLE module based on the TI CC2540 or CC2541 Bluetooth SOC (System On Chip). The HM-10 is made by Jinan Huamao and is one of many Bluetooth devices they produce including the HM-11 which is operationally the same as the HM-10 but has a smaller footprint with fewer pins broken out.
- ▶ <http://www.martyncurrey.com/hm-10-bluetooth-4ble-modules/>

## Komunikasi RF (Tugas Kelompok)

- ▶ Modul RF 433 MHz –
- ▶ Modul NRF24L01 –
- ▶ Modul GSM/GPRS –
- ▶ Modul LTE/NB-IoT -
- ▶ Modul GPS –
- ▶ Modul ZigBee/Xbee –
- ▶ Modul LoRa SX1278 –
- ▶ Modul ASK 315MHz -
- ▶ Modul RC-A/B –
- ▶ Modul RFM69HCW -
- ▶ RFID –

## Komunikasi OWC (Tugas Kelompok)

- ▶ IrDA -
- ▶ VLC -
- ▶ Li-Fi -
- ▶ LiDAR -
- ▶ Lasercomm -

## Komunikasi Suara (Tugas Kelompok)

- ▶ HC-SR04 –
- ▶ FM-RDS Receiver TEA5767, RDA5807,
- ▶ DTMF

1. <https://create.arduino.cc/projecthub/projects/tags/wireless>
2. <https://howtomechatronics.com/page/1/?s=wireless>
3. <https://lastminuteengineers.com/>

# Ada pertanyaan?

**Semoga Bermanfaat dan  
Terima Kasih atas Perhatiannya**