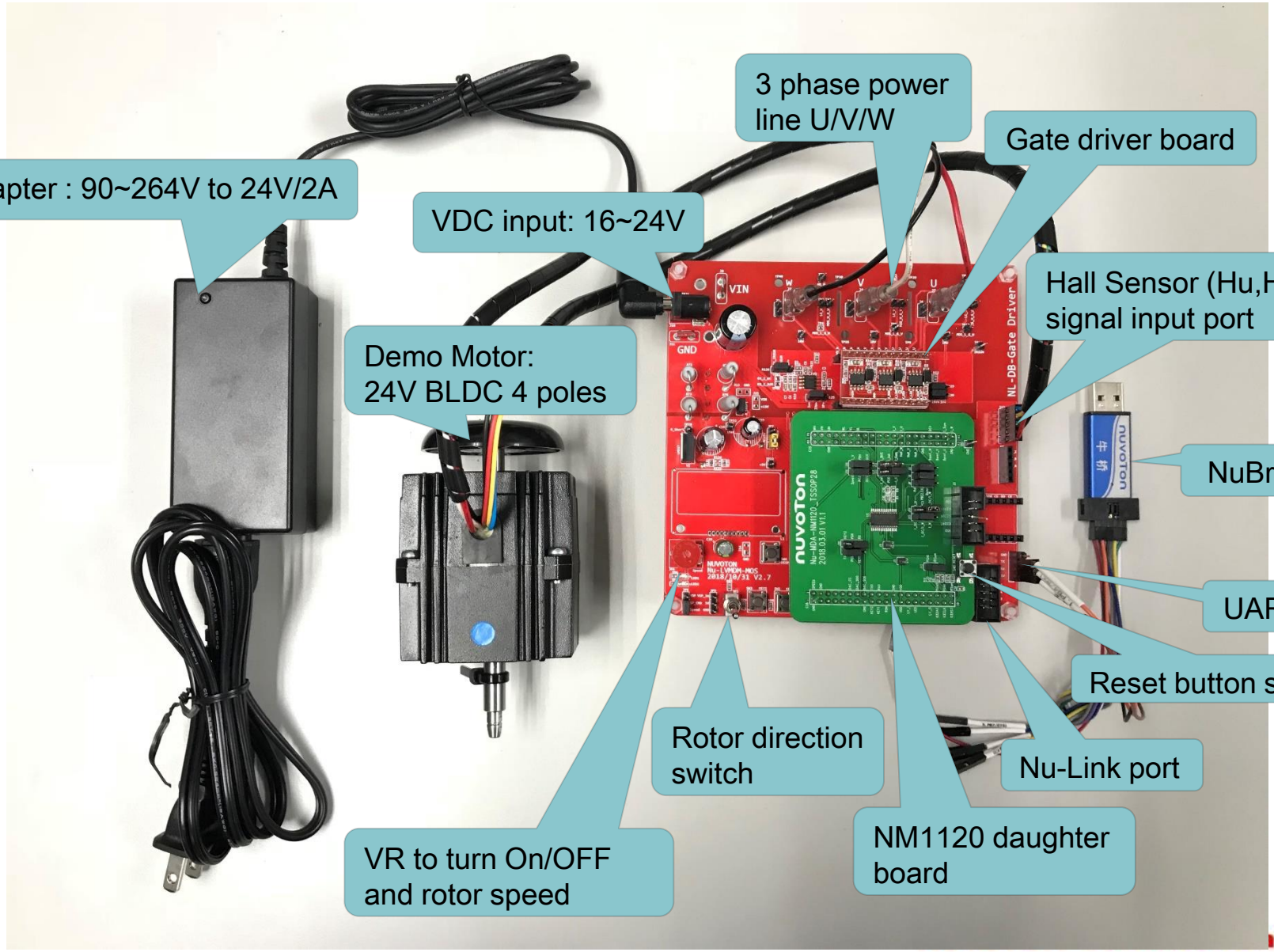
Introduction to Motor Demo System

2019/March

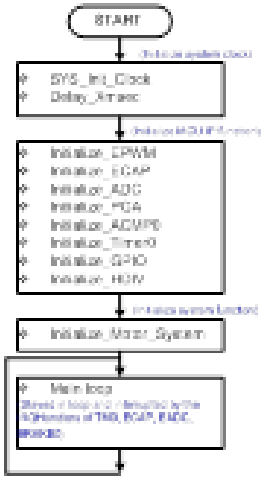
Demo System Overview

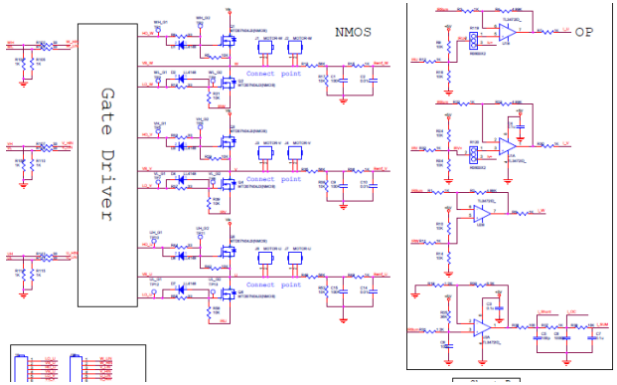


Demo Purpose

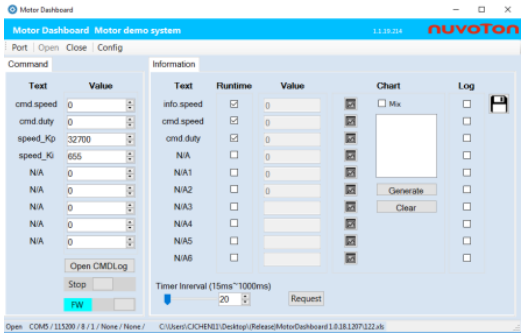
- **Easily & Rapidly Getting Start for Motor Application**
  - Provide demo system for refer-design

- **Motor Drive System**
  - Elementary S/W flow
  - Refer H/W circuit





- **Friendly GUI Interface Linking PC and System Board through UART(COM port)**
  - User can easily demo motor behavior



nuvoTon confidential

Demo Functions

- Hall + FOC + 2-shunt R
- Hall + FOC + 1-shunt R
- Hall + Six step square wave control
- Provide multiple algorithms for motor drive
  - FOC + SVPWM (Library)
  - PI control for speed or current control
  - Motor speed estimated
- Friendly GUI interface
  - Tune parameters to control motor speed

nuvoTon confidential

Demo System Catching

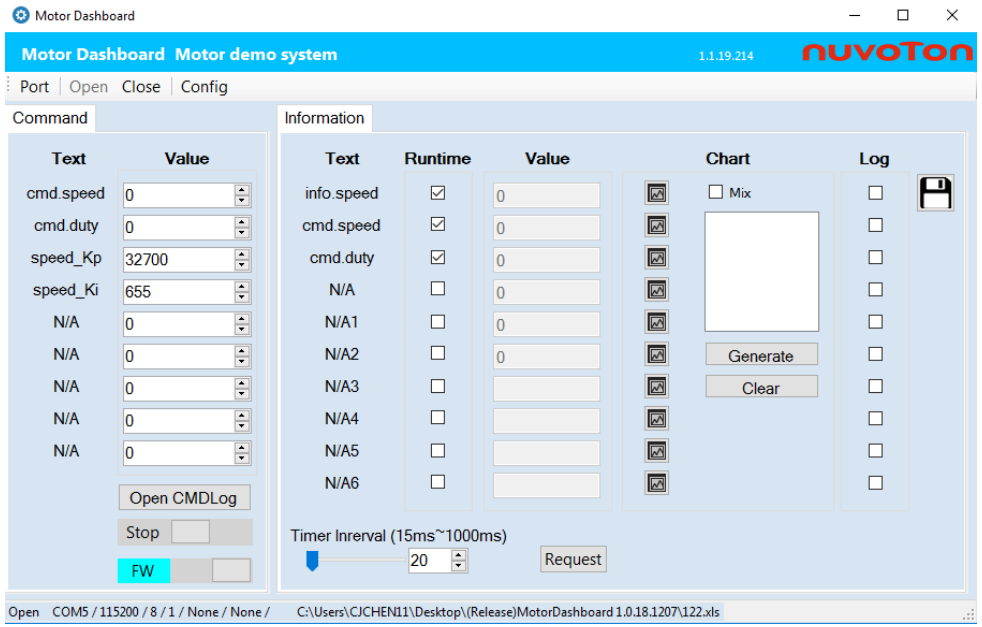
- **MCU initialization**
  - MCU Initialize
  - Timer
  - Interrupt
  - ECAP (Enhance Capture Timer/Counter)
  - Complementary PWM0~5 setting
  - 12-bit 2-S/H ADC
  - PGA (Programmable Gain Amplifier)
  - ACMP (Analog Comparator)
- **Computing**
  - Fixed point + - x ÷
- **Motor speed control**
  - FOC
  - 6-six square wave

nuvoTon confidential

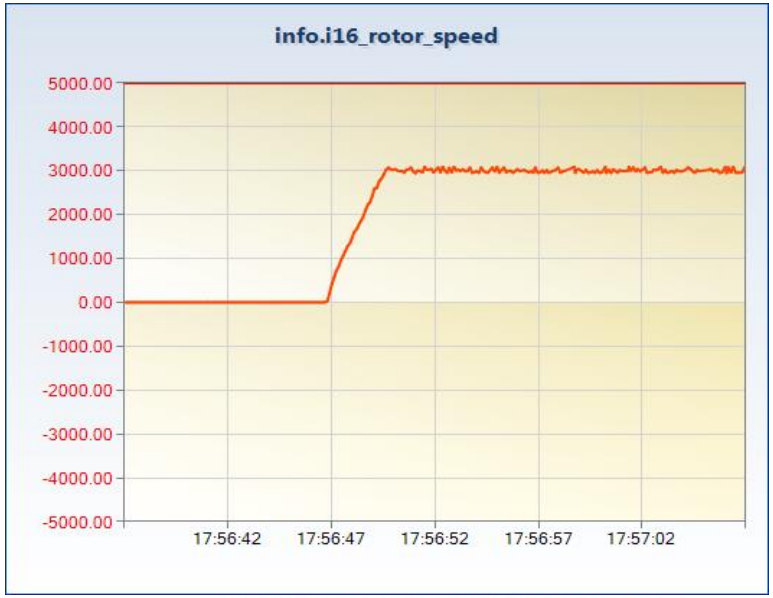
GUI of Motor Dashboard

- Motor Dashboard: PC-GUI : on-line tuning
- Dynamic display. Ex: motor speed.
- Easily define parameters
- Handy Setting/Reading parameters on PC side
- Multi charts or multi-parameters in a chart

PC-GUI



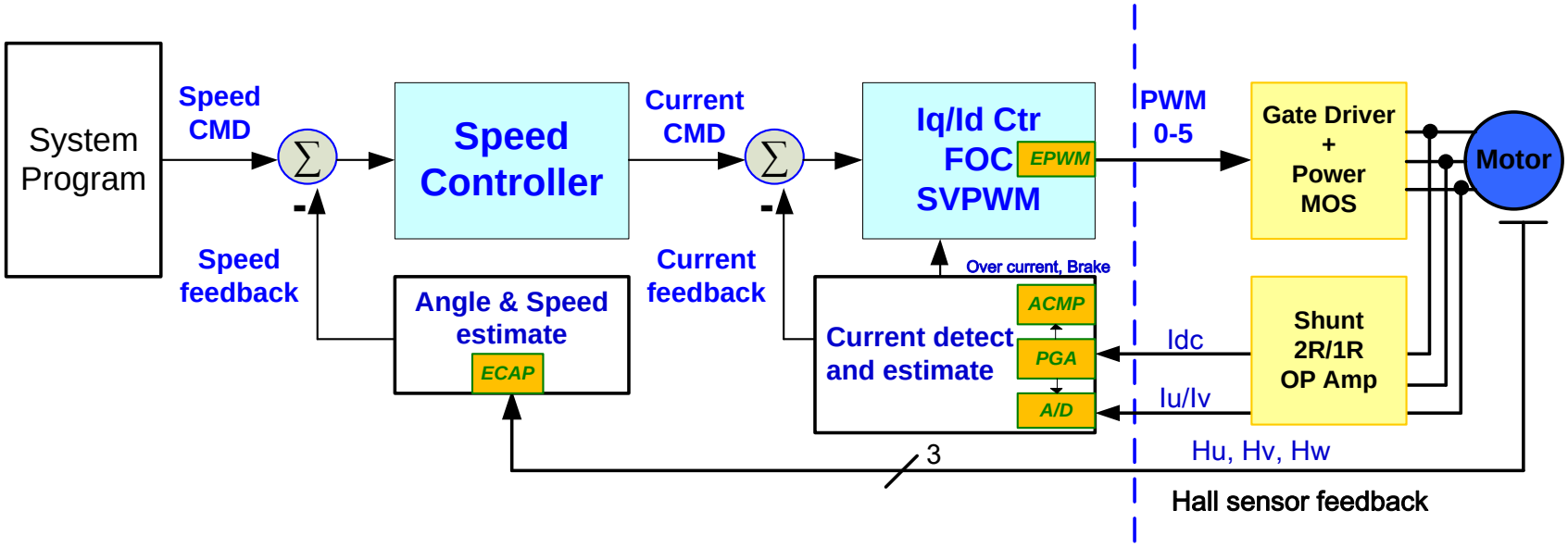
Dynamic display chart



nuvoTon confidential

FOC Control Block

- Demo System : Hall + FOC
- Control mode : 2R / 1R (R : current shunt resistance)



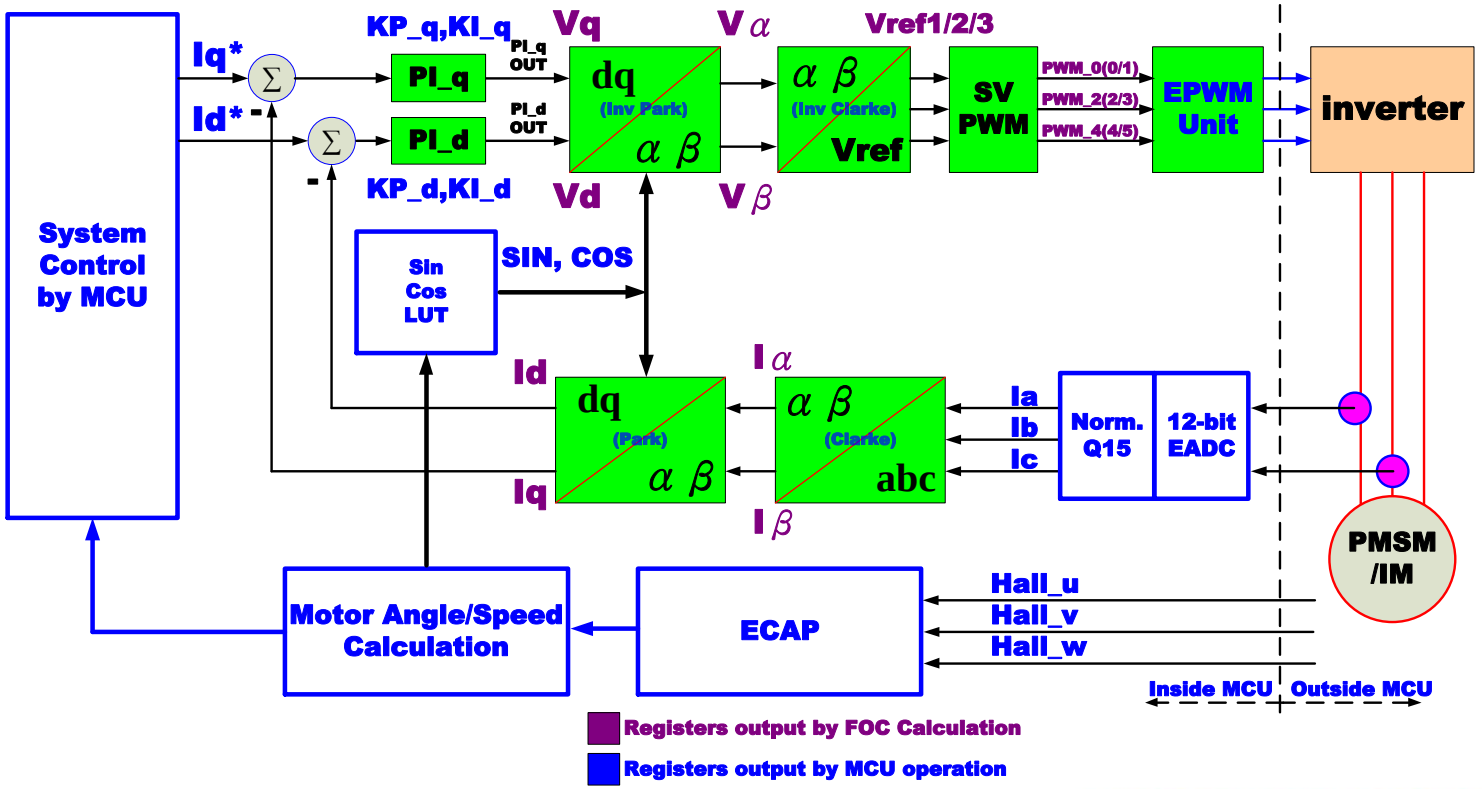
NM15xx series provide H/W FOC

nuvoTon confidential

Field Oriented Control by Software

- FOC: Field Oriented Control, 磁場導向控制
- Vector Control: 向量控制, 矢量控制
- a-b-c stationary frame
- α-β stationary frame
- d-q rotating frame

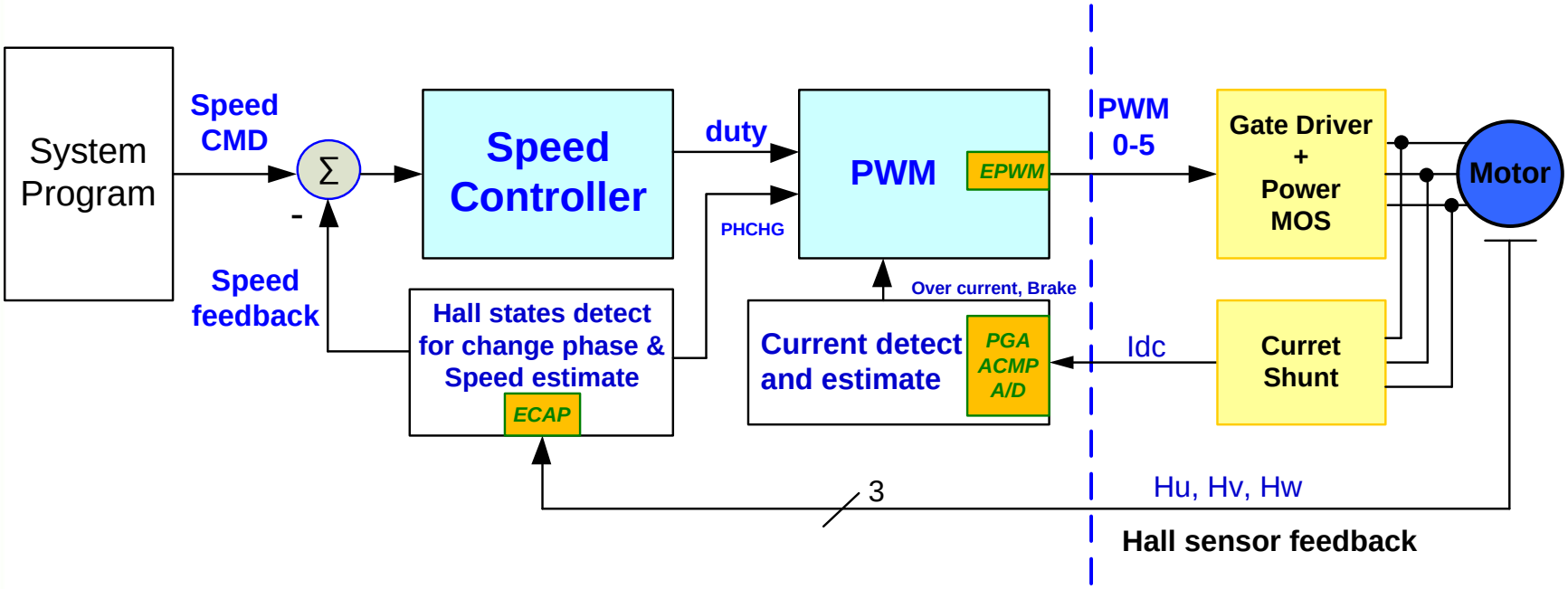
NM15xx series provide H/W FOC



nuvoTon confidential

6-step Square Wave Control

- Demo System : Hall + Six Step square wave control
- Control mode : Speed close loop



nuvoTon confidential

Conclusion

- **Quickly Start**
  - Provides Hall +FOC, Hall+6-six square wave functions. S/W follow & ref-H/W circuit.
  - Through demo system. Users can easily redesign

- **Flexible GUI interface**
  - Easily tune the parameters for adjusting system performance.
  - Graphic Variables dynamic on screen

Quickly & non-Barrier use NM series

nuvoTon confidential

THANK YOU

nuvoTon confidential