

3-phase Brushless DC motor control Reference Platform MCRP03

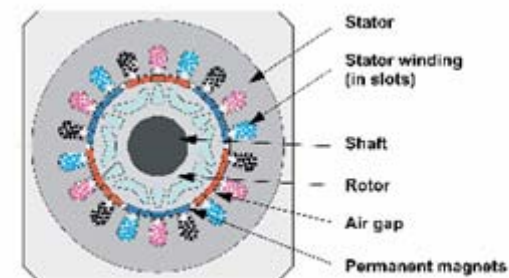


Renesas Technology Europe

CID
Marco Vicini

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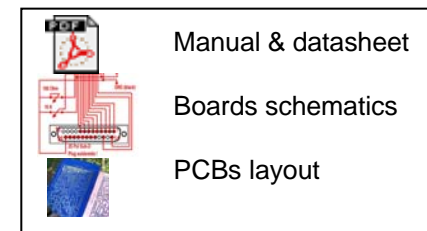


1. MCRP03 - Brushless DC motor – Overview

- Drive easily 24V Brushless DC motor.
- Improved power stage **reliability** by using Mitsubishi IPM (220V & 110V)
- Allow fully insulated debugging.
- First R8C/11 low cost Motor control platform
- Combine all the best from MCRP01 and MCRP02.
- Measure simultaneous current with an ADC synchronized to the carrier frequency
- Easy user interface to set the speed, the rotation, etc.
- Current, voltage, temperature measured and displayed
- Full support sensors interfaces.

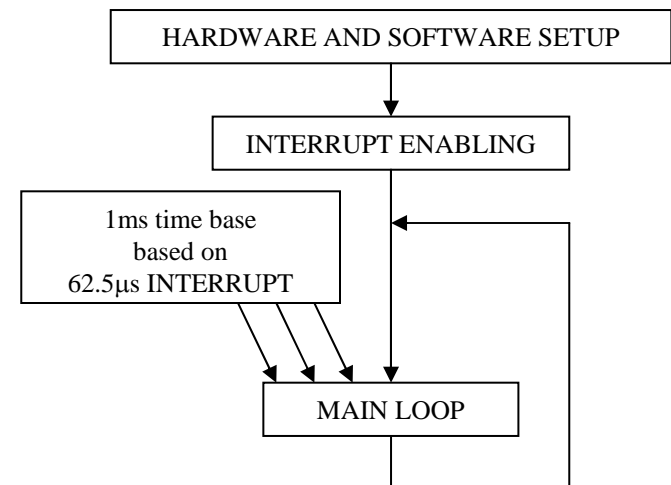


- Software source code available on:



1. General Software Block Diagram

- Main loop takes care of:
 - Serial communication.
 - V_{BUS} calculation.
 - Speed calculation.
 - Temperature calculation.
 - Acceleration/Deceleration ramps.
 - Speed regulation PI.



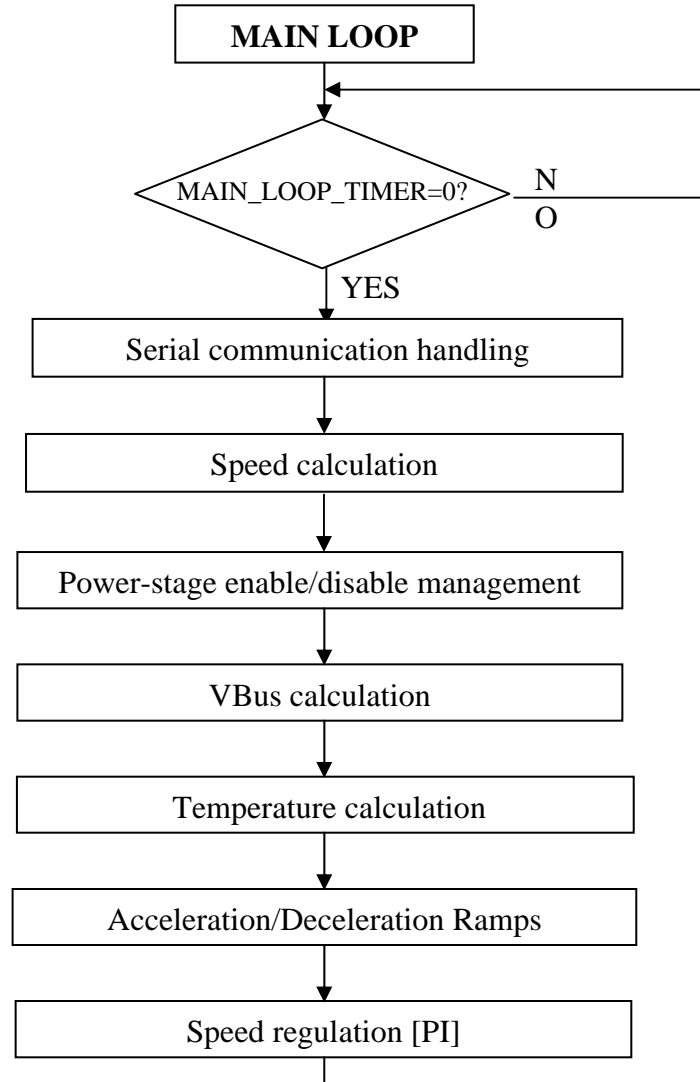
2. Interrupt functions



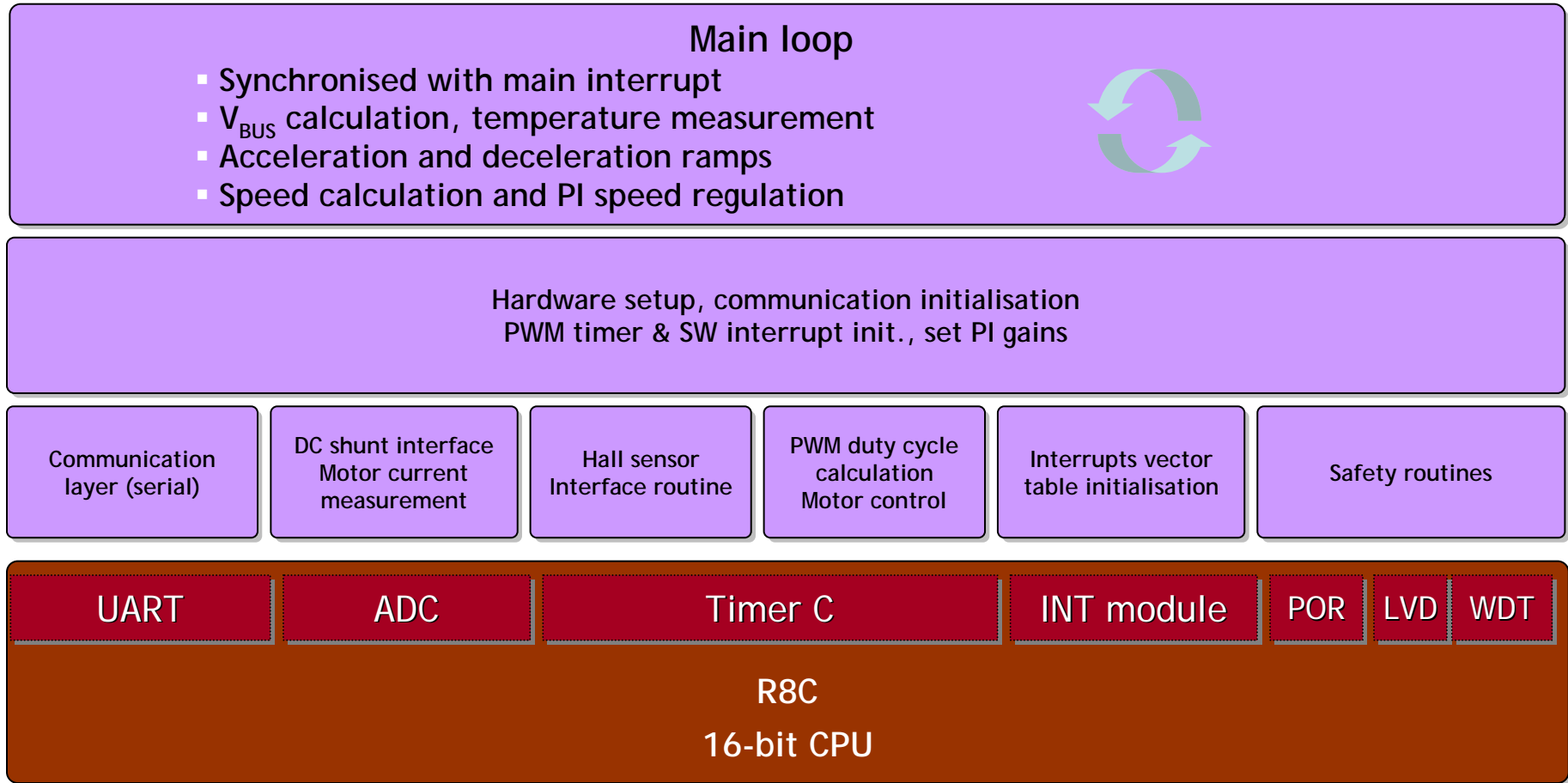
- The 62.5 μ s time base interrupt takes care of:
 - A/D conversion results management.
 - A/D conversion re-start.
 - Motor current limit control.
 - Serial communication polling.
 - 1ms timer management for main loop synchronization.

- Each of the 3 Hall sensors interrupt takes care of:
 - Power-stage disabling if needed.
 - Hall sensors state reading.
 - Identification of the 1/6 of the period where the rotor is.
 - Identification of the rotor direction.
 - Power-stage driving configuration output.
 - Hall sensors edges counting.

3. Main Loop Block Diagram



3. SW layer blocks



4. Performances

- Current performances:
 - No optimization
 - Debug
 - Most of the code written in 'C'
 - PI core in assembler
- Code size ~ 3KB and RAM occupation ~400bytes
- Interrupt Service Routine: less than 20 μ s every 62.5 μ s
- Main Loop: less than **300 μ s** each ms
- Free CPU time: **60%**



5. Used Tools



- Development Environment
 - HEW Version 3.01.08.000
- C Compiler
 - NC30 COMPILER V.5.20 Release 1
- Emulator
 - E7

