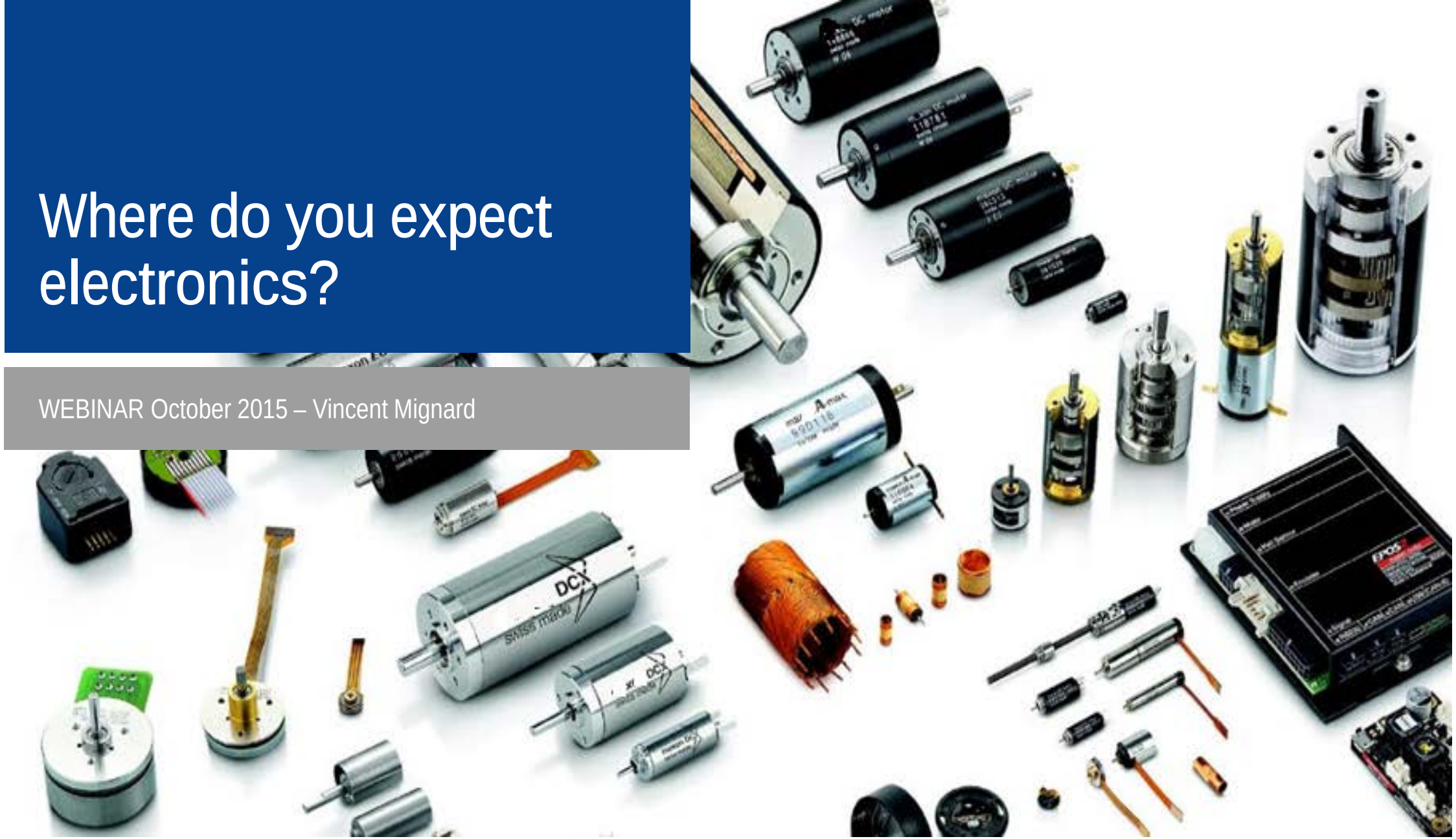
Where do you expect electronics?

WEBINAR October 2015 – Vincent Mignard



RENESAS

Surrounded by electronics during your whole life

Child equipment using electronics, driving motors…

3-phase Brushless

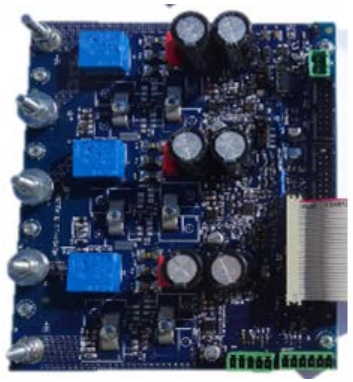
Accurate torque control requested

RX23T fits to the application

BENEFITS

- Single MCU to drive the motors, manage LCD, LEDs, sensors…
- Vector Control algorithm ensures efficient start at zero speed, under high load
- Cost optimized sensorless solution, no sensors needed
- High noise immunity guarantee as the MCU is 5V, possible to stick the inverter close to the motors.

Why is the RX23T a good fit?



New RX v2 Core

- 40MHz delivers 80DMIPs
- Up to 3 times faster than RX v1
- Enhanced DSP to easily implement filters for sensors measurements

Floating Point Unit

- Overall code is reduced
- Complex math executed quicker as no scaling needed
- Perfect to execute fast PI controllers to control torque & speed

RX23T Kit benefits

- Small memory footprint: 20KB flash
- Fast execution: 40µs, e.g. only 32% CPU load
- “Off the shelf” solution, no expertise required

Adult equipment.. Beauty as a priority…

Request to control two motors simultaneously

RX24T fits to the application

High speed motor

40K RPM blower

BENEFITS

- Single MCU to drive two 3-phase Brushless motors
- Manage the over-heating, over-current, faults and communication
- Field Oriented Control guarantee high efficiency, less heat in the hand tool.
- Cost optimized BoM as op-amplifier are on-chip
- 10 minutes to drive the motors and reach 40000RPM

Why is the RX24T a good fit?

New RX v2 Core

- 80MHz delivers 160DMIPs
- Floating Point Unit, true 5V to ensure high noise immunity
- Up to 256KB flash, 100-pin to manage system control & two motors

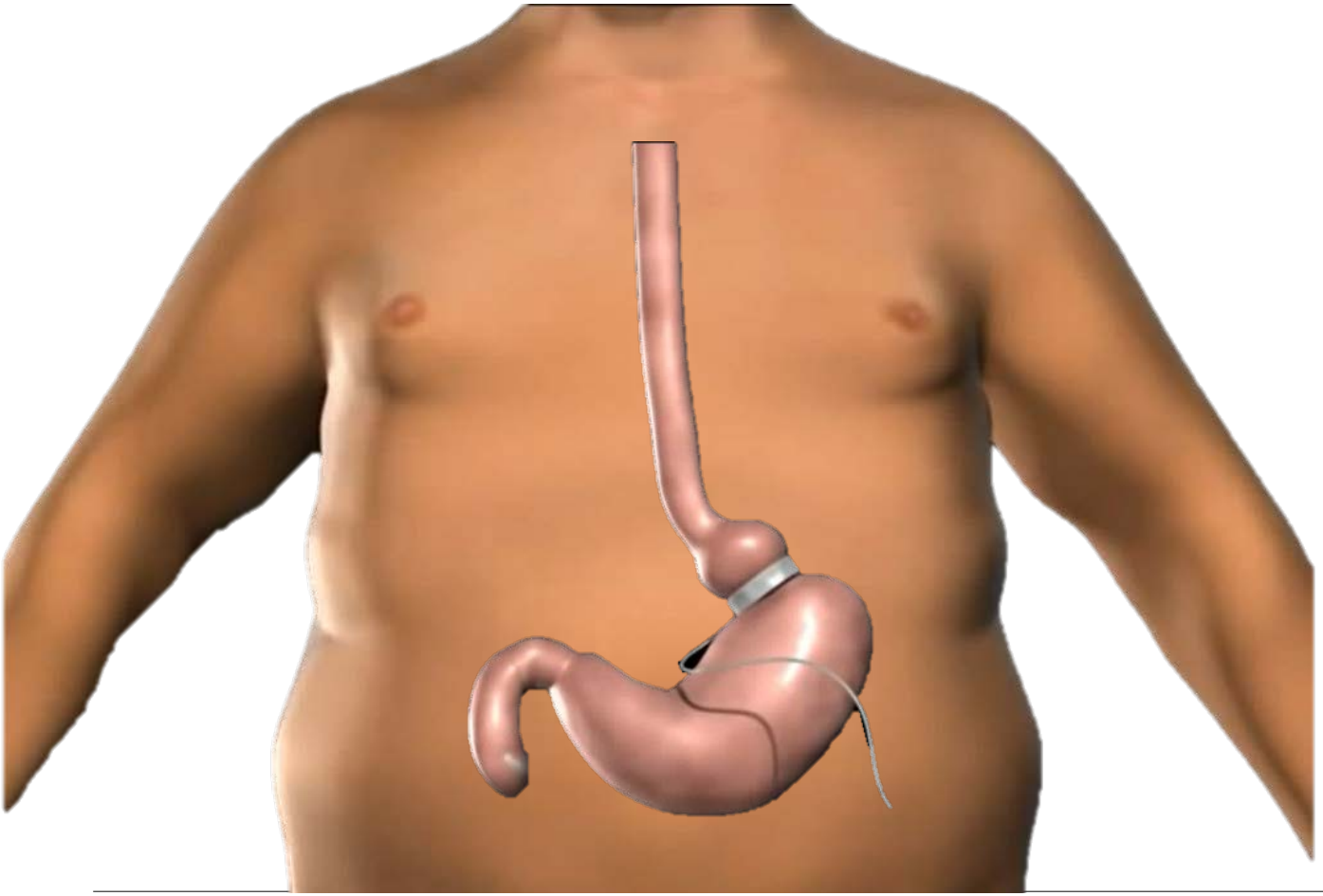
Op-amp / PGA on-chip

- Overall Bill of Material reduced
- Higher accuracy in the motor control, less noise
- Flexible PGA to manage high or low speed motors

RX24T Kit soon

- Single board driving two motors at the same time + PFC
- Fast execution: 25-30µs, e.g. only 20% CPU load
- “Off the shelf” solution, no expertise required

For some of adults… such treatment may be required



adjustable gastric ring

Compact MCU to drive & communicate

RX23T fits to the application

Very tiny 3-phase Brushless motor

BENEFITS

- 48-pin package, tiny flash memory
- Algorithm designed to drive low impedance motors too
- Manage low speed: 20RPM
- Safety features on-chip a must: Shutdown emergency module, CRC check for the flash, RAM check, clock consistency check…
- Cost optimized sensorless approach

Why is the RX23T a good fit?

New RX v2 Core

- 40MHz delivers 80DMIPs
- Up to 3 times faster than RX v1
- Enhanced DSP to easily implement filters for sensors measurements

High Reliability

- 5V operations, ensure immunity against spikes
- Ports, I/O pins highly protected
- Plausibility check on I/O ports, independent watchdog

RX23T Kit benefits

- Small memory footprint: 20KB flash
- Fast execution: 40µs, e.g. only 32% CPU load, manage wireless connection
- Royalty-free source code software, open to certification institute

For the last cycle of our life…

Single MCU to drive & communicate

RX23T fits to the application

3-phase
Brushless motor

BENEFITS

- Vector control algorithm guarantee very low noise, no vibration
- Fast software execution ensure quick reaction time to breath changes e.g. apnea
- No torque ripple or electrical noise ensure no vibrations
- High acceleration and decelerations ramps easy to manage and included into RX23T kit

Why is the RX23T a good fit?

New RX v2 Core

- 40MHz delivers 80DMIPs
- Up to Fast implementation of filtering algorithms
- Enhanced DSP instructions to easily implement filters for pressure sensors

High Reliability

- 5V operations, ensure immunity against spikes
- Plausibility check on I/O ports, independent watchdog
- Langer EMV test report planed for eof October.

RX23T Kit benefits

- Small memory footprint: 20KB flash
- Fast execution: 40µs, e.g. only 32% CPU load for system control
- Speed ramps implemented to test directly on user equipment

RX23T / 24T line-up featuring FPU and 5V

48pin 52pin 64pin 80/100pin

P/N: YROTATE-IT-RX23T

Let's recap: RX23T kit is on-stock for €179

- Vector control Algorithm in Floating Point arithmetic
- 3-phase Permanent Magnet AC motors
- Sensorless Control Closed loop
- 1 or 3 shunts
- Renesas MOSFETs inverter
- 150W @ 48V_{DC}
- External. stage 1.5KW @ 300V_{DC} Or 3.6KW @ 60V_{DC}
- USB powered
- E1 Prog/debug connector
- Hall & Encoder connectors

Let's recap

Auto-tuning Tutorial/video

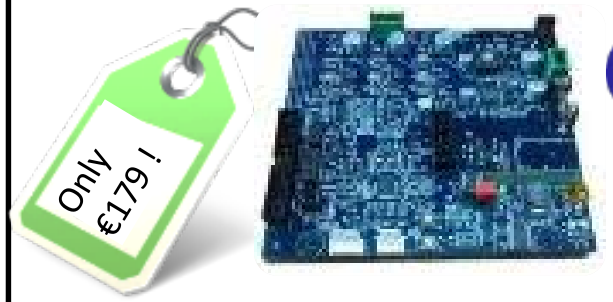
Royalty free embedded Software

- Sensorless Vector control: 1 or 3 shunts
- Flux weakening enable by default
- Auto-tuning of current PI coefficients
- Motor automatic identification
- Off-line automatic process
- Flux estimator type selectable
- Several PWM Modulations available
- External power stage available

3-phase Motor types supported

- Permanent Magnet AC, AC/DC Brushless
- Surface or interior Permanent Magnet
- Inrunner & outrunner motors

Reference kit based on RX23T



YROTATE-IT-RX23T

www.renesas.eu/motorcontrol Website

- Schematics, gerber files, Bill of Material
- for Kits and external 1.5KW power stage, 60V/120A power stage
- Manuals, Starting Guide, Short intro.
- Embedded software source code
- PC Graphical User Interface

Many thanks for listening!

In the next weeks, I may cover such applications…