VICOR

Case study:
Autonomous warehouse robot



High efficiency converters help maximize run-time

Customer's challenge

Recent improvements in sensors and software allow autonomous robots to identify and avoid human workers or other obstacles and to travel to their destination by the shortest route, rather than being limited to defined robot pathways. These nimble robots are required to carry parts or finished goods 24/7 as a key contributor to the SMART factory, providing faster delivery and lower costs. This manufacturer of robots was looking to maximize time between recharges without impacting other performance factors. The key goals were:

- Maximize range between charges by reducing conversion losses
- Free up space for larger batteries and sensors by reducing size and weight

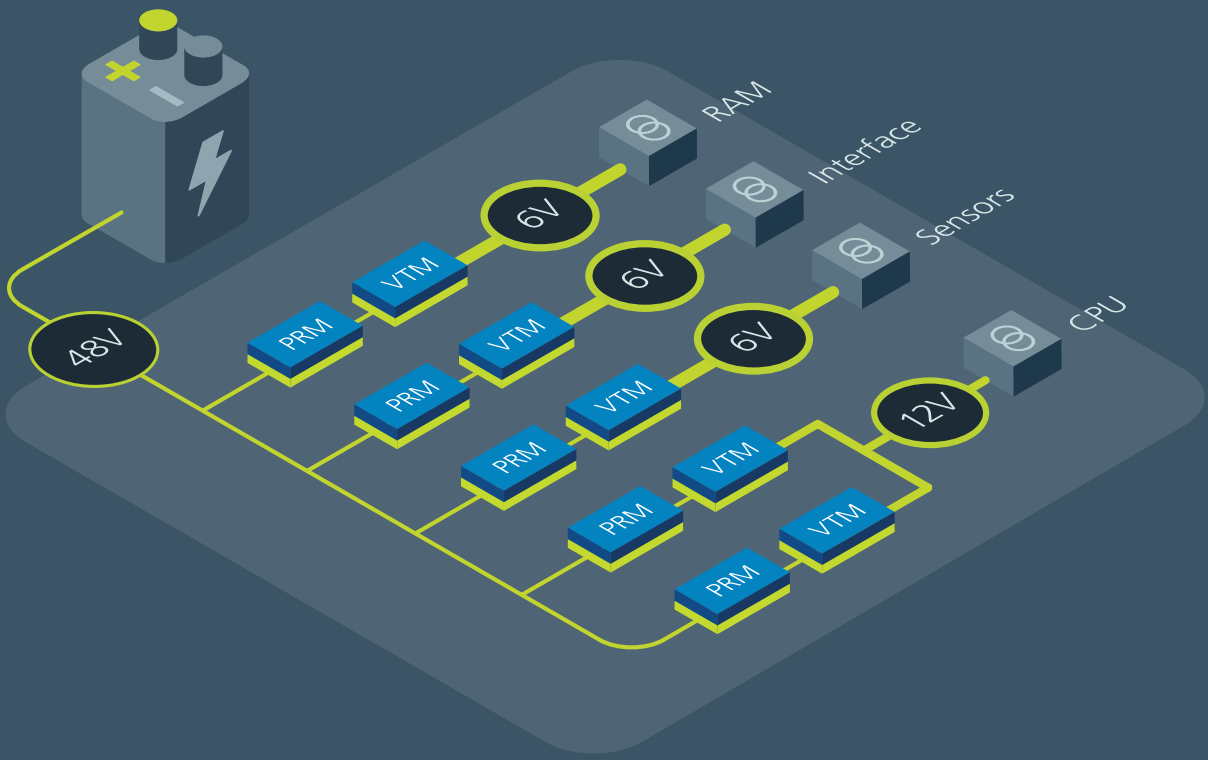
The Vicor solution

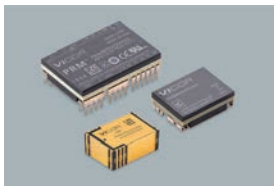
The power for the robot came from a 48V battery stack, which powered the motor drive directly. The power supply was required to convert the battery input to three rails of 6V and one of 12V to power the sensors, navigation interfaces and CPU. The solution was based on four arrays of Vicor PRM and VTM converters, one array for each output. Key benefits were:

- Lowest losses achieved by high efficiency conversion (>92.7%)
- Small footprint, low profile (6.7mm) and low weight

Vicor PRM/VTM solution saves space

Power delivery network: Four PRM/VTM converter combinations provided the isolation and regulation for each output. The ability to parallel converters accommodated the output powers required (6V @ 60W and 12V @ 600W). Output rail power sequencing was easily achieved though configuration of the PRMs. To analyze this power chain go to the **Vicor Whiteboard** online tool.





PRM™ regulator

Non-isolated regulated

Input: 48V (36 – 75V)

Output: 48V (5 – 55V)

Power: Up to 600W

Peak efficiency: 98%

As small as
22.0 x 16.5 x 6.73mm

vicorpower.com/prm



VTM™ current multiplier

Isolated fixed-ratio

Input: 0 – 60V

Output: 0 – 55V

Current: Up to 130A

Peak efficiency: 97%

As small as
22.83 x 8.52 x 4.9mm

vicorpower.com/vtm

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