Peak Performance

Racing to the top with standard car parts: the MiEV Evolution II
Electric vehicles are no “snail-paced” eco-mobiles, as Mitsubishi proved at the tough Pikes Peak mountain race in the USA. Based on standard parts from the i-MiEV, the MiEV Evolution II is a bundle of electric energy that excels on the race track. Its electronics command center is a MicroAutoBox II from dSPACE.
production vehicle parts installed, combined with specially developed high-powered electric motors and batteries. Its body is made of carbon fiber and has been specially adapted to racing requirements – it is extremely light and has excellent aerodynamics.

**Drive and Performance**

Four electric motors drive the MiEV Evolution II – two at the front and two at the back, with a total power of 400 kW (544 HP). Based on the experience gained in last year's race, this year the developers integrated the Super All-Wheel Control (S-AWC) vehicle dynamics system with curve and stability control. This regulates the driving and braking forces on each wheel separately to transmit the forces to the track safely and ensure maximum dynamics. High driving power with reduced air resistance was ensured by slicks – approved for use for the first time in 2013 – and by aerodynamic adjustments to the body.

**Central Control**

To implement the new control algorithms in the vehicle quickly, Mitsubishi used dSPACE’s prototyping system MicroAutoBox II, which acts as the central control unit.

"The MicroAutoBox II is a compact and highly reliable unit in a challenging on-vehicle environment. We were able to use it worry-free for the Pikes Peak vehicle that had to run up from an altitude of 2800 m to 4300 m within about 10 minutes."

Tetsuya Furuichi, Assistant Manager, EV System Advanced Research, EV Component Research Department, Development Engineering Office, MITSUBISHI MOTORS CORPORATION
The MicroAutoBox II is mounted in the vehicle as an ECU which coordinates and controls the four electric motors and brake systems in the MiEV Evolution II. It estimates motor running and drive battery conditions using information collected from a variety of sensors and ECUs, thus optimizing control of the four electric motors and brake systems and enabling safe and stable high-speed running conditions for the MiEV Evolution II. The production ECU from the i-MiEV performs battery management.

**Impressive Results**
The concept of the MiEV Evolution II is definitely a winner. The two cars took the 2nd and 3rd places in the Electric class at the 2013 Pikes Peak – an achievement that speaks for itself. This powerful race car has potential for further development and provides valuable knowledge that benefits the development of electric road vehicles. A win-win situation for electromobility.

"By using the dSPACE prototyping system, we were able to develop the Vehicle Dynamics Integrated Control System for MiEV Evolution II in a short period of time."

**Figure 5: Schematic View of the control system based on the MicroAutoBox II.**