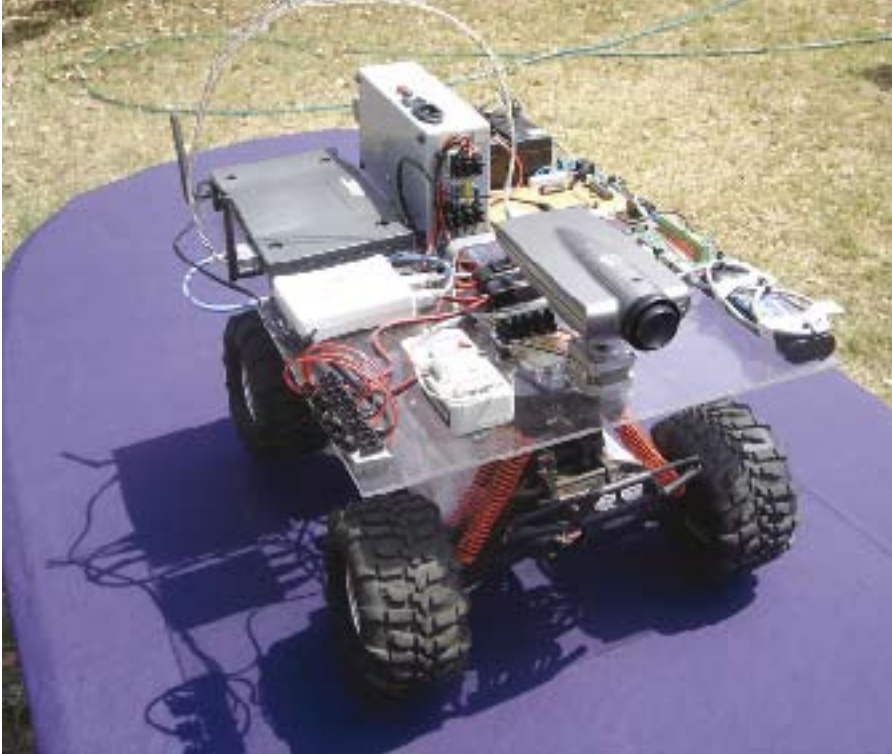


SHIFTING THE FRONTIERS

by Peter Kluge



→ Peter Kluge developed this mechatronic system for his final-year project in Industrial and Systems Engineering

Does a car, controlled via a computer that is connected to the wireless network, sound far-fetched? Think again.

With the tremendous pace of development in wireless communication, it is now possible to control a mechatronic system from almost any place on earth with cellphone or Internet connections. A mechatronic system is any mechanical-electrical system that uses a microprocessor that interprets and controls the motion of the system.

A radio-controlled system is distance-limited and direct sight is normally possible, whereas control over the Internet is not limited by distance, and visual feedback is indirect. Most of the building blocks of an Internet-controllable system are readily available, but are normally developed with other applications in mind. The challenge is to match all the different components and integrate them into a system with central processing that can communicate across all platforms.

A mechatronic system, in this case a prototype distance-controlled car, was developed to test the possibilities of controlling remote devices by using emerging broadband wireless networks. The user can control the vehicle from a computer that is connected to the wireless network. By using a live video feed, sent from the vehicle, the user has visual feedback.

Characteristics of the final prototype vehicle include the vehicle being fitted with a direct current electric motor for propulsion. Left, right, forward and accelerated motions are controlled from a host computer with dedicated buttons on the computer keyboard. The fast speed would normally only be selected for straight-line movement. An emergency slip clutch protects the drive motor when the motor is running. The braking system of the vehicle is also activated with a button on the keyboard of the host computer. For visual feedback, a video camera is mounted onto the vehicle. The video image, as fed through the video camera, is projected onto the screen of the computer. The video camera can turn a full 360° by means of a stepper motor. An arrow on the computer screen indicates the

direction of the camera in relation to the front of the vehicle.

The computer and the vehicle are both equipped with a device connecting them to one of the wireless services. The network service providers for the vehicle and computer can differ. On-board batteries, to allow unrestricted movement of the vehicle, supply power to all electrical and electronic components. A microcontroller on the vehicle takes care of all the decision-making and control functions. In contrast to a cellphone-controlled vehicle, where single sound signals are processed in series, the wireless network allows digital data as input and output to the microcontroller. It is possible to control numerous functions simultaneously and it is, for example, possible to brake while the vehicle is turning, which is impossible with multi-channel devices where the channels operate in series. ☺