



Smartphones as Helpers During Disasters

TU Darmstadt develops software for an autonomous smartphone network

Darmstadt, 07 September, 2011. Scientists at the Technische Universität Darmstadt have developed software, with which smartphones can automatically and autonomously organize an energy-efficient, ad-hoc network. Rapid organization of such a communications network can be vital in the event of disasters where normal communications infrastructures have been destroyed, since smartphones could then exchange, e.g., environmental-sensor data.

Time and information represent two significant, first-aid factors whenever disasters occur. In order to act appropriately, helpers must be able to obtain an overview of the situation as soon as possible. Scientists at the Technische Universität Darmstadt are banking on the aid of smartphones in such cases. Prof. Ralf Steinmetz, of the university's Multimedia Communications Dept., noted that, "The latest generation of smartphones come equipped with a wide variety of sensors, such as GPS-sensors, motion sensors, and digital compasses." Such sensors allow them to scan the local area, making them ideally suited to collecting environmental-sensor data in cases where conventional communications infrastructures have failed. Steinmetz added that, "These days, nearly everyone carries such a data source around with them."

Under the auspices of the "Future Internet" research cluster, TU Darmstadt scientists have thus developed a system of autonomously acting smartphones, termed an "overlay-hybrid network" (OHN), for use in the event of disasters. As soon as smartphones receive a special SOS-signal, they autonomously establish contact with one another and organize an ad-hoc network. Within that network, the individual smartphones involved act and collaborate as sensor nodes and autonomously decide which of them is to collect specific items of data and transmit it to certain other smartphones. As Dr.-Ing. Parag Mogre, who leads the investigations in that area, put it, "Every smartphone takes on those tasks that it is most-capable of handling. The result is an optimal set of data for rescue workers. We utilize the collaborations among the smartphones to both prevent rescue workers from being drowned in a flood of data and preclude potential traffic jams on the network, which is the worst thing that could happen when every second counts."

Another equally important factor is smartphone energy consumptions, since their batteries are capable of powering them for limited times only.

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The Darmstadt group has thus chosen a hybrid architecture composed of Bluetooth and a W-LAN. Mogre noted that, “Bluetooth and a W-LAN complement one another in a virtually optimal manner,” since although employment of a W-LAN allows long-range communications and rapid data transfers, that particular technology also consumes large quantities of energy, which means that smartphones’ batteries will be very quickly discharged. Bluetooth, on the other hand, consumes energy at low rates, but has a rather limited range and is confined to fairly low data-transfer rates. Once a smartphone’s battery nears the fully discharged state, it therefore transmits the data that has been accumulated to a nearby network member whose battery has more life left in it via Bluetooth. The latter can then transmit that data onward via the W-LAN. That approach provides the broadest bandwidths and best ranges attainable, combined with the lowest-possible energy consumptions.

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