Impolite Conversation

Contentious subjects, civilised discussion

Impolite Conversation is a place where we can talk about the things we were told not to discuss in polite company - politics, sex, spirituality & religion and money - as well as science, culture, personal development and more. Our content is not all risqué or even rude: When we use the word "Impolite", we're talking about an attitude - one of not blindly following conventions or authority, especailly when they divide (or even oppress) us. Are you Impolite? Find out more about us here and join or community here

Introducing Impolite Science News

The latest from the world of science including:
Are robot teams the future of planetary exploration?

Science News December 2014

Safety in Numbers:

How Robot Teams Could be the Future of Planetary Exploration

Missions to explore planets and other bodies in our solar system have met with varying success over the years – from the Beagle 2 lander going AWOL on deployment to Mars 11 years ago, to Rosetta's amazing rendezvous with a comet last month. What ideas are scientists coming up with to ensure future successes?

Last month, Dr Wolfgang Fink and his team from the University of Arizona (UA) showcased what they see as the next generation of planetary rovers at a shopping mall in the US. Fink, an associate professor in the college's Department of Electrical and Computer Engineering, brought four robotic vehicles from his Visual and Autonomous Exploration Systems Research lab. The demonstrators commanded the rovers using a wireless connection from iPods. Equipped with a camera, LIDAR (a sensor that uses a scanning laser to inform the rover about what's in front of it), a computer, batteries and motors, the rovers navigated around onlookers, avoided obstacles and climbed curbs.

While the prototypes still depend on us, the goal is to make them completely independent of human control. Fink envisions rovers that could be as effective as a human field geologist.

"My rovers are prototypes that allow for the development of software algorithms for autonomous operations, ie operations with no humans in the loop," says Fink. These algorithms would give the rovers the ability to identify interesting scientific targets — for example, unusual rock formations on Mars — all by themselves, without human programming. Therefore, they would possess their own sense of curiosity. "While these particular rovers are not the ones going to Mars, the software algorithms developed might, and the operational lessons learned may inform future missions," he continues.

"The concept of autonomous rovers has been around for a while. However, my research laboratory defines 'autonomous' in the sense of 'synthetic reasoning', meaning the rover digests sensor data, determines areas, objects or targets of interest, develops plans to explore these up-close, and navigates to them - all by itself."

Although self-preservation is an important function in rovers exploring Mars now, Fink believes we need to move away from the idea of relying on single rovers for each mission. "They pose a potential single point of failure," he says "If the rover gets stuck or becomes dysfunctional, the mission is irreversibly over."

Fink believes that smaller, smarter teams of rovers could overcome this problem. He and his team came up with the idea of 'Tier-Scalable Reconnaissance', which is basically deploying equipment via hierarchical levels: for example, the orbiter above the planet or moon is level 1, communicating with airborne blimps at level 2 near the surface, which in turn communicate with the level 3 ground-based rovers.

The team has also designed a 'lake lander', which could explore liquid environments such as the methane lakes on Saturn's moon Titan.

“The rovers and the robotic lake landers are components of this overarching multi-agent autonomous system architecture,” Fink says. “As such, we can afford to have smaller, more simplified, yet more robust and redundant rovers to be part of such a novel exploration paradigm: If a few rovers get lost while deployed in scientifically relevant but challenging areas, there are still others that will make it and thus have a chance to contribute significant findings. This is a significant departure from currently deployed missions that focus on single, non-redundant, very complex and large rover systems.”

Watch Fink’s rovers in action:

Robotic Rovers (link is external) http://www.youtube.com/watch?v=RqYp6s1pUhk

Robotic Lake Lander (link is external) http://www.youtube.com/watch?v=zF7o7yuSdVM

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Sarah is Impolite Conversation's science editor.

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