PROTOTYPE SOFTWARE FOR FUTURE SPACEFLIGHT TESTED AT MARS DESERT RESEARCH STATION

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NASA scientists in MDRS Crew 49 (April 23-May 7, 2006) field tested and significantly extended a prototype monitoring and advising system that integrates power system telemetry with a voice commanding interface. A distributed, wireless network of functionally specialized agents interacted with the crew to provide alerts (e.g., impending shut-down of inverter due to low battery voltage), access and interpret historical data, and display troubleshooting procedures. In practical application during two weeks, the system generated speech over loudspeakers and headsets to alert the crew about the need to investigate power system problems.

The prototype system adapts the Brahms/Mobile Agents toolkit to receive data from the OneMeter (Brand Electronics) electric metering system deployed by Crew 47. A computer on the upper deck was connected to loudspeakers, four others were paired with wireless (Bluetooth) headsets that enabled crew members to interact with their personal agents from anywhere in the hab. Voice commands and inquiries included:

- What is the {battery | generator} {volts | amps | volts and amps}?
- What is the status of the {generator | inverter | battery | solar panel}?
- What is the hab{itat} {power usage | volts | voltage | amps | volts and amps}?
- What was the average hab{itat} {amps | volts | voltage} since <#> {AM | PM}?
- When did the {generator | batteries} change status?
- Tell {me | <person> | everyone} when{ever} the generator goes offline.
- Tell {me | <person> | everyone} when the hab{itat} {amps | volts | voltage} {exceeds | drops below} <#>.
- {Send | Take | Record} {a} voice note {{for | to} <person>}{at <time>}

This research demonstrates the principles of design in the context of use, investigating requirements through experimental use of prototype systems in an analog setting, and use of MDRS as a research facility for designing and implementing new systems.

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