Early Warning Sensor Network for Brown-out Conditions: Phase II - Field Testing and Assessment

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Abstract:
The impact of windblown dust and sand on traffic safety has been on the rise in the tri-state area (Nevada, Arizona, and New Mexico), owing in part to prolonged droughts that have dried soils and denuded vegetation and biological crusts. In recent years, large, multi-car pile-ups have occurred in all three states within the SOLARIS domain as well as in other states such as Oklahoma, Texas, and Colorado.

It is established science that the movement of sand near the ground is responsible for the suspension of visibility impairing dust aloft. As part of an earlier Phase I SOLARIS study, significant improvements were made to a sand sensor prototype that was originally developed by the Investigators as a geomorphic research tool. Also as part of Phase I, we had: 1. Tested and improved upon the platform's ability to use only solar power and Li-ion batteries for prolonged, unattended use, 2. Added temperature and relative humidity sensing capability, 3. Improved the User interface, and 4. Conducted very preliminary testing of the potential to network these platforms.

For the present Phase II portion of the research, focus will shift to pilot deployments at several key locations and iterative design improvements. Key locations chosen include a section of the I-10 corridor that is prone to brownout conditions and other arid regions where some wind erosion can reliably be expected to occur. The design improvements will include addition of mesh-networking capabilities and addition of GPS location information so that platforms can be easily deployed without the need to provide metadata a priori.