**Suggested Topic Area:** “New Generation Sensors and Applications – Airborne Sensing, UAV”

**Paper Title:** Evaluating, mapping, and managing unpaved road networks using high-resolution remote sensing data

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**Preference:** Oral presentation.

**ABSTRACT:**

A significant portion of road networks in many countries are unpaved, and they are critically important to rural communities for providing access, communication, and transporting of people and goods. Being able to manage them effectively requires the ability to inspect the unpaved roads frequently and rapidly to determine their changing condition so the appropriate preventive maintenance or rehabilitation can be implemented. The major challenge with managing unpaved roads is collecting low-cost condition data that can be effectively used to make decisions on maintaining the network. The advent of cheap, reliable remote sensing platforms such as unmanned aerial vehicles (UAVs), along with the development of commercial and open source off-the-shelf image analysis algorithms, provides a revolutionary opportunity to overcome data volume and efficiency issues.

This paper outlines the development of a completed prototype system to detect unpaved road distresses that is compatible with a Decision Support System (DSS), taking advantage of technological advancements. The system uses arial imagery that can be collected from a low-cost remote controlled unmanned helicopter or multi-rotor UAV to create a three dimensional model of road segments. Condition information on road distresses such as potholes, ruts, washboarding, loss of crown and float aggregate berms are then detected and characterized to determine their extent and severity. Unpaved road condition data are imported into a GIS-based DSS (Roadsoft) for use by road managers to prioritize preventive maintenance and rehabilitation efforts.