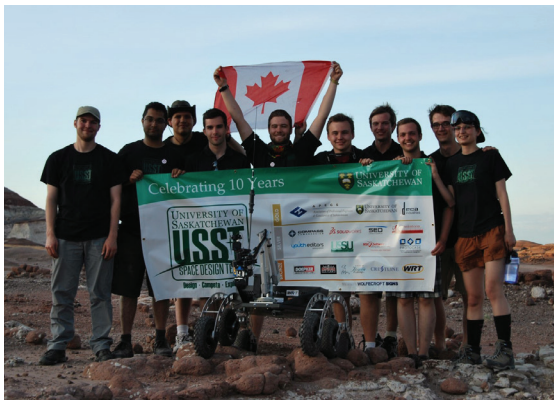
AvaLAN WIRELESS

127 Jetplex Circle, Suite A
Madison, AL 35758
Direct Number 1-650-384-0000
US Toll Free 1-866-533-6216
www.avalanwireless.com

Taking on Mars with AvaLAN: The University of Saskatchewan Space Design Team's Mars Rover Prototype



Starting in 2005 with the Space Elevator Challenge's X-Prize Cup, the University of Saskatchewan Space Design Team (USST) has developed a reputation for pushing the boundaries of space technology. In 2013 the team decided to shift into the realm of robotics and is currently developing their third iteration of a rover prototype for the European Rover Challenge (ERC) and University Rover Challenge (URC) to assist in the habitation of Mars. The team has been very successful in its endeavour and is proud to have placed 1st at ERC for the design, performance, and operation of the robot.

To participate in these challenges, the team must build a rover that is able to navigate the harsh terrain quickly and precisely, manipulate a variety of objects with a robotic arm, operate a control panel, and carry out scientific surveying and sampling tasks. In order to achieve all this, the team had to design as solution that was modular, easy to service, quick to deploy, and above all else - dependable.

Arguably the most important single component of a remotely operated platform is the design of the radio link itself. After a thorough search through dozens of manufacturers trying to find a lightweight, power efficient and integrated system, the team settled on AvaLAN's AW900 series Wireless Ethernet Radios.

One may not expect radio congestion to be an issue in the middle of the Utah desert, but with dozens of teams vying for testing space, the typical 2.4 GHz and 5GHz bands with makeshift Wi-Fi radios completely jammed everywhere in the competition area. Numerous teams had trouble getting a reliable communication link, but the AW900 never failed to deliver a strong and consistent signal and data rate. While other teams used precious time struggling to get their rovers running, our team simply set up the communications tower, powered up, and drove off. Connection was automatic, and never once did we have to check the radios. On top of it all, the radios provided a rudimentary site surveying tool which allowed for a quick sanity check for other interference nearby while setting up.

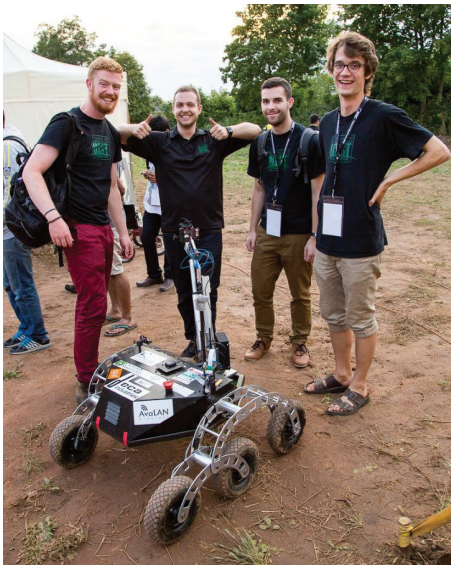
"The USST's experience with AvaLAN has been phenomenal. The company produces top quality products and has excellent support. If you're looking to put in a data link for your golf course or need a zero-downtime radio fit for a hacked together Mars rover designed in the middle-of-nowhere Canada, AvaLAN should definitely be your first choice."

Austin Shirley, *VP Engineering: USST*

UNIVERSITY OF SASKATCHEWAN USST SPACE DESIGN TEAM

The ERC and URC in 2015 was beginning to get more competitive, and the need for greater flexibility for high-quality real-time video was apparent. At just below 1Mbit, the previous radios could not push enough data to get the HD footage we needed. With such good results already, the team turned to AvaLAN again for an upgrade.

Given the importance of staying out of the consumer frequencies, AvaLAN's 5.8 GHz (AW58100) systems seemed like the best choice for what we were trying to achieve with HD video, controls, and telemetry all at once. This frequency band was especially important for the USST when competing in Poland and the USA, as it is available for legal use in most parts of the world without needing any additional certification beyond an Amateur license. As expected, the radio worked flawlessly and we encountered absolutely no problems - even in Europe, where the population density makes getting a clear radio signal a greater challenge. Even so, AvaLAN worked closely with the USST in the summer months tweaking the settings to make sure that the rover was set up optimally and we would be able to adapt to any situation. Having the peace of mind resulting from the immense flexibility of both the hardware and software AvaLAN has developed was much appreciated half a world away from home.



From a design perspective, interfacing with AvaLAN radios is simple. Initial setup is minimal, and once configured the radios are completely transparent to devices on the network. The rover operates on a Linux-based embedded computer, so connection and communication over the radio was running as soon as the Ethernet interface was running, and no special work was needed to transfer from the test bench into the field. We have even been able to confidently deploy updates mid-task to fix a bug encountered while driving, and the standard web interface made reconfiguring the radios and integrating them into our control software very straightforward. For power usage, both the AW900 and the 5.8 GHz radios were impressive and did not contribute significantly to the overall power consumption of the system. With the onboard integrated power system onboard capable of accepting a wide input, Power over Ethernet support, and all the other standard features, running the radios, whether on the battery or the bench was as easy as plugging them in. AvaLAN also made it easy for the mechanical designers on the team - the boards themselves are compact and sturdy, have excellent mounting options, and are very robust even when removed from their enclosures and subjected to a hot and dusty desert environment, or the cool and humid European countryside. The stock panel antenna enclosure, whether mounted using the included bracket to an existing pole or attached directly to a custom quick deploying transmission tower, is extremely sturdy and has shown no signs of wear even after running around the world and being lofted into the sky on a crude tower.

Overall, the USST's experience with AvaLAN has been phenomenal. The company produces top quality products and has excellent support. If you're looking to put in a data link for your golf course or need a zero-downtime radio fit for a hacked together Mars rover designed in the middle-of-nowhere Canada, AvaLAN should definitely be your first choice.

About AvaLAN Wireless

AvaLAN Wireless is an industry-leading developer and manufacturer of long range industrial wireless radios and cryptographic technology. AvaLAN's products are designed to enable affordable secure wireless connections in perimeter or remote locations. Specializing in unlicensed 900 MHz, 2.4 GHz, 4.9GHz and 5.8 GHz radio bands, AvaLAN offers a family of encrypted wireless Ethernet and data communications products. AvaLAN has a market leadership position in providing solutions for surveillance video, access control, industrial automation, remote sensing and remote control markets. AvaLAN's products offer the ideal combination of price, range, data rate, security, interference avoidance, quality-of-service, and a simple plug-and-play setup with minimal user programming required. AvaLAN Wireless Systems, Inc. is headquartered in Huntsville, Alabama, with remote offices in California and Canada. www.avalanwireless.com