Proposal for CSCI 370 Advanced Software Engineering Field Session: Development of a Social, **Web-Enabled Telemetry Modem** for Data Sharing

To the Esteemed Faculty and Students of CSCI 370 - Advanced Software Engineering at the Colorado School of Mines,

Radio Alamosa Limited (Alamosa) is excited to propose a crucial project for the CSCI 370 Field Session: the development of a **web-enabled audio telemetry system** that will serve as the core communication method for our innovative consumer radio device. This system will enable robust data and telemetry (a.k.a. GPS location) sharing, essential for location intelligence during outdoor and overland adventures. This is an unparalleled opportunity to apply advanced software engineering skills to a tangible, high-impact product.

Project Overview

Alamosa, a Colorado-based company, is bringing to market a consumer radio designed to share location intelligence and telemetry among users during outdoor pursuits. This device connects to a smartphone or laptop, requiring the capability to both send and receive digital data over a radio channel.

The central task of this project is to develop a sophisticated web-enabled audio system needing *research* into two primary functions:

1. **Encoding**: Taking small data messages, encoding them, and playing them as audio into radios.
2. **Decoding**: Receiving audio messages and decoding them back into their original data messages.

Sounds simple? This requires more research than you think.

This entire process will be managed through **web-based audio interfaces and processing**, drawing on established standards akin to older computer modems. **The employment of AI-assisted coding is strongly encouraged** to optimize efficiency and performance . This functionality is critical for our location-sharing telemetry consumer radio to reliably send and receive GPS locations and short text messages while users are off-grid and on adventure.

Project Requirements & Logistics

- **Team Size**: We seek a dedicated team of **3 to 5 students**..
- **Desired Skill Set**: While students are expected to learn new technologies, a background or interest in **Progressive Web** design, audio processing, JavaScript, general software development, and network communication basics would be beneficial.
- **Work Locale**: The primary mode of operation is **remote work**. However, occasional on-site meetings or testing sessions may occur. Alamosa is based in the Beck Center on the Mines Campus.
- **Resources Provided**: Alamosa will provide consumer-grade radios, relevant devices, and access to necessary cloud systems for real-world testing.
- **Legal Considerations**: Students may be asked to sign a **Non-Disclosure Agreement (NDA)**. Alamosa also requests that students assign **intellectual property (IP) rights** to our organization for the work performed and all artifacts produced; otherwise, students will retain ownership of their work.

Student Benefits & Client Engagement

- **Student Benefits**: This project offers significant opportunities for students to apply coursework to an actual, real-world, *on-Earth* problem, work with foundational technology, and develop a high-impact solution. Students will gain full responsibility for delivering a working product and enhance their written communication, presentation, and leadership skills.
- **Cross-Industry Skills**: Telemetry and data modulation are crucial in diverse industries for remote monitoring, data collection, and control. In **aerospace**, they enable real-time tracking of spacecraft and aircraft, transmitting vital flight data. **Healthcare** utilizes them for remote patient monitoring, sending vital signs and other health data to medical professionals. The **oil and gas** sector relies on them for pipeline integrity monitoring, wellhead control, and equipment performance

tracking in remote locations. In **manufacturing and industrial automation**, telemetry and modulation facilitate monitoring machinery, optimizing production processes, and ensuring quality control. Finally, in **environmental monitoring** and **agriculture**, they are used to collect data on weather patterns, water levels, soil conditions, and crop health to support informed decision-making and efficient resource management.

- **Client Engagement**: Alamosa is committed to a fully collaborative engagement, with regular meetings (typically bi-weekly in Fall sessions). We will provide mentorship, assistance in learning foundational computational technologies, and necessary tools.
- **AI's OK**. AI won't be able to solve the whole thing for you; trust us, we've tried. But we encourage the employment and usage of AI and coding tools. We guarantee you will still be immersed in research and coding problem solving.
- **Lunches**. Alamosa, where applicable and if possible, will provide lunches for many of the customer meetings.
- **Outdoors**. Testing of this software is best tested outdoors, and provides for ample time away from desks in the QA and testing of the code. Basically, you are not always stuck at your desk.

Project Scope & Timeline

The project is designed to be completed within the typical CSCI 370 commitment. We look forward to the possibility of collaborating with the Colorado School of Mines CSCI 370 students.

Sincerely,

Scott Jensen
Founder, Radio **Alamosa** Limited