

1. Introduction

1.1. PROBLEM STATEMENT

The H.A.B.E.T. project group at Iowa State launches weather balloons and is attempting to recover mid flight video communication with the payload on the balloon. However, at the distances that they want to operate the balloon, current transmission technology is unreliable. The result of this is many of the balloon launches are not transmitting as much useful data as they could. The goal is to use software-defined radio to change the modulation scheme of the video communication. Many clubs at other universities have had the lossy signal problem and if a solution can be found by using software-defined radio then multiple clubs will be able to benefit and run tests.

In our world filled with technology, projects like H.A.B.E.T.'s weather balloons have big potential for science, studying weather, and learning. But there's a problem – the videos sent during balloon flights have limits, and it's stopping us from fully reaching our goals. Fixing this isn't just about Iowa State; lots of schools worldwide are dealing with the same trouble.

Our plan is to use software-defined radio to change how videos are sent during balloon launches. This way, we want to make sure the important data gets sent reliably over long distances. If this works, it's not just good for Iowa State – it's a breakthrough that can help many schools and research groups everywhere. Our method using software-defined radio might become a standard fix for the video problem, letting many universities do better tests with their balloons. Working together like this could really push forward science, weather studies, and education all around the world.

1.2. INTENDED USERS

Our main users will be the H.A.B.E.T. group at Iowa State, a bunch of students and researchers who love studying the weather using balloons. They really need a way to make sure the videos from their balloons work well and get all the important data from high up in the sky. Our product helps them by making sure their videos are clearer and more reliable, making their balloon projects better.

But it's not just for them – our product can be useful for other groups who also want to watch things from high places, like weather researchers, teachers, and people who just love studying the weather. They all want better videos from up high, and our product helps them get that. Also, if someone wants to change filters on their transmitter without a lot of fuss, our product can do that too. It's helpful for anyone doing long-range radio communication – like scientists, people checking the environment, or those trying to talk in faraway places. The big

idea is to solve the problem of not getting good video during balloon launches, so everyone using our product can get more value from their projects, whether it's in weather research, education, or communication.