

Speed & Distance Sensor for Skiers & Snowboarders

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Abstract

Our design is for an inexpensive speed and distance sensor that can be used by snow sports enthusiasts of all skill levels. By using low cost materials, maintaining minimal power consumption of on-board electrical devices and harnessing the size benefits of high frequency Doppler detection, the proposed design will allow for the production of a useful and robust product for all skiers and snowboarders.

Introduction

When training for skiing and snowboarding, some sort of performance metric is required in order to see improvement in technique and expertise. Speed is critical in all aspects of these sports. To safely hit a jump or be the fastest competitor, knowing one's speed is extremely vital to success. The main goal of this project is to make a device that is relatively cheap compared to similar devices on the market.

Budget

Design Requirements

Speed and Distance Recording:

- Average speed
- Max speed
- Distance traveled

Safe and Robust Design:

- Lightweight (less than 2 lbs.)
- Disabled display during recording
- Operates at temperatures as low as 10° F

Long Battery Life:

- Auto-off after 10 minutes of operation
- At least 2 hours of battery life

Easy Data Retrieval:

- Data storage requirement for at least 10 minutes of run data
- Data report on LCD or data export to external device

Project Results

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Doppler Radar

- Signal is sent out at a fixed frequency
- Received signal has a shifted frequency from the reflection
- Calculate speed using frequency deviation

