VERMONT
AGENCY OF TRANSPORTATION

2019 Research Showcase

& STIC Annual Meeting

PROJECT TITLE
Radio Frequency Identification (RFID) Technology for Transportation Signage Management

STUDY TIMELINE
September 2018 – February 2020

INVESTIGATORS
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MORE INFORMATION
VTrans Research will add link to the final report and other materials on VTrans website.

This fact sheet was prepared for the 2019 VTrans Research Showcase & STIC Annual Meeting held at the Dill Building in Berlin, VT, on September 11, 2019 from 8:30 am– 1:00 pm.

Fact sheets can be found for additional projects featured at the 2019 Symposium at
http://vtrans.vermont.gov/planning/research/2019showcase

Additional information about the VTrans STIC Program can be found at
http://vtrans.vermont.gov/boards-councils/stic

FACT SHEET

Radio Frequency Identification (RFID) Technology for Transportation Signage Management

Introduction

Traffic signage management is an important part of transportation asset management from an inventory management perspective. It involves several key steps, such as locating signs and guardrail end terminals, checking their physical integrity and replacing those compromised or damaged, and recording their attribute data, as well as taking any other necessary actions. In order to implement these steps, a unique ID is assigned to each sign to facilitate interrogation, recording, and management operations of the signage data effectively. Traditional barcoding technology is ineffective because of its labor-intensive operation, lack of remote sensing ability, and easy susceptibility to performance degrading obstructions. In this study, we explore radio frequency identification (RFID) as a novel technique to overcome those limitations and achieve higher operation efficiency and efficacy.

Methodology

This project fulfills the following research objectives:
1) Investigating an in-vehicle RFID reader that performs remote RFID tag data interrogation from a moving vehicle.
2) Investigate a handheld RFID reader that provides the additional flexibility of close-range traffic signage interrogation.
3) Investigating and evaluating RFID tags that can withstand harsh environmental conditions and can operate reliably on materials of different dielectric properties.
4) Examining the effectiveness of remotely scanning RFID tags mounted on traffic signs and on guardrail terminals.
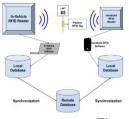5) Develop a comprehensive database to support the RFID-based traffic signage management.

Figure 1. System configuration and test setup

Conclusions and Future Steps

Our system provides integrated, comprehensive, and efficient solutions to practical problems arising with a large-scale deployment of traffic signs in various environmental and operational conditions. Extensive laboratory and field tests validate the system performance and functionality. We will work with VTrans to explore its deployment and practical applications.

Potential Impacts and VTrans Benefits

Our system can raise VTrans transportation asset (particularly traffic signage) management capabilities to the next level, reducing costs while enhancing the efficiency and efficacy of the transportation services. RFID technique can be extended to other transportation applications, e.g., road construction quality management, smart road/traffic management, etc.