Florida Department of Transportation Research

Optimized Mobile Retroreflectivity Unit Data Processing Algorithms

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Current Situation

Lane marking systems are critical for drivers to safely operate on Florida roadways, especially at night. Lane striping in particular is vulnerable to the constant action of tires, debris, and dirt, which can reduce its visibility and create a safety hazard. To address this, the Florida Department of Transportation (FDOT) implemented a system using Mobile Retroreflectivity Units (MRUs) to measure the retroreflectivity of lane markings. MRUs are much more efficient and comprehensive than traditional spot checks using handheld retroreflectivity meters. However, it is critical that MRUs return accurate and repeatable results, which depends on proper methods of data collection and appropriate software.

Reflective lane marking is especially important for safe night driving.

Research Objectives

University of North Florida researchers established precise line stripe reflectivity evaluation methods using an MRU. They developed the Florida Retroreflectivity Software (FRS), software that both controls the MRU and interprets MRU data.

Project Activities

Researchers examined both hardware and software components of the MRU to determine where improvements could be made. The MRU's laser makes one-meter sweeps, which detect retroreflective striping and measure its reflectivity. The MRU also detects other reflective markings such as raised pavement markers, stop bars, etc. Using characteristics of the reflectance signals acquired by the MRU, the researchers developed a part of the FRS to distinguish striping signals from other signals. Improvements were made to the MRU power supply when it was found that the power supply was contributing to data inconsistency. Similarly, other hardware components of the MRU which were found to influence the accuracy and repeatability of measurements were corrected.

With the ability to distinguish between striping and other roadway markings, the researchers examined striping data and methods of interpreting them. The reflectance signal generally mimics the profile of the striping, but the researchers found that in addition to variations in the reflectance signal due to the striping itself, there was also an effect based on how well the striping was centered in the one-meter laser path. Also, lane striping tended to be more worn on its median side, giving the reflectance signal a lopsided appearance. The FRS corrected for these effects and improved the accuracy and repeatability of basic MRU data collection. The FRS interface was also designed to facilitate operator learning and use, making control of MRU settings and data interpretation more straightforward.

Project Benefits

Improved methods for maintaining the visibility of pavement markings can increase the safety of the traveling public.

For more information, please see www.fdot.gov/research/.