



## Project Number

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# University of Florida Testbed Initiative – Transit Components (Smart Bus Bike Rack System)

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### Current Situation

Alachua County is second in Florida only to Miami in the percentage of people who use public transit, and the county's largest city, Gainesville, is a top 20 U.S. city for percentage of bicyclists. Gainesville transit riders often combine these modes by placing a bicycle on the public transit bike racks and then use the bicycle at their destination. Currently, most bus bike racks used in Gainesville have spaces for two bicycles, and bicyclists may find that an approaching bus already has a filled rack. As a college town, bus bike rack usage changes cyclically by day, week, or season for both college and community bicycle users. Three-slot racks are available, but so far, there are no statistics to indicate which bus routes would most benefit from the more expensive three-slot bicycle racks.

### Research Objectives

University of Florida researchers developed a remote real-time sensing system to detect bicycles on bus bike racks.

### Project Activities

The researchers installed pressure-sensitive sensors on bike racks of selected buses. A communications system was developed that allowed occupancy information from the sensors to be collected using a mobile phone network. The research team also developed a mobile phone app that can show the availability of bike slots on buses. Potentially, riders could use the app to discover whether there are available slots for a desired route and plan accordingly.

Bike-sensing systems were installed on 18 buses, 12 with three-slot bike racks, and six with two-slot racks. Data were collected for one year and analyzed on a daily, weekly, monthly, and semester basis. The sensing system operated well throughout the study period.

Analysis of usage data showed that rack usage corresponded with work and class schedules at the University of Florida (UF). Usage was high and consistent throughout the work day. On a weekly basis, rack usage was significantly lower on weekends and almost negligible on Sundays. Weekday use was highest on Mondays and Tuesdays with modest reductions for the remaining workdays. One interesting variation to this pattern was increased Saturday usage during the fall semester, likely corresponding with the fall football schedule at UF.

Monthly bike rack usage was highest by far in April and May, and about 25% lower and steady during June–January. Usage was lower in February and lower still in March, corresponding with spring breaks. Seasonally, bike rack usage was highest in the summer semester and around 25% lower in each of the fall and spring semesters. Higher usage in the summer may be motivated by users compensating for reduced summer hours for bus service.

Analysis of usage by bus route showed that routes passing through the UF campus and Shands Hospital area had the highest usage. These routes may benefit most from three-slot racks.

### Project Benefits

The system developed in this report can assist riders in planning their trips and can assist transit services in determining when and where increased bike capacity is needed.

*For more information, please see [www.fdot.gov/research/](http://www.fdot.gov/research/).*



*Both slots of this typical two-slot bike rack are filled.*