


Naturalistic Bicycling Behavior Study Update

Pei-Sung Lin, Achilleas Kourtellis and Srinivas Katkoori

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Center for Urban Transportation Research | University of South Florida

Background

- Bicyclists experience disproportionate rates of injuries and fatalities compared to other roadway vehicle types.
- The safety of bicyclists is of particular concern in Florida, where bicycle fatality rates were nearly triple the national average.
- Florida has been ranked #1 on bicycle fatality rate in the nation for years.

Background

- Understanding of naturalistic bicycling behaviors and interactions with vehicles in Florida are essential for effective countermeasure development.
- Use of instrumented bicycles to collect naturalistic bicycling behavior data.



Literature Review

#	Year	Title	Objective	Sensors	Participants
1	2006	Driver Overtaking Bicyclists: Objective Data on the Effects of Riding Position	Identify factors influencing riding position of bicycle based on vehicle passing distance	Distance proximity sensor, camera	1
2	2010	The Effect of Cycle Lanes on the Proximity Between Motor Traffic and Cycle Traffic	To establish influence of bike lane width to vehicle passing distance	Camera	1
3	2010	Naturalistic Cycling Study: Identifying Risk Factors for On-Road Commuter Cyclists	To identify risk factors for collisions/near-collisions involving on-road commuter cyclists and drivers	Cameras	13
4	2012	Observations of Driver Behavior During Overtaking of Bicycles on Rural Roads	To understand the behavior of drivers passing bicycles on rural roads	Cameras, GPS, ultrasonic range sensor	1
5	2012	Understanding Bicycle Dynamics and Cyclist Behavior from Naturalistic Field Data	To establish the methods and equipment in collecting naturalistic cycling data	Cameras, GPS, accelerometer, gyroscope, brake force	20

#	Year	Title	Objective	Sensors	Participants
6	2012	Piloting the Naturalistic Methodology on Bicycles	Investigating the effort to adapt the naturalistic driving methodology to bicycles at SAFER	Cameras, GPS, accelerometer, gyroscope, magnetometer, brake force, speed	17
7	2013	The Use of Quasi-Naturalistic Riding Behavior Methods to Investigate Bicyclists; Behaviors When Motorists Pass	To investigate how vehicle-related factors, road-related factors, and bicyclist-related factors influenced motorists' decisions about initial passing distances and bicyclists' behaviors after the motorists started to pass	GPS, Accelerometer, gyroscope, distance sensors, proximity, steering angle, cameras	34
8	2013	A Naturalistic Study of Commuter Cyclists in the Greater Stockholm Area	To describe and pinpoint accessibility and safety problems, but also to generate an accessible geographical interface that could serve as a traffic planning tool for cycle network improvement	GPS, Camera	22
9	2014	Introducing Naturalistic Cycling Data: What Factors Influence Bicyclists	To establish bicyclists risk on the road	Camera, GPS, inertia units, brake force	16



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Study Methodology

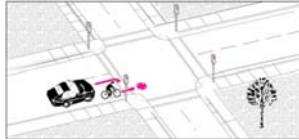
1. Develop Bicycle Data Acquisition System (BDAS) including trip information app
2. Recruit **100 participants**
3. Develop analysis tools including machine vision
4. Collect 3,000 person-hour data
5. Compile analyze behavioral data
6. Research six specific research questions
7. Recommend countermeasures



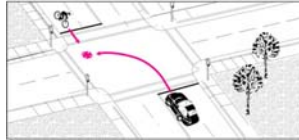
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Six Specific Research Questions

1. What are the interactions between bicyclists and drivers making right turns at intersections (**right-hook**)?



2. What are the interactions between drivers making left turns and oncoming bicyclists (**left-hook**)?



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Six Specific Research Questions

3. What are the behavior, experience, and interactions of bicyclists and drivers at night?



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Six Specific Research Questions

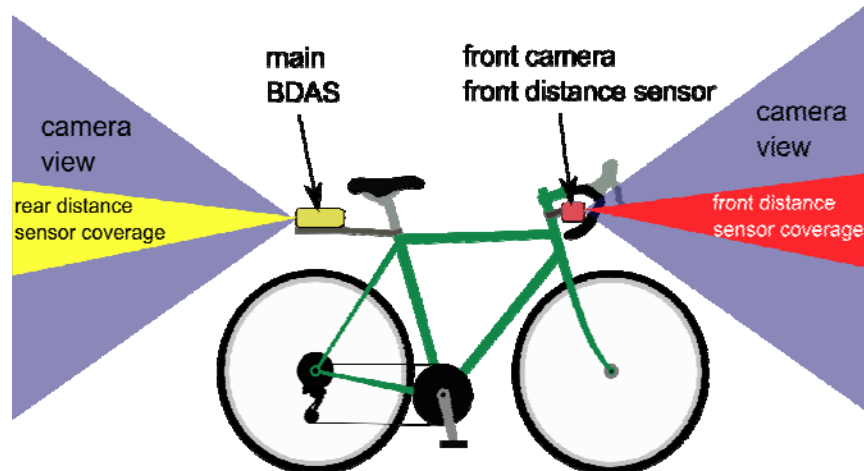
4. What are bicyclist route choice decisions with given origins and destinations?

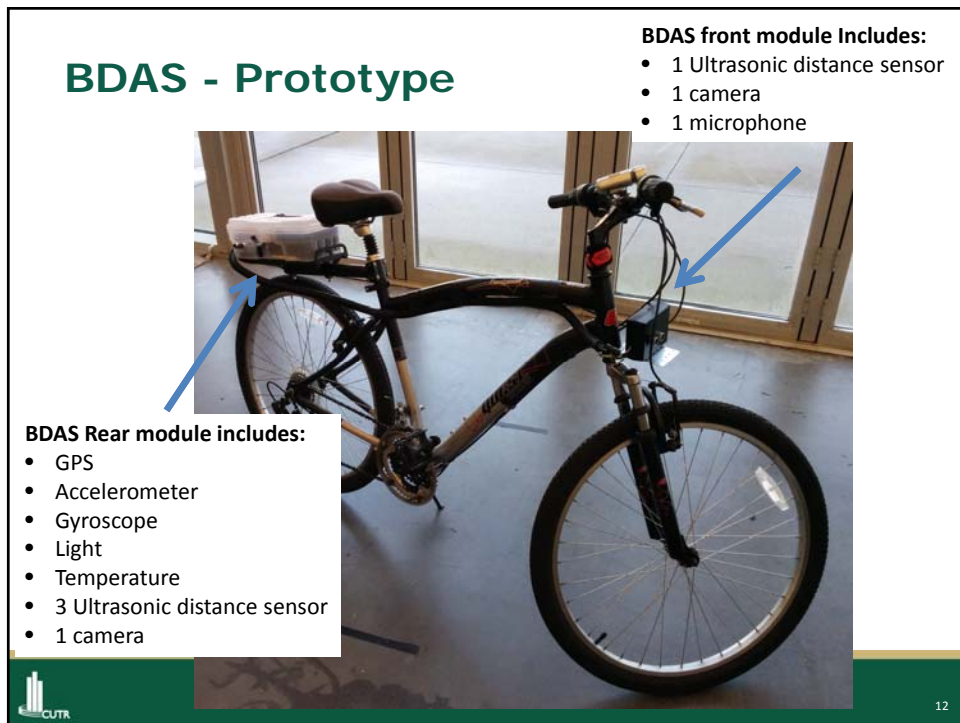
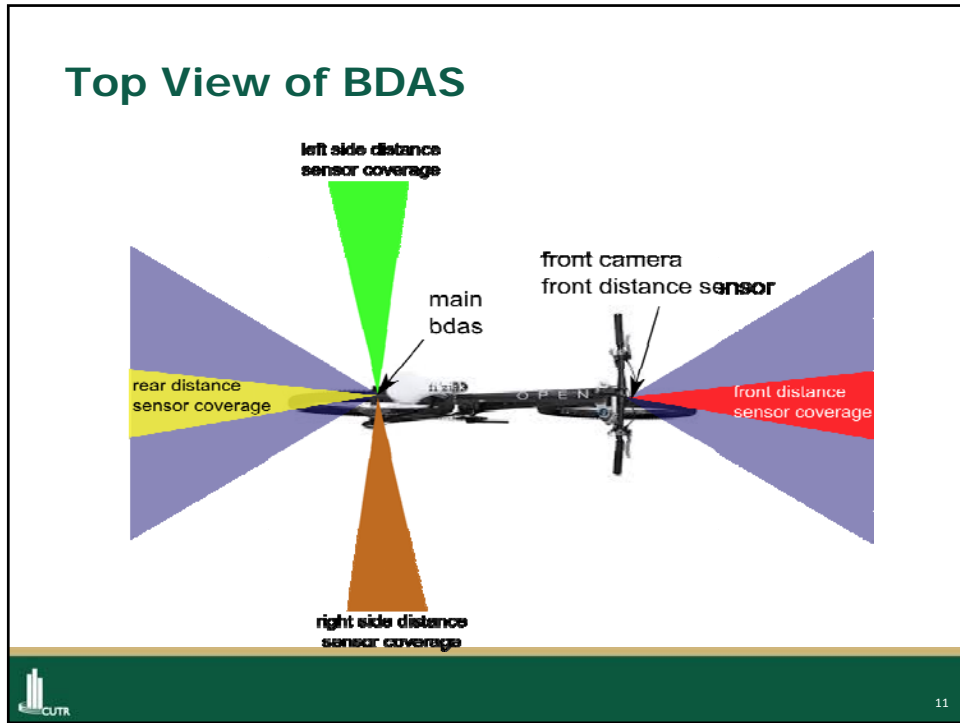


5. What are the difference of bicycling behaviors with and without formal bicycle-riding training such as Cycling Savvy?
6. What are the contributing factors to bicycle crashes or close calls?



Side View of BDAS





Next Steps

- Test and evaluate prototype
- Create 2nd version
- Test and finalize BDAS
- Produce 50 BDAS systems