

1ST Annual Program Progress Report
For
University of California Center on Economic Competitiveness:
Region 9 University Transportation Center



Submitted to
U.S. Department of Transportation
Research and Innovative Technology Administration

Grant Period:
September 30, 2013- September 30, 2017

Reporting Period End Date:
September 30, 2014

Submitted:
November 10, 2014

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Grant: DTRT13-G-UTC39
Duns: 124726725
EIN: 94-6002123

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1. Accomplishments

a. What are the major goals of the program?

The aim of UCCONNECT is to set Research, Education, and Workforce Development objectives that achieve two complementary goals. The two goals are: 1) to reduce congestion, improve highway operations and enhance freight productivity; and 2) to ensure that the next generation of Transportation professionals are prepared to tackle the complex challenges confronting our region's and country's transportation networks.

- i. Research Objective: UCCONNECT support research projects that are aimed at enhancing our region's economic competitiveness by advancing the state of knowledge and the state of professional practice in transportation.
- ii. Education Objective: Consortium features university degree programs at the bachelors, masters, and doctoral level, which address transportation topics.
- iii. Workforce Objective: UCCONNECT support conferences, symposia, and workshops for the purpose of bringing together practitioners and researchers around topics that are advancing the region's top priorities.

b. What was accomplished under these goals?

UCCONNECT Consortium

The Center's accomplishments during the reporting period are: (1) developing a Request for Proposal (RFP) that provides opportunity for the consortium members and other members in region 9 to propose innovative solutions for combating transport congestion and its attendant costs; (2) developing and initiating a competitive review process for the proposals submitted; (3) designating funds to Cal Poly, Pomona for outreach activities; and (4) meeting its aspirations in the realm of education. A more comprehensive description is given below.

UC Berkeley Funding Support for Consortium Members: As headquarters for UCCONNECT, UC Berkeley provided funding to consortium members to facilitate their research agendas in line with the research, education, and workforce objectives as described above in part 1a of this report. UC Berkeley has also provided financial support packages to students- both undergraduates and graduate students.

Request for Proposals: In the spring of 2014, the center presented a Request for Proposals. The RFP featured two calls: one inviting members of the consortium to propose research to advance the surface-transport priorities of California; and a second call to extend opportunities to colleagues throughout Region 9 to insure transport research aligned with regional aspirations.

Review Process: Following a competitive peer-review of 34 proposals from the consortium members, 19 Faculty Research Grants were awarded for FY 2014-2015. UCCONNECT awarded two additional grants to Region 9 scholars from outside the consortium.

Proposal and Topics:

Proposals within the consortium

- Lourdes Abellera, Cal Poly Pomona- OCICATS (Online community input classification to advance transportation services)- a GIS- based decision- support tool
- Evelyn Blumenberg, UCLA- Heightening walking above its pedestrian status: walking and travel behavior in California
- David Brownstone, UC Irvine- Experimental studies for traffic incident management
- Rick Church, UC Santa Barbara- Smartphone information and transportation demand modeling: An analysis of transportation network companies
- Carlos Daganzo, UC Berkeley- Pricing urban transportation networks: multi-modal strategies leveraging big data
- Offer Grembeck, UC Berkeley- Automated assessment of safety-critical dynamics in multi-modal transportation systems
- Roberto Horowitz, UC Berkeley- Modeling and control of HOT lanes
- Jay Jayakrishnan, UC Irvine- Promoting peer-to-peer ridesharing as transit system feeders
- Wenlong Jin, UC Irvine- Performance analysis and control design for on-ramp metering of active merging bottlenecks
- Robin Liggett, UCLA- Bicycle crash risk: how does it vary and why?
- Michael McNally, UC Irvine – Potential impacts of VMT taxes on California Travel Behavior
- Alexey Pozdnukov, UC Berkeley- Demand forecasting and activity-based mobility modeling from cell phone data
- Raja Sengupta, UC Berkeley- Crowd-source data to activity models: Human mobility prediction for real-time ridesharing
- Max Shen, UC Berkeley- Strategic charging infrastructure deployment for electric vehicles
- Alexander Skabardonis, UC Berkeley- Control strategies for corridor management
- Brian Taylor, UCLA- Accessibility an economic development: how the transportation network affects the economic performance of regions
- Martin Wachs, UCLA- Impacts and future of the California Fuel Tax Swap of 2010
- Joan Walker, UC Berkeley- From trend spotting to trend setting: modeling the impact of major technological and infrastructural changes in travel demand
- Guoyan Wu, UC Riverside- Developing an agent-based online adaptive signal control (ASC) framework using connected vehicle (CV) technology

Proposals from outside the consortium

- Wei Hua Lin, University of Arizona- Exploring the use of spatial data as input to traffic control and traffic safety analysis
- Yao-Jan Wu, University of Arizona- Multi-modal arterial performance measurement using multi-source ITS source

Outreach: UCCONNECT has designated funds and human capital to support the affiliated institution, Cal Poly Pomona, in its ongoing development of a transportation academy for high school students in the Los Angeles Unified School System and for

students at selected junior colleges in the Los Angeles County. The summer academy will offer activities aimed at exposing these students to career opportunities in transportation. Cal Poly will also play a key role in the center's efforts to broaden the transportation field by attracting applicants from underrepresented communities. Cal Poly is a Hispanic serving institution, as is UC Riverside. We expect that the research and teaching activities at both these campuses will enrich the socio-demographic basis of UCCONNECT research by attracting students and professionals, particularly from the Latino community. Additional funding was provided to Cal Poly Pomona in order to achieve the goals associated with outreach to underserved demographics within the university and in the surrounding community. The funding is accounted for in the performance indicator spreadsheet.

Meetings its aspirations in the realm of education: The center's performance is measured using three metrics, which are: the number of graduate degrees and the number of undergraduate that choose transportation as their specialty area; number of registrants at UCCONNECT- supported conferences, short courses, outreach activities, and like events; and number of graduates from Cal Poly who pursue graduate-level study in transport at one of the UC campuses in our consortium. Refer to the 'performance indicators' attachment to see the center's performance in the realm of education.

University of California, Los Angeles

The majority of the award has been allocated to students in the form of financial support packages and student salaries. As such, one of the major goals of the program was to enable the recruitment of exceptional transportation students, which it has done. The quarterly disbursement of financial support award packages began this fall and will continue throughout the 2014- 15 academic year.

University of California, Santa Barbara

University of California, Santa Barbara wrote ten papers that became GeoTrans reports. Six of these papers will be presented at the January 2015 Annual Transportation Research Board Meeting and Published in the TRB conference proceedings.

University of California, Riverside

Early in the 2013-2014 year, UC Riverside went through the process of offering two graduate students financial support packages to assist them in carrying out transportation research at UCR with an emphasis on economic competitiveness. After an application process and faculty review, two financial support packages were awarded (from nearly 20 applications). One was May-Ling Lu, from the Chemical and Environmental Engineering Department. The other was to Carissa Lemon from the Psychology department. May- Ling Lu's research focuses on testing out the potential of agave, especially those native to California, for conservation to bioethanol by determining the optimal process of configuration for saccharification and fermentation. This bioethanol is an alternative to fuel that has a very low carbon impact, thereby reducing greenhouse gas emissions and improving our nation's energy independence. Carissa Lemon's research focuses on motion perception changed with age and how these changes related to driving tasks, namely speed regulation, collision avoidance, and detection and braking.

In addition, UCR started the planning and execution of a major outreach event for high school students, emphasizing research in the area of transportation. This event (which took place in October 2014), was the third annual Science Technology Education Partnership (STEP)

Conference where over 300 high school students attended from five different high schools in California's Inland Empire region. The targeted high schools have a strong science and math core with after school programs that help mentor students with hopes to inspire students to further their STEM education. The high school students were able to experience hands-on demonstrations in laboratory settings. Eight different stations were planned- covering six different research areas, all with a focus on sustainable transportation. These included 1) Thermochemical Conversion, where demonstrations were held on how biomass and biosolids can be used to produce fuels or electricity, through the use of a patented Steam Hydrogasification Reactor; 2) Next Generation Renewable Transportation Fuels, where it was demonstrated how to reduce pollution by researching new chemical and biological methods, to produce fuels from plants for cars, trucks, boats, and airplanes; 3) Vehicle Emission Measurements and Secondary Organic Aerosol Formation, where demonstrations were held to show the relationship between engines, emissions, and fuels and their effects on air pollution; 4) Black Carbon Emissions, where it was demonstrated what black carbon looks like and how it impacts the atmosphere; 5) Hydrogen Powered Vehicles, where students were given the chance to generate hydrogen gas by the process of electrolysis, using green electricity from solar; and 6) Eco-Driving, where students were given the chance to test drive an eco-driving simulator that modeled heavy duty trucks driven on various roads and observed the output of a vehicle's speed and fuel consumption.

University of California, Irvine

The program provided financial support to 13 graduate transportation students pursuing MSCE, MURP, MSTS, and PhD (in CEE) degrees.

California State Polytechnic University, Pomona

Cal Poly Pomona has established a set of tasks that enhance student participation in transportation planning and engineering programs. The tasks are to encourage graduate and undergraduate students to consider transportation careers, to introduce them to further educational opportunities in the University of California system, and to bring underrepresented students to the transportation professions. Cal Poly Pomona has invited a number of guest speakers to come to the university. Also, Cal Poly Pomona has started a set of mini-research projects that involve graduate and undergraduate students.

c. What opportunities for professional development has the program provided?

UCCONNECT Consortium

UCCONNECT took active part in the 2013-14 UCTC Student Conference. The 2-day event took place on Cal Poly Pomona's campus. The event was geared towards both undergraduate and graduate students pursuing research in the Transportation arena. This conference was a great opportunity to share their research and it also included other activities such as lectures and presentations given by industry representatives.

Both UCCONNECT's executive and advisory committee annual meetings took place as part of the conference. This had various beneficial effects. First, it exposed the leadership of the Center to the details of the UCTC Student Conference, which UCCONNECT will organize during the 2014-15 academic year in Santa Barbara. Moreover, it allowed the interaction between the students of the various members of the consortium and our executive and advisory committee members. This provided an opportunity for students to share their research with relevant decision-makers and academics in the Transportation field.

UCCONNECT will have a much more active role in 2014-15, not just by organizing the conference, but also by directly engaging all those students who will receive a dissertation grant award in the upcoming months. With this, the center is facilitating the reach of its research and is providing the students with opportunities to gain significant exposure in front of important transportation stakeholders.

University of California, Santa Barbara

Accomplishments under this program include: 1) research findings that are used in undergraduate and graduate courses; and 2) four graduate students and one undergraduate student are trained in advance methods of data collection and analysis.

University of California, Riverside

During the 2013-2014 year, UCR started the process of training and developing new programs in the area of electric vehicles and their interaction with SmartGrids. Several new courses have recently been added to the electrical engineering curricula on this topic area. New faculty (both academic senate and research faculty) have been hired to further develop this area. This effort will continue into next year.

University of California, Irvine

UCCONNECT has offered education and training in transportation engineering, planning, economics and science as well as urban planning.

California State Polytechnic University, Pomona

The program has provided opportunities to students to attend conferences at ITE and other transportation-related events.

d. How have the results been disseminate?

Since UCCONNECT is a new center, dissemination of results have been limited for this reporting period.

University of California, Santa Barbara

UC Santa Barbara has disseminated results through conference presentations at the 2014 Annual TRB meeting.

University of California, Riverside

UCR major results are being disseminated through research papers and presentations, from both student projects and faculty research projects. Research project awards were recently announced, UCR will conduct the following project: “Developing an agent-based on-line adaptive signal control (ASC) framework using connected vehicle (CV) technology; PI: G. Wu. Since this project started in October, there are no publications to date.

University of California, Irvine

UCI has disseminated results through graduate student seminars and through preparations of TRB Annual Meeting papers.

California State Polytechnic University, Pomona

Cal Poly Pomona developed newsletters that disseminated to the public via emails, Facebook, blogs, twitters, etc.

e. What do you plan to do during the next reporting period to accomplish the goals?

UCCONNECT Consortium

UCCONNECT released a new RFP for faculty research grants for FY 2015-2016, and also released its first call for Dissertation Awards. UCCONNECT also intends to designate an ‘outstanding graduate student’ through a program jointly sponsored by DOT and the Council of University Transportation Centers. In February 2015, UCCONNECT, in partnership with UC Santa Barbara, will host the annual student conference with a focus on undergraduate and graduate student led research presentations.

University of California, Santa Barbara

UCSB will design new survey for in-depth data collection, test methods, and develop new data analysis techniques, continue data analysis, organize a workshop and a conference in Santa Barbara, visit other universities with similar research objectives, and write more papers to accomplish the program’s goals.

University of California, Riverside

UCR will begin the faculty research project, develop a local UCR transportation workshop, develop new transportation curriculum.

California State Polytechnic University, Pomona

Cal Poly Pomona will develop a series of transportation seminars to educate students and transportation professionals.

2. Products

a. Publications, conference papers, and presentations

University of California, Berkeley

UC Berkeley plans to fund multiple students to attend the annual Transportation Research Board meeting in Washington DC, several of whom will likely present papers and/or posters at the event. In addition, we are providing funding to UCLA for creating a new website for Access Magazine, a periodical published semi-annually by the University of California Transportation Center.

University of California, Los Angeles

Given the late arrival of funding, there are currently no products to list. However, as an example UCLA plans to fund multiple students to attend the annual Transportation Research Board meeting in Washington DC, several of whom will likely present papers and/or posters at the event. In addition, [with the financial support of UC Berkeley] we are currently working on creating a new website for Access Magazine, a periodical published semi-annually by the University of California Transportation Center.

University of California, Santa Barbara

Lee J.H., A.W. Davis, and K.G. Goulias (2014) Exploratory Analysis of the Relationships Among Long Distance Travel, Sense of Place, and Subjective Well-Being of College Students. Paper presentation at the *94th Annual Meeting of the Transportation Research Board*,

Washington, D.C., January 11-15, 2015. Also published as GEOTRANS Report 2014-8-01, Santa Barbara, CA.

Lee J.H. and K.G. Goulias (2014) Examining Differences and Commonalities of Life Cycle Stages in Daily Contacts and Activity-Travel Time Allocation. Paper presentation at the *94th Annual Meeting of the Transportation Research Board, Washington, D.C.*, January 11-15, 2015. Also published as GEOTRANS Report 2014-8-02, Santa Barbara, CA.

Davis A.W., J.H. Lee, and K.G. Goulias (2014) Analyzing Bay Area Bikeshare Usage in Space and Time. Paper presentation at the *94th Annual Meeting of the Transportation Research Board, Washington, D.C.*, January 11-15, 2015. Also published as GEOTRANS Report 2014-8-03, Santa Barbara, CA.

Goulias K. G., J.H. Lee, and A.W. Davis (2014) Longitudinal Mixed Markov Latent Class Analysis of the 1989 to 2002 Puget Sound Transportation Panel Data. Paper presentation at the *94th Annual Meeting of the Transportation Research Board, Washington, D.C.*, January 11-15, 2015. Also published as GEOTRANS Report 2014-8-04, Santa Barbara, CA.

Ravulaparthi S.K. and K.G. Goulias (2014) A comprehensive evaluation of locational determinants on birth and death of business establishments. GEOTRANS Report 2014-8-05, Santa Barbara, CA.

Ravulaparthi S.K. and K.G. Goulias (2014) Exploring locational influences on technical efficiency of business establishments in Santa Barbara County using stochastic frontier modeling framework. Paper presentation at the *94th Annual Meeting of the Transportation Research Board, Washington, D.C.*, January 11-15, 2015. Also published as GEOTRANS Report 2014-8-06, Santa Barbara, CA.

Deutsch-Burgner K and K.G. Goulias (2014) Measuring Heterogeneity in Spatial Perception for Activity and Travel Behavior Modeling. Paper presentation at the *94th Annual Meeting of the Transportation Research Board, Washington, D.C.*, January 11-15, 2015. Also published as GEOTRANS Report 2014-8-07, Santa Barbara, CA.

Dalal P. and K. G. Goulias (2014) An Analysis of Jobs, Business Establishments, Housing, and Commuting Travel in the Smart Growth Centers of the Puget Sound Region. GEOTRANS Report 2014-3-01, Santa Barbara, CA.

Deutsch-Burgner, K.E., Ravulaparthi, S. K., and K.G. Goulias (2014) Place Happiness: It's Constituents and the Influence of Emotions and Subjective Importance on Activity Type and Destination Choice. *Transportation: 1-18*. Also published as GEOTRANS Report 2013-07-02. Santa Barbara, CA.

Ravulaparthi, S.K., and K.G. Goulias (2014) Characterizing the Composition of Economic Activities in Central Locations: A Graph-Theoretic Approach to Urban Network Analysis. Paper accepted for presentation at the *93rd Annual Meeting of the Transportation Research Board, Washington, D.C.*, January 12-16, 2014, and considered for publication in the *Transportation Research Record: Journal of the Transportation Research Board*. Also published as GEOTRANS Report 2013-07-01. Santa Barbara, CA.

California State Polytechnic University, Pomona

Students sponsored by the UCCONNECT grant got their papers accepted for the TRB

presentations. UCR is planning to send a total of ten graduate and undergraduate students to attend the 2015 TRB meeting with financial support from UC Berkeley.

University of Arizona- Region 9

UCCONNECT-UC Berkeley has also approved proposals to advance research within Region 9 by awarding funds to the University of Arizona. A proposal was approved to explore the use of spatial data as input to traffic control and traffic safety analysis. This research will lead to a better understanding of the importance of spatial data generated from individual vehicles to algorithm development for traffic control and traffic safety analysis. Funds were also awarded to the University of Arizona to research multi-modal arterial performance measurement using multi-source ITS data. This multi-mode data collection effort will produce performance measurement for automobiles, transit vehicles and pedestrians/bikes. These measurements along with other findings from the research will be disseminated in a working paper and final report.

b. Books or other non-periodical, one-time publications:

Nothing to report.

c. Website(s) or other Internet Site(s):

<http://ucconnect.berkeley.edu/>

d. Technologies or techniques:

Nothing to report.

e. Interventions, patent applications, and/ or licenses:

Nothing to report.

f. Other Products:

Nothing to report.

3. Participants and collaborating organization

a. Individuals Involved

Executive Board

- Michael Cassidy, Director of UCCONNECT and Professor of Civil and Environmental Engineering at UC Berkeley
- Juan Argote-Carbanero, Assistant Director
- Karen T. Frick, Assistant Adjunct Professor of City and Regional Planning
- Mathew J. Barth, Professor of City and Regional Planning at UC Berkeley
- Daniel Chatmanm Associate Professor of City and Regional Planning at UC Berkeley
- Kostas Goulias, professor of Geography at UC Santa Barbara
- Stephen Ritchie, Professor of Civil and Environmental Engineering at UC Irvine
- Brian Taylor, Professor of Urban Planning at UC Los Angeles

Advisory board

- Dennis Agar, chief of Division of Traffic Operation at California Department of Transportation

- A. Ricardo Archilla, Associate Professor of Civil and Environmental Engineering at the University of Hawaii
- Katie Benouar, Chief of Division of Research, Innovative and System Information
- Tilly Chang, Executive Director of the San Francisco County Transportation Authority
- Lawrence Dahms, Metropolitan Transportation Commission
- Debra S. Elston, Director of the Office of Corporate Research, Technology and Innovation Management
- Gail Goldberg, Executive Director of Urban Land Institute
- Xudong Jia, Professor at Cal Poly Pomona
- Wei Hua Lin, Associate Professor of Systems and Industrial Engineering and Engineering Management, University of Arizona
- James W. Martling, Founding Principal, Sperry Capital
- Eric Shen, Director of Transportation Planning, Port of Long Beach

b. Partners

Caltrans

UCCONNECT recognizes Caltrans as a vital partner in guiding the research agenda, putting the findings into practice, and further disseminating our ideas by co-sponsoring and participating in workshops and webinars.

ITS

UCCONNECT is housed at UC Berkeley's Institute of Transportation Studies. The Center enjoys the institutional efficiencies by sharing the facilities and research infrastructure. The Center will be enhanced by being part of the collection of other transport centers that are housed at UC Berkeley's ITS. Those other centers are:

UC Berkeley PATH (Partners for Advance Transportation and Technology)

UCCONNECT would be enhanced by collaborating with PATH, which has a focus on the improvement of surface transport operations through the application of advance technologies.

CCIT (Center for Innovative Transportation)

UCCONNECT will benefit from this center because its goals are to promote the development of emerging transport technologies in real settings.

TSRC (Transportation Sustainability)

The Center will benefit from TSRC's focus on reducing the carbon footprint of transportation, particularly in the developing world, by managing policy and technology.

Technology Transfer

UCCONNECT is partnering with Technology Transfer, because the program is already established as the prime source of professional training and expert assistance for the transport community throughout the region.

c. Additional collaborators

UCTC

UCCONNECT continues to follow the tradition of UCTC, but in a more focused way: by redoubling its emphasis on economic competitiveness and by advancing this aim by means of multi-disciplinary studies of multi-modal transport systems. Some activities under UCCONNECT will build directly upon earlier successes at UCTC. At the same time, our sharpened focus is expected to give rise to new threads of basic and applied research.

4. Impact

a. What is the impact on the development of the principal discipline(s) of the program?

University of California, Berkeley

By soliciting responses to calls for proposals, engaging in a review process and ultimately selecting research proposals that match the goals and aspirations of the center, the UCCONNECT headquarter campus has set the agenda for the advancement of transportation research both within Region 9 and on a national level. By securing the required matching funds, the research arm has been extended throughout the consortium and will lend itself to impactful research and sustainable applications.

University of California, Los Angeles

The increased amount of student funding enabled the UCLA Department of Urban Planning and Public Policy to recruit top candidates in the field of transportation

University of California, Santa Barbara

We expanded our reach to include Spatial Cognition and Geographic Information Science to start creating spatial perception and travel behavior analytical corpus.

University of California, Riverside

Transportation research and education is expanding across all of UCR, including engineering, sciences, and our new school of public policy.

University of California, Irvine

Education and training of future leaders in transportation engineering, planning, economics and science, as well as urban planning.

California State Polytechnic University, Pomona

Civil Engineering, transportation engineering and planning, intelligent transportation systems.

b. What is the impact on other disciplines?

Nothing to report.

c. What is the impact on the development of transportation workforce development?

Nothing to report.

d. What is the impact on physical, institutional, and information resource at the university or other partner institutions?

Nothing to report.

e. What is the impact on technology transfer?

Nothing to report.

f. What is the impact on society beyond science and technology?

Nothing to report.

5. Changes/ Problems

a. Changes in approach and reasons for change

Nothing to report.

b. Actual or anticipated problems or delays and actions or plans to resolve them

University of California, Los Angeles

The budget period for the first installment of UCCONNECT DOT funds is October 1, 2013-September 30, 2014. However, UCLA did not receive the award notice until midway into the academic year in March 2014, which delayed the spending of the funds for 2013-14 as planned. We have thus reallocated spending for academic year 2014-15.

University of California, Irvine

Faculty research awards under this program have still not begun due to ongoing delays in receiving funding from UC Berkeley.

c. Changes that have a significant impact on expenditures

University of California, Santa Barbara

Timing of funding is out of synchronization with student recruitment but we are recovering from institutional inertia.

d. Significant changes in use or care of human subjects, vertebrate animals, and/ or biohazards

University of California, Santa Barbara

Possible commencement of data collection using Internet based surveys.

e. Change of primary performance site location from that originally proposed

Nothing to report.