Nevada office of Traffic Safety contracted UNLV Transportation Research Center to estimate night time seat belt usage rate for the Las Vegas metropolitan area. This was determined by conducting seat belt usage observations during the months of December and January, 2008/09, at 6 locations across the Las Vegas Valley.

A total of 3,677 vehicles were observed during the survey process. Only front seat occupants were observed for this survey. Collected data are summarized at 15 minute intervals to analyze variation of usage rates by time. Daytime observations are also made at these sites on the same day for comparison purpose. Overall nighttime seat belt usage rate (for 8-hour time periods for all the six sites), without considering weighted average is 81.3 for all occupants (drivers 80.4 percent and passengers 84.9 percent). The usage rate for female drivers (81.1 percent) was higher than male drivers (80 percent). These usage rates are about 10 percent value lower than the daytime average usage rates. Usage rates were determined by vehicle type with no consideration of the State of registration. They were determined to be 80.9 percent for sedans/station wagons, 72.6 percent for pickups and 82.4 percent for vans/SUVs. Analyses also showed that the usage rates depend heavily on the time. As expected, in most of the sites, the seat belt usage rates showed significantly lower percents at late night and early morning hours (11:30 PM – 3:00 AM). This study shows that it is important to consider the time when conducting nighttime observations.

FARS data and traffic volume data are analyzed to estimate the significance of the lower nighttime seat belt usage rates. This showed that the risks associated with the nighttime restraint non-usage is much higher that those during daytime.

Figure 1: Variation of nighttime seat belt usages for all drivers by time  
Figure 2: Variation of nighttime seat belt usages for passengers by time
Summary of Funded Projects for the Second Fiscal Year

Analysis, Modeling and Design for Traffic Incident Management Systems  
**PI(s): Pushkin Kachroo, Ph.D., P.E., Vinod Vasudevan, Ph.D., P.E.**  
The major aim of this project is to develop mathematical models, perform analysis, develop simulations, and then apply those to assist decision support system for incident management in the Las Vegas area. In order to implement the system the project will get a handle on the local state of the art on Incident Management; will study alternate designs for incident management and then design a system that focuses on the details of field implementations and operations. This system will involve the collaboration with various agencies in Clark County such as RTC of Southern Nevada, Nevada DOT and Nevada Highway Patrol through FAST, and their consultant ITERIS. Additional collaboration will occur with local agency first responders and the private towing industry.

Develop Guidelines for Access Management in Las Vegas  
**PI(s): Mohamed Kaseko, Ph.D. and Hualiang Teng, Ph.D.**  
This is one of the two-year projects funded in the first year. The objective of the study is to develop guidelines on access management for the Las Vegas area. Specially, the spacing between accesses including signal intersections, driveways, and opening in medians will be investigated. The benefit of corner clearance, circulations in commercial subdivisions, and frontage roads will also be evaluated. The investigation and evaluation will be conducted based on (1) using statistics model analyzing field data and (2) developing microscopic simulation models. The findings from the study will be used as a foundation for developing guidelines on access management for the Las Vegas area.

Build A Mobile Vehicle for In-situ Measurement of Dust of UFP and PM1  
**PI(s): David James, Ph.D., P.E.**  
This another two-year project funded in the first year. A multidisciplinary group of engineers from the Department of Civil and Environmental Engineering and Department of Electrical and Computer Engineering propose to develop a mobile vehicle equipped with particle size analyzers for in-situ measurement of traffic-generated Ultrafine Particles (UFP, particles with a diameter of 0.1 micrometers or less)) and PM1 (particles with a diameter of 1.0 micrometers or less). The existing systems could not determine UFP and PM1 because of the variable composition and the ability of these particles to penetrate deeply into the respiratory tract. The proposed vehicle can measure both particle number concentration and particle size distribution, while the existing systems can only measure the particle number concentration. This would be the first system of its kind with these capabilities, and may help develop understanding of the emissions of ultrafine particles. This project is restructured this year due to the initial PI’s move to another University.

Analysis of Alternatives for Accommodating Trucks on Urban Freeways in Southern Nevada  
**PI: Eric Sandgren, Ph.D.**  
Traffic engineers and planners are increasingly becoming aware of the safety and traffic operations implications brought by the differences in operating characteristics of trucks and autos in mixed traffic lanes. The current system that mixes large trucks and autos in traffic lanes, leads to frequent conflicts between these vehicle types. The truck operators generally believe the mixed lanes unduly limit the potential productivity of long-haul trucking. On the contrary, most passenger vehicle drivers are intimidated when squeezed-in or tailgated by large trucks, which is sufficient enough to consider excluding trucks from some lanes. Furthermore, safety groups are increasingly pressuring transportation agencies to implement various truck strategies that would keep the general motorizing public free from exposure to big rigs in the mixed traffic lanes, thus, alleviate traffic congestion and improve safety. This is the second year of this project.

Using Image Processing to Estimate Truck Volume  
**PI(s): Muthukumar Venkatesan, Ph.D. and Mukund Dangeti, Ph.D.**  
Planning and Design of efficient freight transportation infrastructure is critical for the growth of the state and national economy and should consider current and near-future traffic flows and demands to-and-from seaports, airports and adjacent roadway networks. To facilitate this, accurate and comprehensive traffic data extraction of freight (Truck) data on major roadways at macroscopic and microscopic levels are essential. The current data collection systems employed by Regional Trans. Comm. and NDOT around the Las Vegas valley do not meet the current practical needs of advanced traffic management systems. Therefore, this project targets at developing a video based (freight) truck data extraction system to determine traffic flow characteristics like volume, average speed, density and classification of trucks with respect to lanes, time, day, month, etc. The extracted data will be used in computer simulation modeling that can be used to analyze the existing infrastructure to determine where inefficiencies are or where they may occur in the near future.
Traffic Management Data Tools  
**PI: Mukund Dangeti, Ph.D.**

The growth and its associated infrastructure maintenance costs in the county, have led Clark County Department of Public Works (CCDPW) to look for innovative solutions and strategies to better maintain, manage, and allocate its resources. The success of these strategies will have significant impacts on the business and economy of the region. Access to data is vital in the design of these strategies. Digitized data and computerized tools can help facilitate communications among the CCDPW staff. This includes the exchange of information to improve level of coordination within the CCDPW and other agencies. The proposed project will develop a system to track work orders for the traffic signals in the CCDPW jurisdiction. It is achieved by converting the existing paper based process into a automated system that is easily accessible over the Internet, and demonstrate the use of such tools.

Traffic Safety Information Depot 
**PI: Vinod Vasudevan Ph.D., P.E.**

UNLV-TRC and Safety Community Partnership conduct several traffic safety research studies and oversee several education and enforcement campaigns. Although these campaigns and studies are documented based on the sponsor’s requirements, they are not published for public or other agencies. The objective of this study is to gather information for various traffic safety studies and campaigns, document it and publish it via internet.

UNLV Offers A Course in Transpotronics  
**by Pushkin Kachroo, Ph.D., P.E.**

At UNLV, we have started a new course called “Transportronics”. It is a synthesis of “Transportation” and “Electronics”. It is designed to teach students hands-on electronics skills for transportation applications. The applications are typically geared towards traffic electronics and automotive electronics. The course covers DC circuits, AC circuits, basic components like resistors, capacitors, inductors, power supplies, diodes, and transistors. The course also covers, operational amplifiers, digital circuits using AND, OR, NOT gates, and flip-flops. It also teaches combinational and sequential digital circuits. Finally microcontroller programming using Arduino board is taught. Sensor interfacing with microcontrollers is taught giving examples from traffic and automotive sensors such as loop detectors, IR sensors, ultrasonic sensors, radars, Hall-effect sensors is taught. Interfacing of the microcontrollers with displays, such as LEDs, LCD, and computers, as well as actuators such as relays, motors and servos is taught. A textbook on this new subject is being written by Pushkin Kachroo, and his graduate students Neveen Shlayan, and Lillian Ratliff. The website for the class is at: http://faculty.unlv.edu/pushkin/transportronics/transportronics.html

The course uses a transportation textbook, electronic kit and a microcontroller kit shown.
News from the Center

Staff members and several students of the UNLV UTC attended 2009 TRB Annual Meeting in Washington DC.

UTC Staff members and students made four presentations at the 2009 TRB Annual Meeting.

UTC Staff members attended 2009 annual winter meeting of the CUTC

Dr. Mukund Dangeti and Dr. Vinod Vasudevan, along with Dr. Shashi Nambisan presented results of the FHWA sponsored pedestrian safety program at the special session hosted at the 2009 TRB Annual Meeting.

Dr. Mukund Dangeti and Dr. Vinod Vasudevan, along with Dr. Shashi Nambisan were invited by World Bank to make a presentation on the results of the FHWA sponsored pedestrian safety program at the workshop they hosted.

Mr. Vinod Vasudevan was elected as the President of Institute of Transportation Engineers (ITE) Nevada Chapter for 2009-2010.

Visit us on-line at:
http://crosswalk.trc.unlv.edu