

Public Automated Transportation Design Initiative Mountain View & Sunnyvale December 12, 2013

INIST, the International Institute of Sustainable Transportation, invites Silicon Valley cities and industries to collaborate with San José State University and the INIST team to design and establish a procurement framework for a public transportation system which is economical, efficient, powered by renewable energy, elevated to be free of street congestion, and available on demand.

Introduction

Silicon Valley is facing unprecedented growth in the commercial sector. New construction is moving rapidly, creating serious challenges especially for transportation infrastructure needs. A new office building is a private initiative but the streets are part of the commons and not the direct responsibility of building owners or occupants. As such, cities are obliged to adapt their streets to continued growth with inadequate and often antiquated tools. Well-intended planning initiatives are handicapped by regulations which preclude consideration of unproven innovative alternatives.

Cities

Without concrete examples in place, it is hard for people to visualize what a new transportation system might be like. Recognizing this dilemma, INIST has been holding visioning meetings since June 2013 with elected officials and staff of local cities to explore automated public transit alternatives. Through this convening, government officials have strengthened their shared interest and are discovering new approaches to solving Silicon Valley's transportation problems.

Academic Research

To investigate possible new approaches, INIST has for the past two school years been fostering a center of excellence in ATN ("podcar") research at San José State University. Consequently, local government and the business community can, with a unified front, strengthen and hasten the development of advanced transportation solutions, by setting up creative urban design laboratories and internships for students to design systems and research programs of interest to local businesses and cities. In October, the San José State team took the \$5,000 first place award for INIST's Solar Skyway Challenge at the annual international Podcar City Conference in Washington, DC.



Industry

Industry participants have two potential ways to benefit from automated public transportation opportunities:

- 1. As *users*, achieving lower costs and a less stressful commuting experience for their workforce.
- 2. As *producers*, creating and selling a game-changing solution to the rest of the world, in keeping with Silicon Valley's reputation as innovation leaders in the global marketplace.

To capture the imagination of Silicon Valley companies to participate in this emerging marketplace, the Transportation Department staff at the City of San Jose coined the term ATN (Automated Transportation Networks). Opportunities to supply the "A" in ATN means new markets for Silicon Valley companies



established in electronics, software, control systems, networks, power electronics, sensors, etc.

To initiate this opportunity with local industries, INIST is encouraging industry representatives to provide mentoring to student teams at San José State. This mentoring activity can be motivated simply by the opportunity to recruit employees, and as such gives industry the opportunity to understand the podcar / ATN market with very modest investment.

INIST Academic Projects Framework

Given the significant resources required for a full scale test track (discouraging even professional suppliers), INIST has taken a three pronged approach to iterating through the pertinent design challenges. INIST works with academic teams on urban design, scaled and component-based projects. At SJSU, projects are taking place in all three of these categories.

Urban Design—Virtual 4D Modeling

The Urban Planning Department at San José State and technology partner Encitra are collaborating with INIST to create 4D models for advanced transportation alternatives in Mountain View and Sunnyvale. Selecting appropriate sites, this 4D modeling is a way to communicate possibilities with a visual tool that goes far beyond the usual 2D or 3D images. With the Encitra platform, you interact directly with all possibilities of a development project such as visual impact, noise, sound, light and traffic around you.



Participants in the model can interact with social media - Twitter, Facebook, Google+, blogs and more. Online surveys, movies, slideshows and even meetings between stakeholders can be integrated into the model.

Scaled—Second Generation Model

The scaled model completed last year allows visitors to see a suspended podcar system and get a feel for the concept of off-line stations. The six student team working on controls this year is enhancing this model to use as their test bed. To accomplish this, Cory Ostermann, a Mechatronics senior, led a team to redesign the drive system and make necessary changes to the track. With the second controllable drive nearly



assembled, the controls team at SJSU eagerly awaits the beginning of spring semester when they will begin to test the routing and control software. On-board controllers get directions wirelessly from a routing controller and, in addition to controlling the actuation of the motors driving them, are constantly monitoring on-board sensors for object detection, acceleration, velocity, and position awareness.

In parallel with this development, an Industrial Design student group has designed a fare-box application for smart phones. Imagine scheduling, ticketing and navigating with your phone, avoiding lines to feed money or credit cards into a cantankerous machine as the train rolls up. The students' goal is to integrate this app into the operation of the scaled model.

Component—**Prototype Switch**

The refinement of certain pieces of the podcar puzzle can be found on the critical path to a full test track. The switch in ATN systems is quite different than an ordinary train switch. (ATN systems need to move many cars through a branching in the track at short headways. A traditional train switch would thus need to flip back and forth every few seconds, a mechanical nightmare. ATN switching is implemented in the drive of each podcar, allowing for the mechanical locking of the direction choice long before the switch is traversed.)



This fall student teams have vetted various guideway, switch, and drive systems. A student team, led by Mechanical Engineering student Cormac Wicklow, is building a wooden prototype over the holidays and will finish design and begin construction next semester. This will include not just the switch but a small "Y" section of track and the bogie (chassis and wheels) needed to test it.

Component—Cabin

During the Fall semester, four student teams from the Industrial Design Department built mock-ups of three podcars and one simple station. Their work inspires and sets the stage for a functional full scale podcar Cabin to be combined with the Prototype Switch component to demonstrate more of the key components to the podcar system.



Next Steps

INIST welcomes Silicon Valley Industry to participate in these Automated Transportation initiatives in all three categories identified here – creating Urban Designs for initial locations in Mountain View and Sunnyvale with assistance from San José State's Urban Planning Department, and through mentoring and support for San José State's Spartan Superway projects – Scaled Mechatronics Models and system Components.



For more information, contact:

Ron Swenson President, INIST 147 South River Street, Suite 207 Santa Cruz, CA 95061 tel +1 408-332-5375 ron@inist.org