

Midwest Gateway Newsletter

International Council on Systems Engineering

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President's Corner

Dear Midwest Gateway INCOSE Members

Welcome to our re-vitalized Midwest Gateway Chapter Newsletter. It's been some time in the making, having been absent for a number of years, but I hope you'll like what you see in this newest edition. We've received excellent articles from our local chapter members and affiliates, so please take a moment to browse the contents. Let us know what you think and please consider contributing for a future edition. We'd like to make this a quarterly periodical, but you can help make that a reality with your active participation. In the meantime, check out the latest in Systems Engineering – Midwest Gateway INCOSE Style...

Bob Scheurer, President
Midwest Gateway INCOSE



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Urban Challenge: Are Robotic Taxi Cabs Next?

By Mason Myers

Background:

DARPA's Grand Challenge competitions are in response to a 2001 Congressional mandate that "It shall be a goal of the Armed Forces to achieve the fielding of unmanned, remotely controlled technology such that by 2015, one-third of the operational ground combat vehicles are unmanned."

The Urban Challenge is the third DARPA Grand Challenge competition and an outgrowth of the DARPA Grand Challenge 2005 autonomous vehicle competition conducted in October 2005. The October 2005 event focused on the development of autonomous vehicles that operate in an off-road environment with only limited interaction with other vehicles. Urban Challenge will extend this concept to autonomous vehicles that safely execute missions in a complex urban environment with moving traffic.

Overview:

The Urban Challenge will test the vehicle's ability to operate safely and effectively with other vehicles in and around an urban environment. The course will be nominally 60 miles in total distance, with a time objective of 6 hours. The road surface will range in quality from new pavement to potholes and

*(see **Urban Challenge** on page 3)*

INCOSE and Systems Engineering

Not Just Professional Benefits

*By Bob Scheurer, President
Midwest Gateway INCOSE*

As you probably know, INCOSE is a growing organization with a number of opportunities for learning, participation, and leadership in systems engineering-related activities. These can take on a variety of forms, from participation in our local chapter activities, to writing and presenting papers at the international symposia, and to serving on International committees. What you might not have considered is how what you learn or discover with INCOSE can improve your daily life.

An example of this is the type of trade off decisions you make on a regular basis in your personal life. When you make a purchase or investment in a home or new car, you evaluate your requirements against the solutions offered by the various suppliers. The ones meeting your requirements within your constraints (i.e., cost,

*(see **Benefits** on page 4)*





Midwest Gateway Chapter Report for 2006

By Bob Scheurer, President

It's been a very eventful year for our Midwest Gateway chapter, for which I identified a very aggressive set of goals with the Board of Directors at the onset of 2006. I'm happy to report that we achieved

many of them and continue to make good progress on the others, thanks to a number of very committed members.

Of all of our activities this year, several stand out as particularly noteworthy. Our chapter meetings, thanks to the Programs Chair leadership of Bill Schoening and your participation, have been

especially well received.

We've averaged more than 35 attendees at all of the meetings held on a generally monthly basis throughout the year. I think this speaks volumes on the timeliness and quality of the various presentation topics at the meetings. Thanks to all of our presenters. If you missed any of them, check out

(see **MGC Report** on page 5)

Outreach is About Adaptive Learning

By Marcos Chu, Outreach Chair

October 18, 2006 FIRST Robotics Team #1706 was invited to demo their robot to Wentzville Chamber of Commerce members at their monthly meeting. As a FIRST Robotics mentor, I felt compelled to go and show my support to the team. I was delightfully surprised to see also a presentation at the meeting by Dr. Terry Adams, superintendent of Wentzville Schools district. In his presentation he mentioned a quote from the Peter Senge book "The Fifth discipline."; the book's main topic is about systems thinking. That really brought home the fact that Systems Thinking and Engineering are everywhere, even at places you would least expect --- such as a Chamber of Commerce meeting!!!

The work of "outreach" is to create or enable these learning opportunities not only for our Midwest Gateway INCOSSE members but also the community at large. This year, we had a number of great opportunities to get the word out on systems engineering and thinking. Our chapter outreach metrics by the number for 2006 are as follows:

100+ 8th grade students in St. Charles County learned about systems engineering.



30+ H.S students learned how FIRST Robotics relates to Systems Engineering.

20+ College students learned about INCOSSE and Systems Engineering.

15+ Engineering professionals reached on-site system engineering presentations.

10+ University students attended presentation on Systems Engineering/INCOSSE.

3 INCOSSE members applied for 2 INCOSSE FIRST Robotics Grants.

1 Student Division to be formed.

(and this was just since our committee was established in the latter half of 2006!) Check out our web for photographs and more

details on some of the 2006 highlight events:

<http://www.incose.org/mdwest/YrInRvw2006.htm>

Are you looking to share the good news about systems engineering and INCOSSE to your co-workers at your organization? Contact us for opportunities to make or receive a presentation on systems engineering and INCOSSE at your site.

Our Midwest Gateway Outreach Committee is looking forward for another great year and we're looking for more members to join us! Please send an e-mail to marcos.chu@incose.org if you would be interested in getting more involved in this personally-rewarding activity.

2007 Outreach Schedule

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
• JAN C Wash U	• FEB e-week - CC St. Charles - CC Florissant - K-12 Wentzville		• APR C URBANA	• MAY TBD	• JUN - SAT WORKSHOP	• JUL TBD	• AUG COLLEGE: UMR	• SEP: BLAST-St. Charles	• OCT TBD	• NOV: FIRST/FCIS W/KP • NOV: 8 th Grade	• DEC: SC 8 th Grade
	• APR Boeing SE										



Urban Challenge

from page 1

broken pavement. The vehicle may negotiate sharp curbs, downed branches, traffic barrels, drains, hydrants, rocks, brush, construction equipment, concrete safety rails, power line poles, and other stationary items likely to be found in an urban environment. Vehicles will obey traffic laws as they negotiate traffic circles, intersections, and merge with moving traffic. Traffic on the route may be provided by manned vehicles, tele-operated vehicles, and other autonomous vehicles. Static vehicles may also be parked or stopped along the route. Roads may be blocked by DARPA during the course of the event, forcing the vehicle to recalculate its path between checkpoints. Trees and buildings along the route may interfere with GPS. Along some road segments there may be significant distances between waypoints, requiring vehicles to use their sensors to stay in the travel lane.

Participant teams that successfully complete the National Qualification Event in October will be eligible to

participate in the Urban challenge Final Event in November 2007 for prizes of first place: \$2,000,000; second place: \$500,000; and third place: \$250,000.

Objectives:

The objective of the Urban Challenge is demonstration of safe and correct autonomous driving capability in traffic at 20 mph. To do this, vehicles will demonstrate capabilities such as:

- Completion of a mission defined by an ordered series of checkpoints in a complex route network. The vehicle will have to autonomously determine the route between checkpoints and obey speed limits.
- Interpreting static lane markings (e.g., white and yellow lines) provided with the route network definition file and behaving in accordance with applicable traffic laws and conventions.
- Exhibiting safe-following behavior when approaching other vehicles from behind in a traffic lane. This includes maintaining a safe-following distance.
- Exhibiting safe check-and-go behavior when pulling around a stopped vehicle, pulling out of parking spot, moving through intersections, and in situations where collision is possible.

- Staying on the road and in a legal and appropriate travel lane while en route, including around sharp turns, through intersections, and while passing. The route network definition file will

specify the GPS coordinates of the stop signs. Physical stop signs, however, may or may not be present at the stop line locations.

- Follow paved and unpaved roads and stay in lane with very sparse or low accuracy GPS waypoints.
- Change lanes safely when legal and appropriate, such as when passing a vehicle or entering an opposing traffic lane to pass a stopped vehicle. Vehicles must not pass other vehicles queued at an intersection.
- Stop safely within 1 meter of the stop line at a stop sign intersection and proceed without excessive delay (less than 10 seconds) according to intersection precedence rules.
- Exhibit proper queue behavior at an intersection, including stopping at a safe distance from other

(see *Urban Challenge* on page 4)

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Two of the hazards on the DARPA Grand Challenge course. As vehicles go through the tunnel, they lose their GPS signal and must rely on other sensors. The narrow cattle gate requires the vehicle's sensors to be extremely accurate in sensing side obstacles and the center of the route.

<http://www.darpa.mil/grandchallenge/index.asp>



Chapter Website Provides a Rich Set of Midwest Gateway Presentation Content

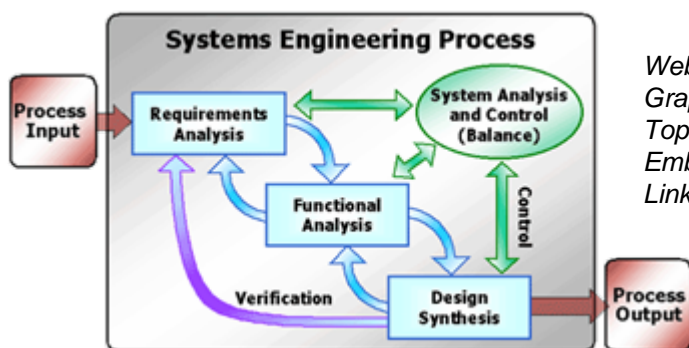
By Steve Recker

The systems engineering process model shown below is used on the INCOSE Midwest Gateway Chapter's (MGC) website presentations web page at <http://www.incose.org/mdwest/presentations.htm>. Presentations from past meetings are available in case you missed any of our meetings.

The model graphic has links embedded into it that will take you to the list of topic relevant presentations given at MGC meetings. The name of the author and title of the presentation are available, and in

most cases, we have links to a copy of the presentation available (where releasable by the author). At the top of the page, there is a link to the [Latest Meeting Presentation](#). We added this link for folks who like to keep current on what's going on with our chapter. The background of the graphic has links to presentations that cover multiple process areas.

The quality of presentations available reflects the strength and commitment of our systems engineers here in the Midwest. If you would like to be an active part of this INCOSE community by giving a presentation, please contact Bill Schoening, Programs Chair at 314-234-9651 or Bob Scheurer at 314-232-8650. Opportunity awaits...



Web Site
Graphic has
Topic-Related
Embedded
Links

Benefits

from page 1

schedule, performance, etc.) will likely be the winner of your business. Likewise, the risks and opportunities associated with the decision that you ultimately make (e.g., against product reliability, maintainability, safety, lifecycle costs, etc.) will hopefully have been successfully weighed against the alternatives. These fundamental elements can save or cost thousands of our own dollars on a regular basis throughout our lives.

I'm sure you can come up with other systems engineering principles that are encountered in everyday life. My point is, however, that whole-life relevance is one of the appealing elements that makes INCOSE very relevant today as well as an enabler of a better future. Participation in INCOSE events and activities, whether at the chapter, national, or international levels enables us to not be just better professionals but have better all-around lives. You may have heard me say it before, but it is truly more and more a systems world.

Urban Challenge

from page 3

vehicles and stop-and-go procession to the stop line without excessive delay

- Navigate toward a destination in a large, open area where minimal or no GPS points are provided, as in loading dock areas or parking lots. These areas may contain fixed obstacles such as parked vehicles and moving obstacles including other vehicles.
- Safely pull into and back out of a specified parking space in a parking lot.
- Safely execute one or more three-point turning maneuvers to effect a U-turn.
- Dynamically re-plan and execute the route to a destination checkpoint if the primary route is blocked or impassable.

The following behaviors or capabilities are outside the scope of this program:

- Recognition of external traffic signals such as traffic lights and stop signs, through the use of sensors.
- Behaviors necessary for highway driving such as high speed passing or high speed merge at an onramp. Speed limits for the Urban Challenge will be 30 mph or less.
- Driving in difficult off-road terrain is outside the scope of the program. Off-road navigation in an unpaved area, travel along roads with potholes, and travel along a dirt road are within scope.

Does anyone want to volunteer to drive one of the manned traffic vehicles around this urban area while the contestant vehicles are competing?






MGC Report

from page 2

the posted presentations on our chapter web site meetings. Thanks to all of our presenters. If you missed any of them, check out the posted presentations on our chapter web site.


Another great accomplishment was the establishment of our Midwest Gateway Outreach committee under the direction of Marcos Chu. In a short time, Marcos has established a program and moved around our region to spread the word of the value of systems engineering and participation in INCOSE. I think you'll see the passion in Marcos anytime you hear him talk about Systems Engineering, our Midwest Gateway Chapter, and INCOSE. Please contact him if you'd be interested in joining his committee on this exciting mission.

Along with our new Outreach committee, your chapter is proud to sponsor three teams in the FIRST Robotics competition for 2007 with \$250 cash awards each. (FIRST stands for: "For Inspiration and Recognition of Science and Technology". See <http://www.usfirst.org/>) What better way to captivate young minds on the merits of Systems Engineering than to work with them on such a worthy cause at the impressionable high school age? Thanks to three of our Midwest Gateway Chapter members, Lou Pape, Marcos Chu, and Teresa Camp for their involvement with FIRST on their respective teams and competing for our sponsorships. Let's plan on watching them and their robots compete early next year and wish them much success in the various competitions. Your chapter's sponsorship of technology interests did not end there, however. Earlier this year, the chapter Board of




Midwest Gateway Chapter

St. Louis - Missouri



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WELCOME TO THE
INTERNET HOME OF THE
MIDWEST GATEWAY
CHAPTER OF INCOSE

Welcome to our internet site.
We hope you find it useful!

COMMUNITY OUTREACH : K-12 INCOSE Midwest Gateway Chapter is pleased to announce support to **FIRST Robotics** teams in the greater Midwest region. Midwest Gateway chapter will be awarding two \$250 grants to teams in the area with at least one mentor being a member of the Midwest Gateway Chapter of INCOSE. Selection of teams to receive the award will be based on commitment from the INCOSE member mentor in the immediate past year of FIRST Robotics competition.
[Click here to download an electronic form](#) in Microsoft Word format. Deadline for submission is 11/16/2006

Contact: [Bob Scheurer](#)
Updated 26-Oct-2006

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The Midwest Gateway Chapter of INCOSE web site offers you a way to connect with the Systems Engineering community in our region. Our site is updated monthly with Events information and past Presentations.

<http://www.incose.org/mdwest/index.htm>

Directors awarded a \$500 grant to the INCOSE Foundation to foster improvements in that scholarship program for Systems Engineers. We are one of only a few chapters fortunate enough to be able to share resources at this level.

Under the leadership of Bill Schoening and your Midwest Gateway chapter board, we have tentatively agreed to join four other chapters to hopefully bring the 2009 INCOSE International Symposium back to the Midwest. A preliminary proposal was just submitted to the INCOSE Central Office. Watch for much more on this in the future, as we work to have the first symposium back in the Midwest since the 1995 international symposium was hosted in St. Louis. As you "old-timers" will recall, that's when NCOSE became INCOSE! The year 1995 is also when the internet and web technology

became recognized for the capability they bring for communicating virtually anything at anytime and nearly anywhere. We now take this functionality for granted, but I'd like to remind you that much of our Midwest Gateway Chapter progress is posted on our web site (<http://www.incose.org/mdwest>). Thanks to Steve Recker for maintaining this essential communication resource on our behalf.

Finally, I'd like to thank you for the support and very positive feedback for this past year. Systems Engineering and INCOSE are now recognized as essential ingredients to technical success and will become even more vital in the years ahead. In that regard, please join me in wishing Mason Myers, our Chapter President for 2007, success in moving forward during these exciting times.