A Benz With a Virtual Chauffeur

A MUST read: HAMBURG, Germany — Hangar doors slid open to reveal a fleet of white Mercedes-Benz vehicles arrayed on a rain-slicked runway. As fireworks shot skyward, an imposing gray sedan zoomed forward onto a temporary stage, delivering Alicia Keys, in a dark floor-length evening gown, to the piano where she performed with a local backup band, the Hamburg Symphony. Video of Premier a MUST view.

Press Release: The new Mercedes-Benz S-Class

The aspiration: the best automobile in the world

Stuttgart/Hamburg. With the three engineering priorities "Intelligent Drive", "Efficient Technology" and "Essence of Luxury", the new S-Class extends the boundaries of technology on many levels. The S-Class is not just a technological spearhead for Mercedes-Benz but for automotive development as a whole... Finally on page 9 the really good stuff:

"Intelligent Drive: networked with all senses"

"Avoid accidents and mitigate their consequences – this is the integrated approach adopted by Mercedes-Benz Accident Research under the heading "Real Life Safety". Mercedes-Benz is systematically pursuing this strategy in the S-Class with numerous new assistance systems and greatly enhanced functions. Comfort and safety are enhanced at the same time. Mercedes-Benz calls this "Intelligent Drive". The new functions all rely on the same sensor system, comprising a new stereo camera together with multistage radar sensors. "Intelligent assistance systems analyse complex situations and better recognise potential dangers out on the road with the aid of improved environment sensor systems," explains Prof. Thomas Weber, Member of the Daimler Board of Management responsible for Group Research and Head of Mercedes-Benz Cars Development. "Figuratively speaking, the new S-Class doesn't just have eyes at the front, it has 360-degree all-round vision."

A key factor is the networking of all systems, which safety experts call "sensor fusion". The aim is to ensure comprehensive protection, not just for the occupants of a Mercedes-Benz, but for all other road users, too. The support functions range from relieving the burden on the driver and therefore increasing comfort, to issuing visual, acoustic and/or tactile warning signals, to boosting the driver's reactions. Some systems are even able to take corrective action in an emergency, such as autonomous application of the brakes to prevent an accident or lessen its severity. Here is a summary of the new assistance systems and those with notably enhanced functionality:
• **DISTRONIC PLUS with Steering Assist and Stop&Go Pilot** takes the burden off the driver when it comes to lane guidance and is also able to follow vehicles in traffic jams automatically.

• For the first time, thanks to the stereo camera the **Brake Assist system BAS PLUS with Cross-Traffic Assist** is able to detect crossing traffic and pedestrians too, and to boost the braking power applied by the driver accordingly.

• If the lane markings are broken lines, **Active Lane Keeping Assist** can detect when the adjacent lane is occupied, especially by oncoming traffic, and reduce the risk of the vehicle leaving its lane unintentionally by applying the brakes on one side.

• **Adaptive Highbeam Assist Plus** allows the high-beam headlamps to be kept on permanently without dazzling traffic by masking out other vehicles in the beams' cone of light.

• **Night View Assist Plus** was further improved and supplemented by a thermal imaging camera. Night View Assist Plus can alert the driver to the potential danger posed by pedestrians or animals in unlit areas in front of the vehicle by automatically switching from the speedometer to a crystal-sharp night view image and highlighting the sources of danger. A spotlight function is furthermore able to flash any pedestrians detected ahead. This attracts the driver's attention to the source of the danger at the same time as warning the person on the side of the road.

• **ATTENTION ASSIST** can warn of inattentiveness and drowsiness in an extended speed range and notify the driver of their current state of fatigue and the driving time since the last break, offers an adjustable sensitivity setting and, if a warning is emitted, indicates nearby service areas in the COMAND navigation system.”

Promo Video 2014 S-Class

AlainK Visits With Leading Beijing SmartDrivingCar

**Researchers**  May 26-27, 2013, AlainK and Eva Lerner-Lam, F. ITE visited with leaders in China’s automotive and ITS research to discuss ways in which their on-going work in smart driving cars and the supporting roadside and telecommunications can be integrated with international initiatives. Wang Jianqiang, Ph.D., of the Tsinghua University Department of Automotive Engineering, State Key Lab of Automotive Safety and Energy, described how their research efforts in intelligent automotive engineering, including testing SmartDrivingCars in urban street networks and energy-saving initiatives involving the national energy grid, is part of China’s national science and technology “863” research program and Dr. Li Bin, Director/Ph.D./Professor of ITS Engineering and Technology of the Research Institute of Highway (RIOH), China Ministry of Transport, described how their research in roadside and telecommunications infrastructure is part of China’s national development program. Both of these national-level research institutions are making great strides toward establishing the kinds of supporting infrastructures that will enhance the development of SmartDrivingCars. Of particular interest is the MOT ITS Research Center’s development of the transportation sector’s portion of the “Internet of Things,” which will enable the smooth integration of vehicles, infrastructure and travelers into the nation’s system architecture of intelligent systems. Both also actively participate in international research conferences and workshops and frequently sponsor lectures by domestic and international experts in SmartDrivingCars.
Experts say U.S. likely secondary market for self-driving cars

“...The U.S. is likely to be secondary market for fully autonomous vehicles when they become available in about a decade, analysts predicted Thursday. But it's not because of a lack of innovation from automakers or a problem with America's poorly maintained transportation infrastructure. It's because of the country's bureaucratic legislative system and lawsuit-happy society, which could stymie the pace of autonomous vehicle growth through driving restrictions or endless lawsuits if self-driving cars are involved in accidents. "If there is some sort of incident that happens ... that's going to slow the whole deployment down," said Jim Hall, analyst with 2953 Analytics LLP, during an Automotive Press Association panel on Thursday.

Hall mentioned China, with its growing auto market, as a more optimal location for driverless vehicles. "Most countries do not have the incredible bumper crop of lawyers that we have," he said...

I, of course, disagree! Smart Driving Cars are a lawyer's (and the new post modern Taj MaHospitals) worst nightmare because, different from crash mitigation technologies such as airbags, seat belts and crush zones, which still have accidents and the inevitable "oh my back!" and "oh you need an MRI" , SDCs avoid accidents! Avoid the "oh, my back" and "oh, you need an MRI", no lawyers, no doctors, no insurance scams! Flo and the Gecko will love it! If they don't see it then it’s time to buy an insurance company and "make hay"!

Also, the reason why China may indeed be the leading market for SmartDrivingCars is because it is the fastest growing car market, surpassed the US in new car sales in 2012 and...

2014 Mercedes-Benz S-Class arrives in China after Hamburg unveiling

It shouldn't come as much of a surprise that the new Mercedes S-class is slated to debut in China rather than the U.S. China represents the fastest growing auto market in the world currently and is already responsible for more car sales than the U.S. or Europe.

The Road Ahead:

Advanced Vehicle Technology and its Implications

May 15 2013 2:30 PM  Russell Senate Office Building - 253

Archived webcast Starts @ 26:20 It is well worth watching! David Strikland (NHTSA Administrator) begins @ 37:00. NHTSA now focusing on crash avoidance in addition to crash worthiness/mitigation. He gives an excellent testimony even though he is still pushing v2v with the driver in the loop. (Fallacy here is that the driver will know what to do in an emergency situation. A better approach is v2v in conjunction with automated crash avoidance technology that pre-empts driver actions. This is how anti-lock brakes have operated since day one. As their name implies, they inhibit the driver from locking up the brakes while automatically applying the maximum braking force, exactly as the driver intended. Automated crash avoidance systems should inhibit the driver from flipping the car while automatically avoiding the accident, exactly as the driver intended. Since the half-life of a vehicle is 10 years, the probability that two approaching vehicles will both have v2v operating as the collision approaches is ridiculously small for many years to come even if DSRC is mandated today. So the better approach is to focus on the automated crash avoidance technology that is individual vehicle centric. Technology that progressively takes the driver out of the collision avoidance loop by fusing the information on what its cameras, radars and lidars are seeing as well as any information from v2x communications channels and respond automatically to drive the vehicle without crashing. )

Senator Rockefeller expresses deep concern about the increased driver distraction caused by communication and entertainment devices and implies a desire to have them regulated out of existence and encourages the development of
countermeasures that would disable their use in automobiles. (What the Senator fails to suggest is the other alternative which is the development of automated collision avoidance technology that would relieve the driver of the constant enslavement of the driver to the thankless driving task).

Testimony of Mitch Bainwol, President of Automobile Manufacturers Association begins @ 1:14:16. He poses two questions: What are the barriers inhibiting the implementation of life saving innovations and what can the committee do to speed innovation. He states that “technology is not the biggest obstacle to speed innovation rather the bigger hurdles are: 1. Consumer acceptance, 2. Product liability, 3. Connectivity (?), Weak effort to be on the v2v bandwagon.), and 4. Fleet mix concerns.” He states further “…the driving experience in deeply engrained.” (Yet there is other testimony that younger drivers are driving less and turning to mass transportation. Maybe many of us would prefer to be chauffeured by our automated collision avoidance system for at least part of our journey). He seems most concerned, as he should be given his employer, by after-market solutions and the fact that there exist regulations constraining the design of built-in devices such as GPS systems yet such regulations don’t extend to comparable aftermarket devices. (I do take issue with his and Senator Rockefeller’s description of the typical use of smartPhone-based turn-by-turn navigation systems. From my personal experience in the development of CoPilot|Live, the systems need no user input beyond the setting of a destination which is done before the start of a trip or can be accessed as easily as a station on the car radio. (For return trips, nothing needs to be done because the system pre-supposes that you are returning.) The system also presents the right information at the right time audibly or in a form that can be captured in a glance and can readily be positioned so that one’s peripheral vision is still on the road.)

Jeffery Owens, VTO, Delphi begins @ 1:20:00. He believes that “… the next frontier for safety is to prevent the accidents before they occur. Active safety technologies are the key to reducing accidents, injuries and deaths... forward collision warning with collision imminent braking, lane departure warning and blind spot detection (Mercedes has gone even farther with automated lane-keeping and lane change preemption). He feels that consumers are not sufficiently aware of the availability of these safety features and appropriately encourages for a modification of the New Car Assessment Program’s (N-CAP) STAR rating system that appears on all new car window stickers. “Today N-Cap is not structured to accommodate active safety vehicle options... Delphi is recommending that NHTSA amend the STAR rating system to include active safety collision avoidance features and be incorporated in the window sticker on all new cars. These are mature technologies that have been on the road since 1999 and are ready to be deployed in high volume.” He is focused on the consumer: “…the best path forward is to provide a forum they (the consumer) can use and to which the market can respond....”. While he advocates for automated systems he still demands that drivers “…keep their eyes on the road, hands on the wheel, minds on the mission...”. My question is: at what point will Delphi be confident enough in its technology that it will allow drivers for even just short periods of time to take their “eyes off the road, hands off the wheel, minds off the mission”? He claims that the current systems will save lives, but how do they do that if not by operating when we have “our eyes off the road, hands off the wheel, minds off the mission” or going beyond our capabilities when we do have “our eyes on...”? If they are that good, and I believe that they are, then why isn’t he saying: go ahead, take your eyes off the road, ...? I know, he’s covering his ...! He ends by discussing Delphi’s “…industry first integrated radar and camera system that combines radar sensing, vision sensing and data fusion in a single module... as well as other Delphi technologies and “… believes that the foundation for safer driving is the robust deployment of active safety technologies.”

Peter Sweatman, UMTRI, describes his v2v demo consisting of 3,000 vehicles

John Lee, U of Wis. @1:31:10 focuses on the human side of driving. He is concerned about an automated driving system unexpectedly handing back control to the human driver. He claims, without giving support, “...changing vehicle technologies may make such situations... more likely”. (Nothing happens instantly and there is no reason why a system can’t be designed to properly anticipate that handing off to a (less capable) driver such that it doesn’t come as a surprise.) He does suggest “… that in 15 years we are likely to be discussing whether people should be allowed to drive because autonomous vehicles are so much less error prone that people.” He is appropriately concerned about the proper design of the human-machine interface. He “...draws upon the wisdom of the Committee on of Electronic Vehicle Controls and Unintended Accelerations and paraphrases.. 1. Do electronic interfaces... delay responses in emergency situations, 2. Promote government and industry collaboration to create designs that communicate vehicle
capability and status to drivers, 3. Identify when driver’s expectations of vehicle automation diverge from driver’s intent and finally establish data recorders and associated infrastructure to catch design errors that escape even the most thorough design process.”

Questioning begins @ 1:36:10: How much will the infrastructure cost? They finally admit after prodding that “… you can do the individual car implementation that will get you a lot of the way there (“v2v safety which will take forever to get there”, their words) without any kind of infrastructure dependency… you’d have an individual machine that could operate with a higher degree of safety and less fatalities for sure.” There is also the response that the “driver assist technology is the market driven technology and its costs will come down over time and there the individual will make the choice. When you get to the connected car, that’s a different animal. That’s where government needs to get involved and there are two responsibilities: 1. To make sure the spectrum works...and 2. since infrastructure is government funded the rollout will in large part be dictated by government.” Senator Johnson’s (R Wis) response was… “that one I’m skeptical of”. Senator Rockefeller’s uneasiness about letting the market work with respect to active safety systems is addressed well @ 2:04:46 by Bainwall: “… the marketplace is producing today driver assist technologies … we are on the precipice of a golden age in safety…” Finally Prof. Lee recommends that NHTSA needs to evolve to “…a better information infrastructure to help NHTSA identify and understand the inevitable failures that will come out of these computerized automobiles.” So that the failures can be fixed and enable the technology to evolve properly.

What was barely mentioned was the role of insurance. Cars equipped with active collision avoidance technology must be cheaper to insure. NHTSA should maintain and make readily available detailed real-time accident rates by vehicle equipment type so that the safety benefits of the various technologies are appropriately quantified and insurance companies can properly price insurance. Such clarity will go a long way to propel the proper evolution of SmartDrivingCars in the marketplace.

The National Automated Highway System That Almost Was


This is a very good article about the Federal government’s AHS (Automated Highway System) development program of the mid 90’s. It rightly points out the primitive nature of GPS and computers; however the AHS concept was itself fatally flawed. It achieved a “moon-landing” demonstration consisting of a string of eight automated cars following each other along one 7.6 mile lane of I-15. It’s video’s naiveté makes it hard to watch. The article ends with …”Needless to say, the program didn’t deliver driverless cars and automated highways to Americans. So what was the problem? The legislation didn’t really give the Department of Transportation any direction on how they should go about the research—only that they needed to demonstrate it by 1997. But perhaps the biggest problem was that the legislation never clearly defined what was meant by “fully automated highway system.”” I respectfully disagree, the system was clearly defined, it was simply, wrongly defined.

Even with todays “mature” GPS and computers it didn’t deserve a chance to succeed. The concept had the fatal flaw of being exclusive rather than inclusive: automated highways used exclusively by automated cars rather than: SmartDrivingCars co-operating with manually driven cars inclusively on existing highways. The beauty in SmartDrivingCars is that they don’t require any infrastructure investment in order to deliver a substantial portion of the AHS value proposition: “…improving safety, ..., travel times and better fuel economy.” Absent from the AHS value proposition are comfort, convenience and peace-of-mind, elements that might motivate a customer to purchase such a vehicle. There was little, if any, consumer focus.

Contrast the National AHS effort with what Daimler has done in the past month. It has introduced to the consumer marketplace the Mercedes 2014 E-and S-Class, “semi-automated SmartDrivingCars”, without requiring NJ DoT or any other agency to insert “magnetic nails” or “DSRC” or any other gizmo into any of New Jersey’s or any other’s roads. Once purchased, each E and S Class Mercedes configured with the driver assist option (@< $3,000 incremental cost) will for
the life of that car deliver to its owner enhanced safety, comfort, convenience comparable to that envisioned by the National AHS System.

With SmartDrivingCars beginning to roll out of showrooms, it would behoove those responsible for Road Infrastructure and the Rules of the Road to properly acknowledge the presence of these new users of their Roads and Rules. Undoubtedly, even greater safety, comfort and peace-of-mind may be achieved by discovering alternatives in the maintenance and design of infrastructure and the Rules that delivers enhanced mobility for not only manually-driven cars but also SmartDrivingCars.

Calendar of Upcoming Events:

Stanford University, Palo Alto, CA Transportation Research Board’s premier multidisciplinary research and policy conference focused on Road Vehicle Automation. If you are actively involved in road vehicle automation and would like to actively contribute to the success of this conference by becoming a patron or sponsoring one of the meals, please contact me at alaink@princeton.edu.

June 17-18, Rutgers University
June 11-12, Detroit MI
June 26-28, Gold Coast, Australia

Mercedes “Hard to Imagine” Commercial. I watch little TV, but I am pleased that Mercedes continues to hit prime spots with this ground-breaking commercial. NBC had it right after the running of the Kentucky Derby and it aired several times in the New York market during the Rangers Playoff games. They are even playing this spot on during the Daily Show. They must be seeing traction.

Uncongested Mobility for All: NJ’s Area-wide aTaxi System

Part 1, The Demand for Mobility This year my students and I have been conducting a quantitative assessment of the mobility implications of the ultimate in Smart Driving Cars. The task was simple: How well could a truly safe fleet of self-driving cars serve the full spectrum of personal mobility needs...
Mercedes is 1st Mover and Lifts Bar with ‘14 Mercedes E-Class Safety Features

Supported by the following TV Commercials (If you haven’t seen them on TV they are worth watching “

“Hard to Imagine” Commercial

“Clown” Commercial

From the Public Sector: My response to the US DoT on Surface Transportation System Automation (http://orfe.princeton.edu/~alaink/SmartDrivingCars/Kornhauser_%20Response2AutomationRfi.pdf)

The Business Case for SmartDrivingCars: For the consumer, SmartDrivingCars have three main values: increased safety, comfort and convenience. Of these safety is most easily quantified because damages are largely adjudicated in monetary terms. AAA estimates that traffic fatalities and injuries amounted to $256B in 2011, or a cost of about $1,328 in ’05 dollars for each licensed driver. Of this amount approximately 50% ($664) is paid by private insurance, the pass-through portion of insurance premiums. Individual crash victims absorb 26% ($340) of the cost (basically the deductable of what the insured has to absorb if involved in an accident), other 3rd parties absorb 14% ($185), the Federal treasury absorbs 6% ($80) and local municipalities 4% ($50). Google’s simulation of the operation of its self-driving car on the range of real crash scenarios resulted in a forecast of 81% fewer fatalities and 65% fewer injuries. This substantial reduction in car crashes would save in the US $183 billion annually. Moreover, these safety improvements would be enjoyed proportionally by each owner/user of a Google car. Thus, the insurer of the average licensed driver switching to a “Google car” could expect to reduce its pass-through liabilities by an average of $475 per year. Since these are simply pass-throught dollars, one could expect that an insurance price-leader might readily offer discounts of up to, say, $450, keeping the expected remaining $25 for its “generosity”. The Google car user would also forgo $247 in expected “deductible self-insured” obligations.

The $450 insurance discount could readily finance, if not the expensive Google “lidars”, the lower cost radars and cameras contemplated by the auto industry for its initial wave of automated lane keeping and “always-on” collision monitoring and avoidance systems. For example, the Mercedes “jam-assist” system is expected to be available on 2014 models as a $3,000 “driver assistance safety option”. While jam-assist doesn’t have all of the features of a Google car, it may be able to capture as much as two-thirds of the safety benefits through the collisions that jam-assist can be expected to avoid during the car’s lifetime. If so proven, then the $300 discount that Flo, or the Gecko, or Good Hands or the General or some other insuer can readily offer would essentially finance this $3,000 safety feature. In fact Flo
should escort you to the Mercedes dealer and pay for the option if you agree to buy a Mercedes and continue your current policy payments. (Remember, in giving Mercedes $300 per year over say 12 years, she is also keeping that $25 “generosity” for her effort, so she is happy.) In addition to substantially reducing the probability that this car is going to kill you, what’s in it for you? Well, how about the two-thirds of the $247 self-insurance expected obligation that you would avoid each year. More importantly you get the anxiety-relief that flows from having driving assistance while traveling in some of the most tedious, boring and unpleasant roadway conditions. Finally, society wins because we can’t really place a value on the injuries and fatalities that will be prevented. They are priceless!

Going all the way with Google Cars (or even just two thirds of the way with “jam-assist”) would mean for New Jersey an annual avoidance of 500 (340) fatalities and 28,000 (19,000) injuries “valued” at $3.55 ($2.38) Billion per year.

We MUST make this happen. Everybody wins.

European Update: Workshop: Automation in Road Transport (contains links to participants & presentations)

As background if you haven’t read it: from June 29, 2011: Definition of necessary vehicle and infrastructure systems for Automated Driving Final report SMART 2010/0064

Best videos from Workshop: Automation in Road Transport (contains links to participants & presentations)

Automated Steering Avoidance of imminent collision on Frozen Lake done Feb 23, 2013. Videos of automated collision avoidance maneuvers involving only steering followed by Volvo Platooning video

European Update: Workshop: Automation in Road Transport (contains links to participants & presentations)
Continental and BMW Group Working Together to Develop Freeway-Grade Highly Automated Driving

This is BIG, not only because they have “an agreement to jointly develop an electronic co-pilot for this purpose”, but because...

- It aligns a component supplier with a manufacturer. Where does this leave Daimler and VW/Audi? To join up with Bosch?? What about Delphi? Join back with GM on this one?? Where does this leave the other manufacturers; will they align? The competitive race to attract consumers to the showroom has really heated up.
- They’ve realized that safety is now clothed in comfort & convenience. Together, they make a powerful message to the car buying public.

This technology will draw people into the showrooms. The wake-up call was delivered by the emergent competitor, Google, rather than government edicts or rule-makings. “...[I]n capitalist reality..., it is not [price] competition which counts but the competition from the new commodity, the new technology...- competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives.” Joseph A Shumpeter (1883-1950)

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