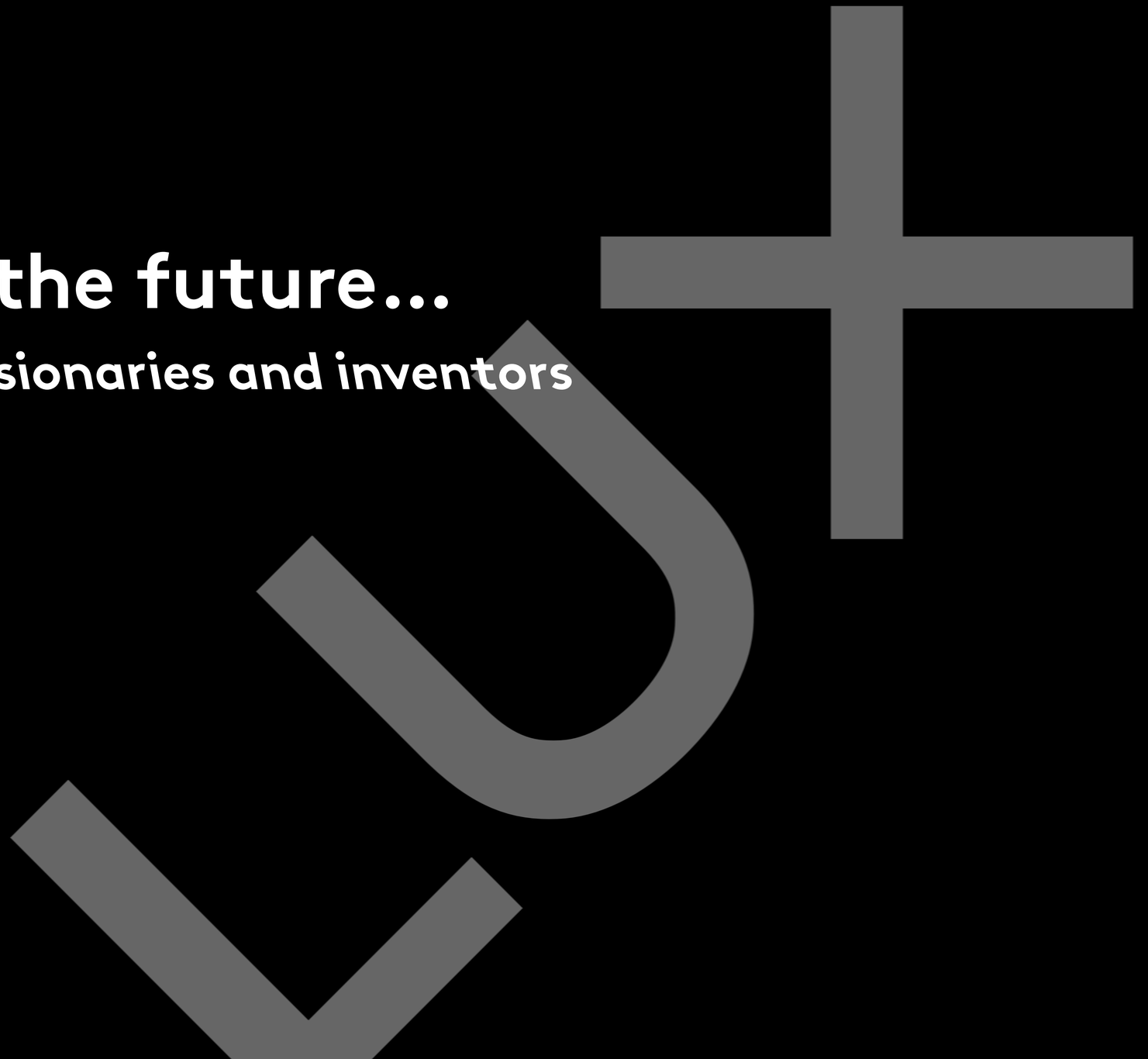
Accelerating the future...

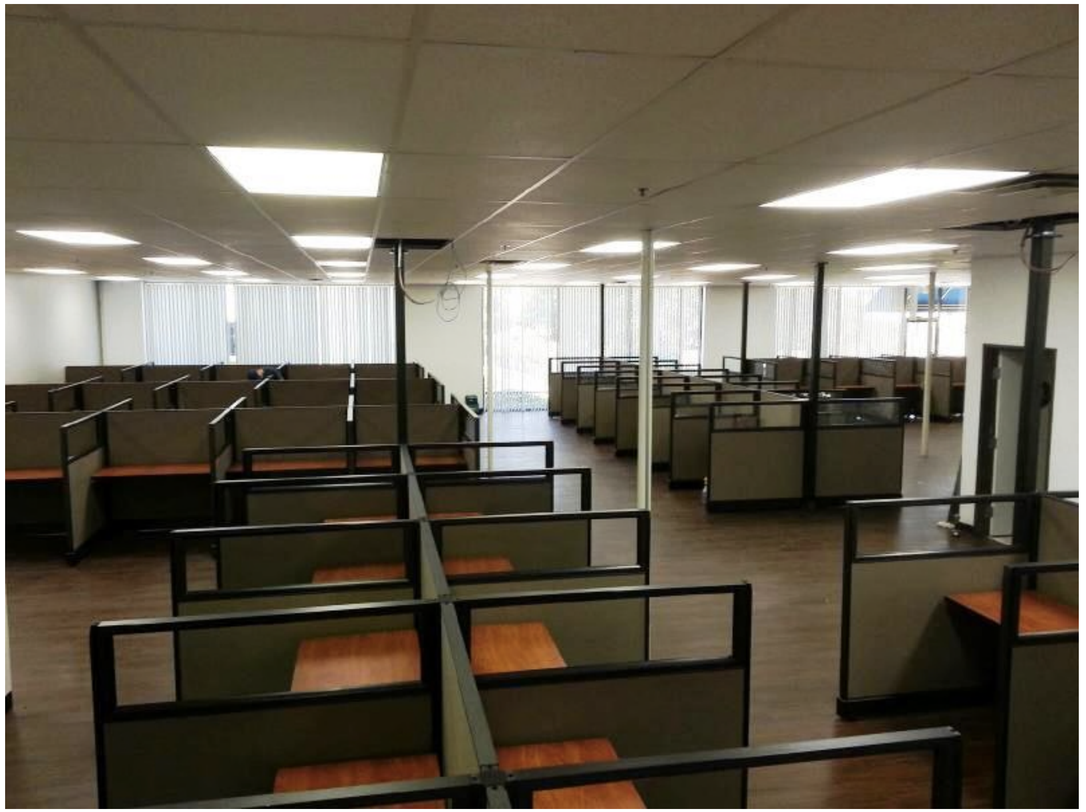
...by empowering visionaries and inventors

@farshchi



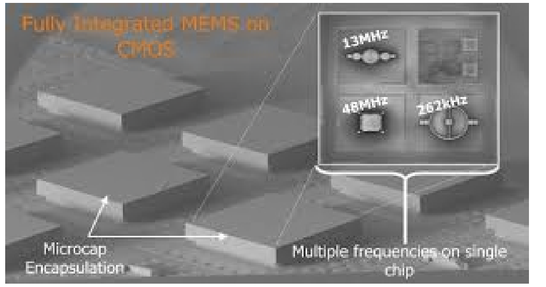
NASA
Glenn Research Center

NASA
Glenn Research Center



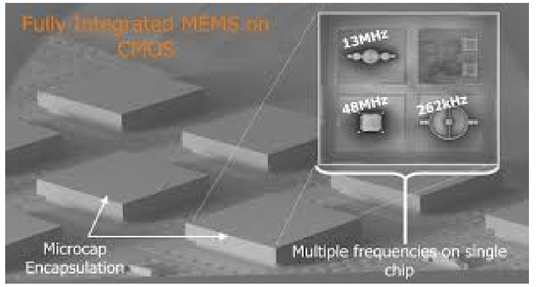
sf@lux.vc

sf@lux.vc

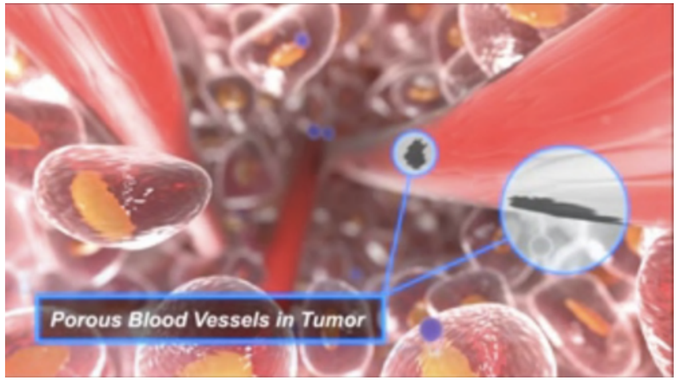

Fully Integrated MEMS on CMOS
13MHz
48MHz
262kHz
Microcap Encapsulation
Multiple frequencies on single chip

PCMIA

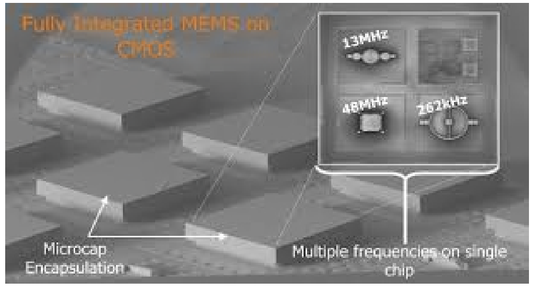
sf@lux.vc


Fully Integrated MEMS on CMOS
13MHz
48MHz
262kHz
Microcap Encapsulation
Multiple frequencies on single chip

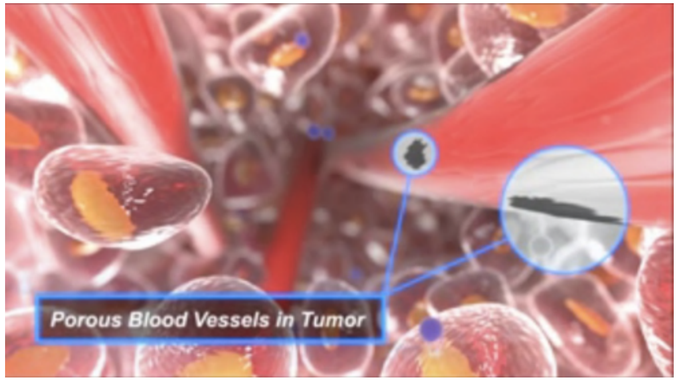
www.semiaccurate.com


Porous Blood Vessels in Tumor

sf@lux.vc


Fully Integrated MEMS on CMOS
13MHz
48MHz
262kHz
Microcap Encapsulation
Multiple frequencies on single chip

www.semiaccurate.com

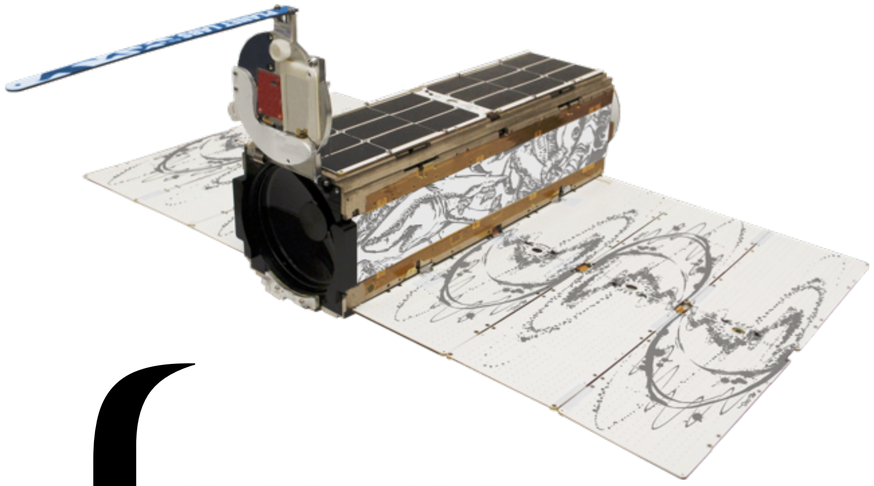

Porous Blood Vessels in Tumor

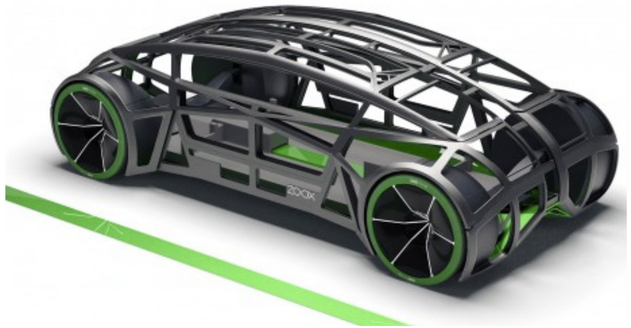
sf@lux.vc

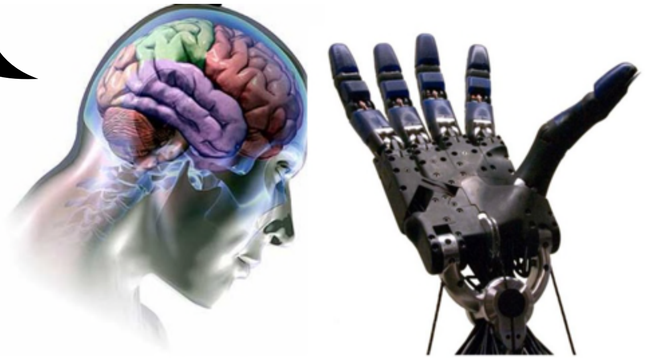
Into the mind of a VC…

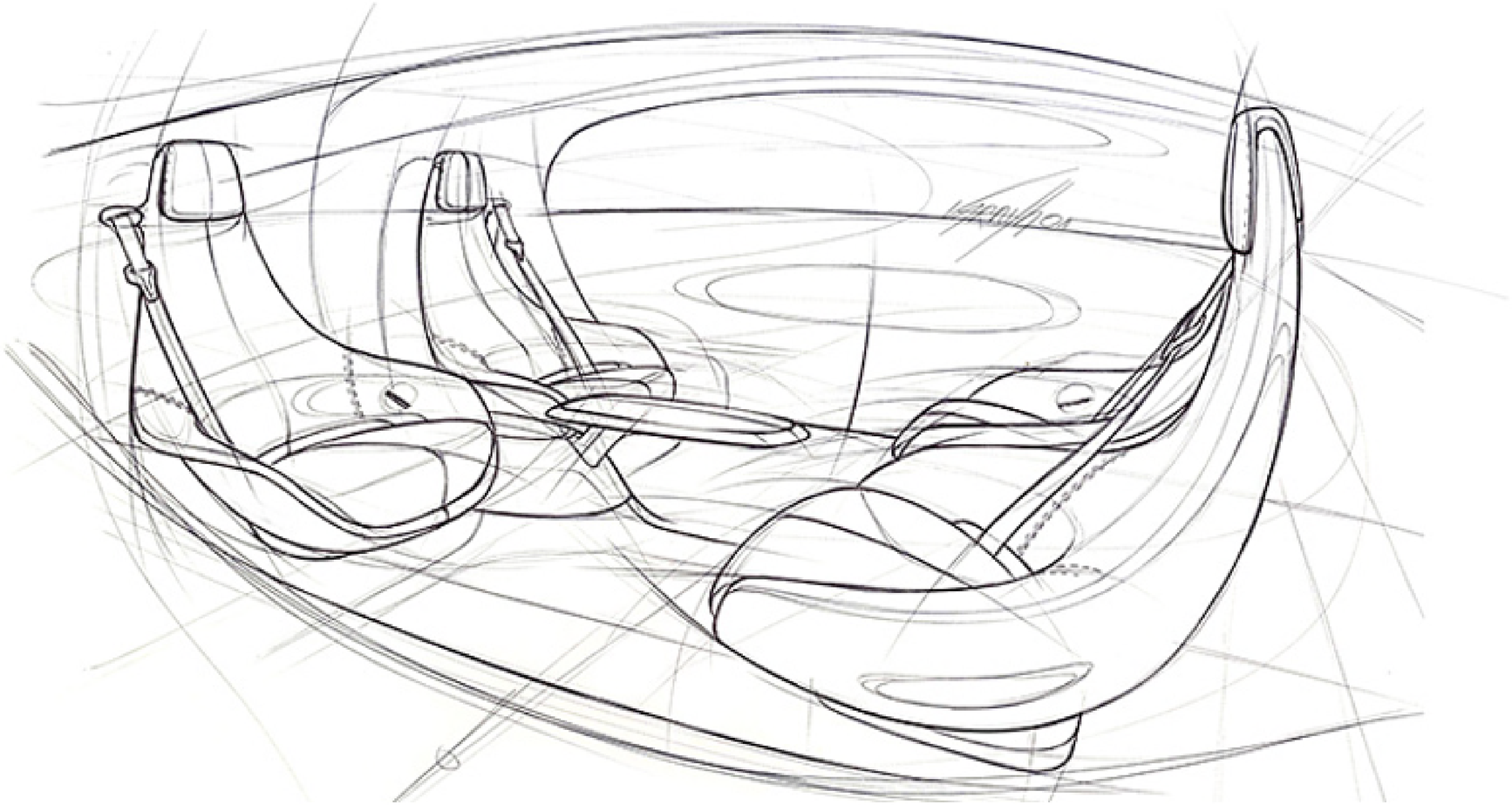
Metrics

Impact







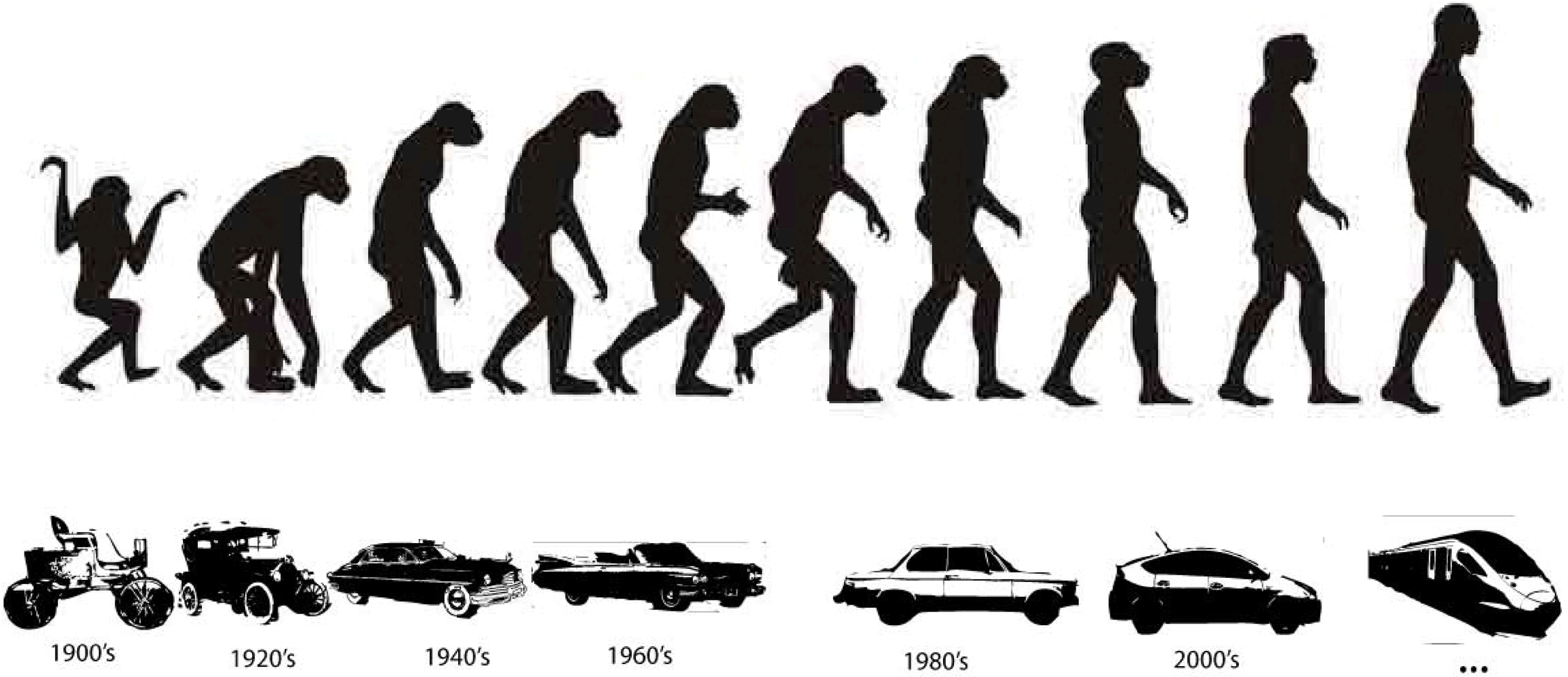


Manufacturability

Style and Performance

Safety and Emissions

Autonomy



Driverless cars are coming sooner than you think

By Ashley Halsey III May 13

Will Nissan Follow In Kodak's Footsteps By Rejecting Driverless Cars?

Forbes
5/20/2015

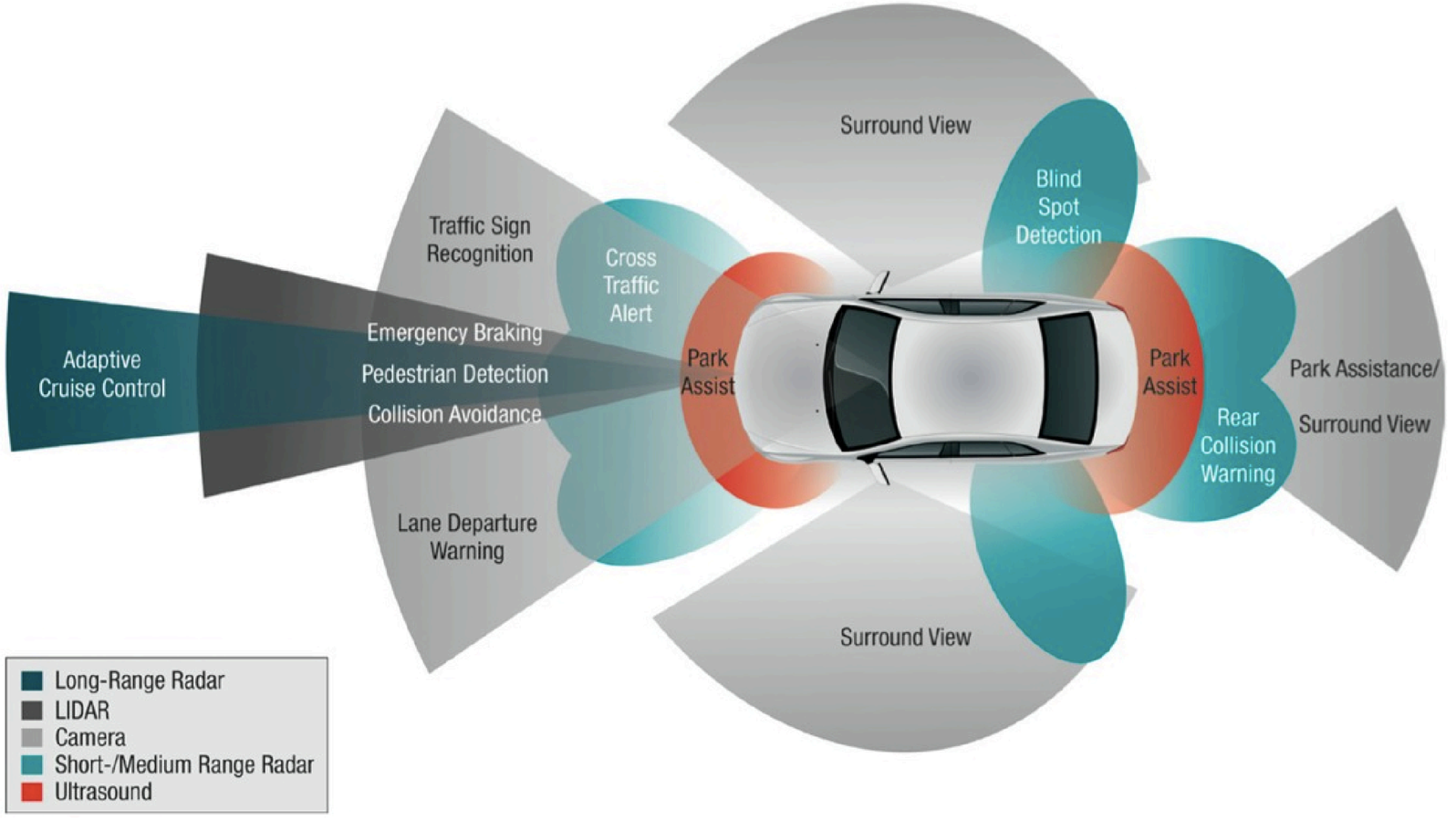
Driverless car rides? Garcetti hopes L.A. will be first

Los Angeles Times
By SOUMYA KARLAMANGLA
9/30/2014

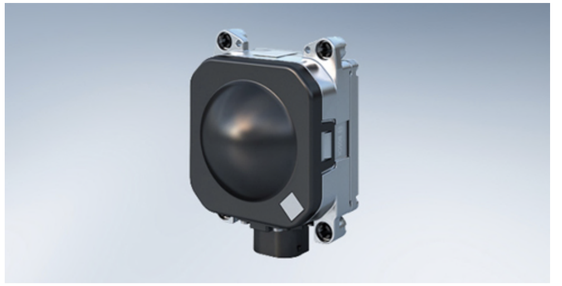
How Do You Insure a Driverless Car?

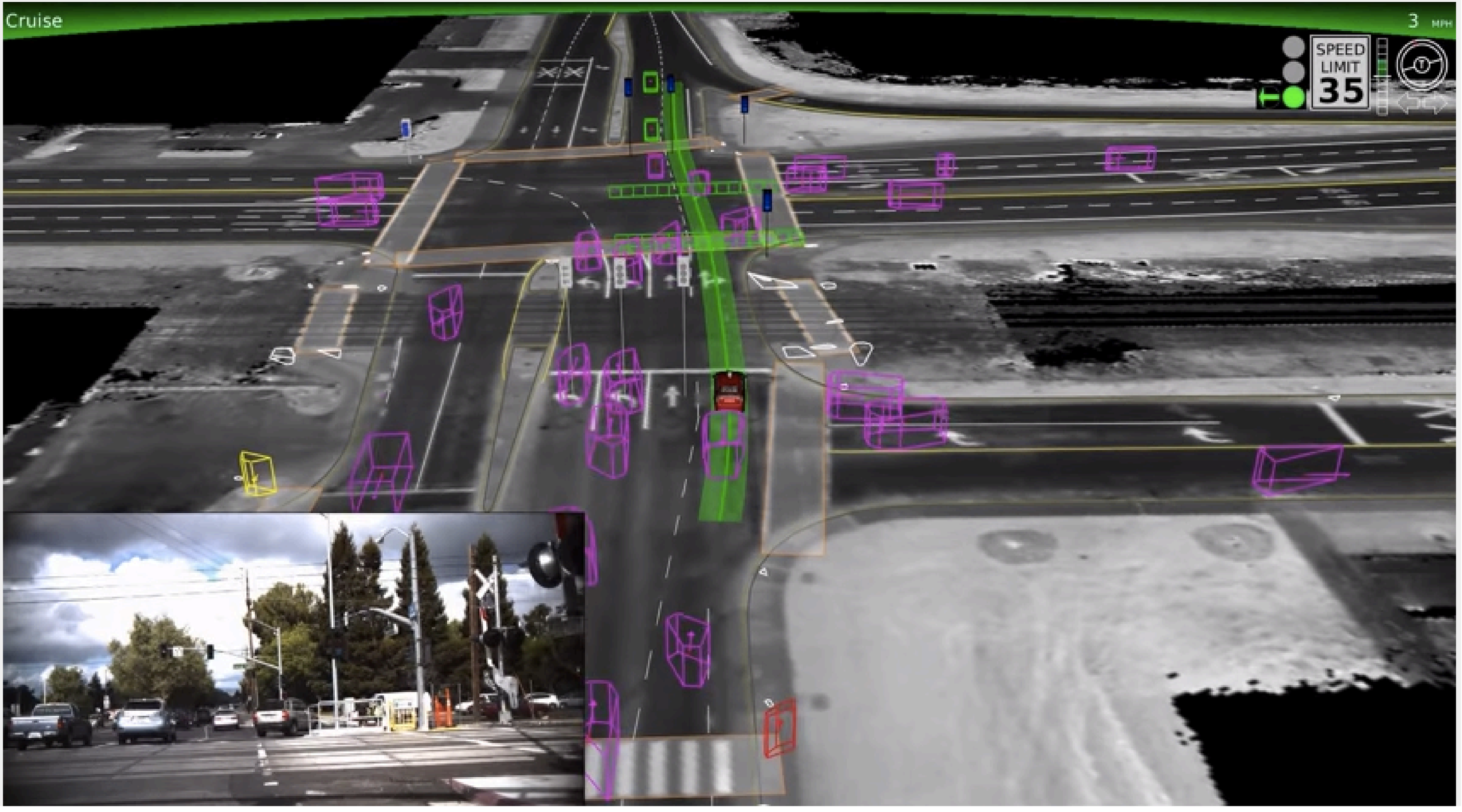
Auto Makers Seek Approval in Some States as Regulators, Insurers Weigh Liability

THE WALL STREET JOURNAL.
By JOSEPH B. WHITE
Aug. 7, 2014 1:26 p.m. ET


Surround View
Blind Spot Detection
Traffic Sign Recognition
Cross Traffic Alert
Adaptive Cruise Control
Emergency Braking
Pedestrian Detection
Collision Avoidance
Park Assist
Park Assist
Park Assistance/
Surround View
Rear Collision Warning
Lane Departure Warning
Surround View
Long-Range Radar
LIDAR
Camera
Short-/Medium Range Radar
Ultrasound

Velodyne

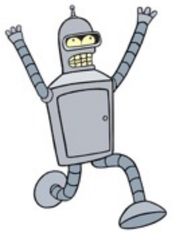



Cruise
3 MPH
SPEED LIMIT 35

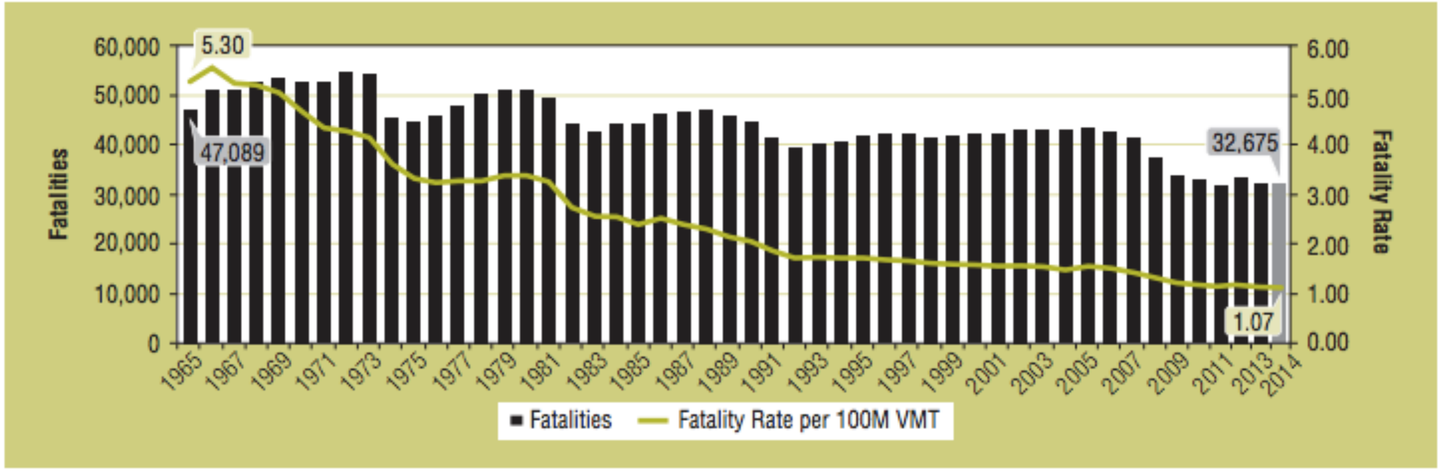
CBINSIGHTS

www.cbinsights.com

CRUISE drive.ai comma, ZOOX

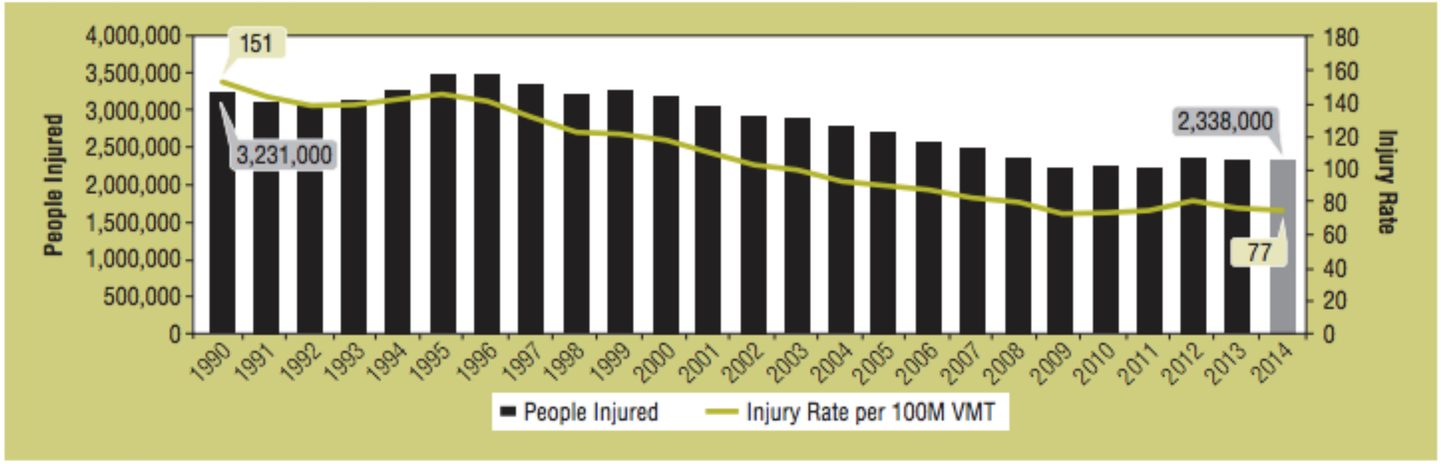


Fatalities and Fatality Rate per 100 Million Vehicle Miles Traveled by Year



Source: 1965–1974: National Center for Health Statistics, HEW, and State Accident Summaries (Adjusted to 30-Day Traffic Deaths by NHTSA);
FARS 1975–2013 (Final), 2014 Annual Report File (ARF); Vehicle Miles Traveled (VMT): Federal Highway Administration (FHWA).

People Injured and Injury Rate per 100 Million Vehicle Miles Traveled by Year



Source: NASS GES 1990–2014; VMT: FHWA.

- > 30k killed
- > 2.3M injuried
- 1.07 deaths per M mi
- 77 injured per M mi

Driving to Safety

How Many Miles of Driving Would It Take to Demonstrate Autonomous Vehicle Reliability?

by Nidhi Kalra, Susan M. Paddock

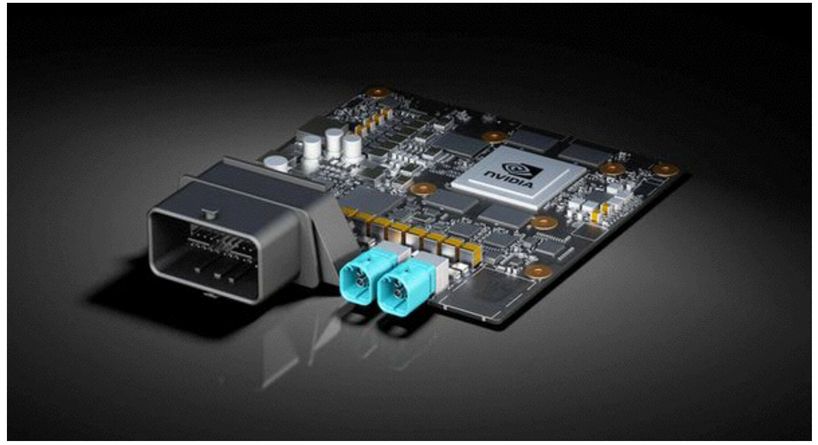
Related Topics: Autonomous Vehicles, Traffic Accidents, Transportation Safety

		Benchmark Failure Rate		
Statistical Question	How many miles (years[a]) would autonomous vehicles have to be driven...	(A) 1.09 fatalities per 100 million miles?	(B) 77 reported injuries per 100 million miles?	(C) 190 reported crashes per 100 million miles?
	(1) without failure to demonstrate with 95% confidence that their failure rate is at most...	275 million miles (12.5 years)	3.9 million miles (2 months)	1.6 million miles (1 month)
	(2) to demonstrate with 95% confidence their failure rate to within 20% of the true rate of...	8.8 billion miles (400 years)	125 million miles (5.7 years)	51 million miles (2.3 years)
	(3) to demonstrate with 95% confidence and 80% power that their failure rate is 20% better than the human driver failure rate of...	11 billion miles (500 years)	161 million miles (7.3 years)	65 million miles (3 years)

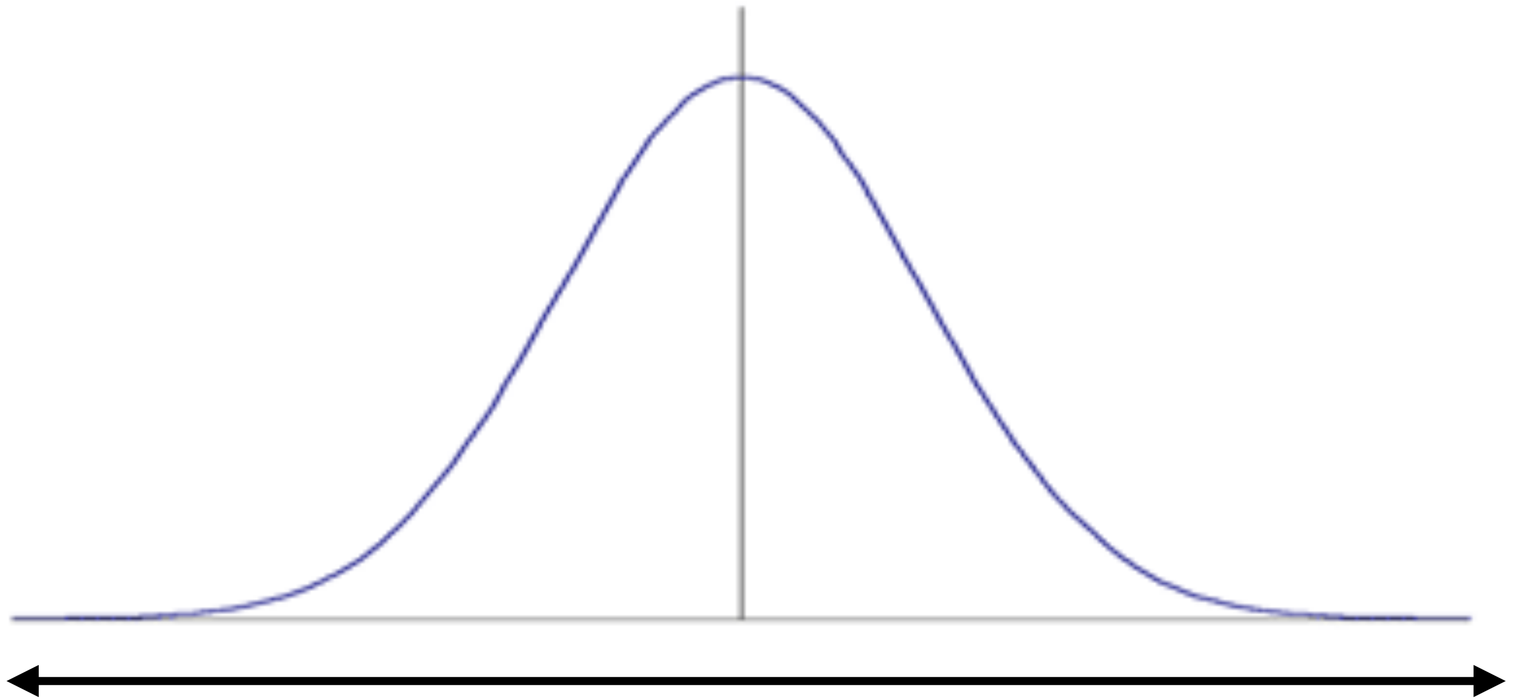
[a] We assess the time it would take to compete the requisite miles with a fleet of 100 autonomous vehicles (larger than any known existing fleet) driving 24 hours a day, 365 days a year, at an average speed of 25 miles per hour.

http://www.rand.org/pubs/research_reports/RR1478.html

- 400B trips per year
- 6.1M crashes
- 1/65,000 chance of getting into a crash

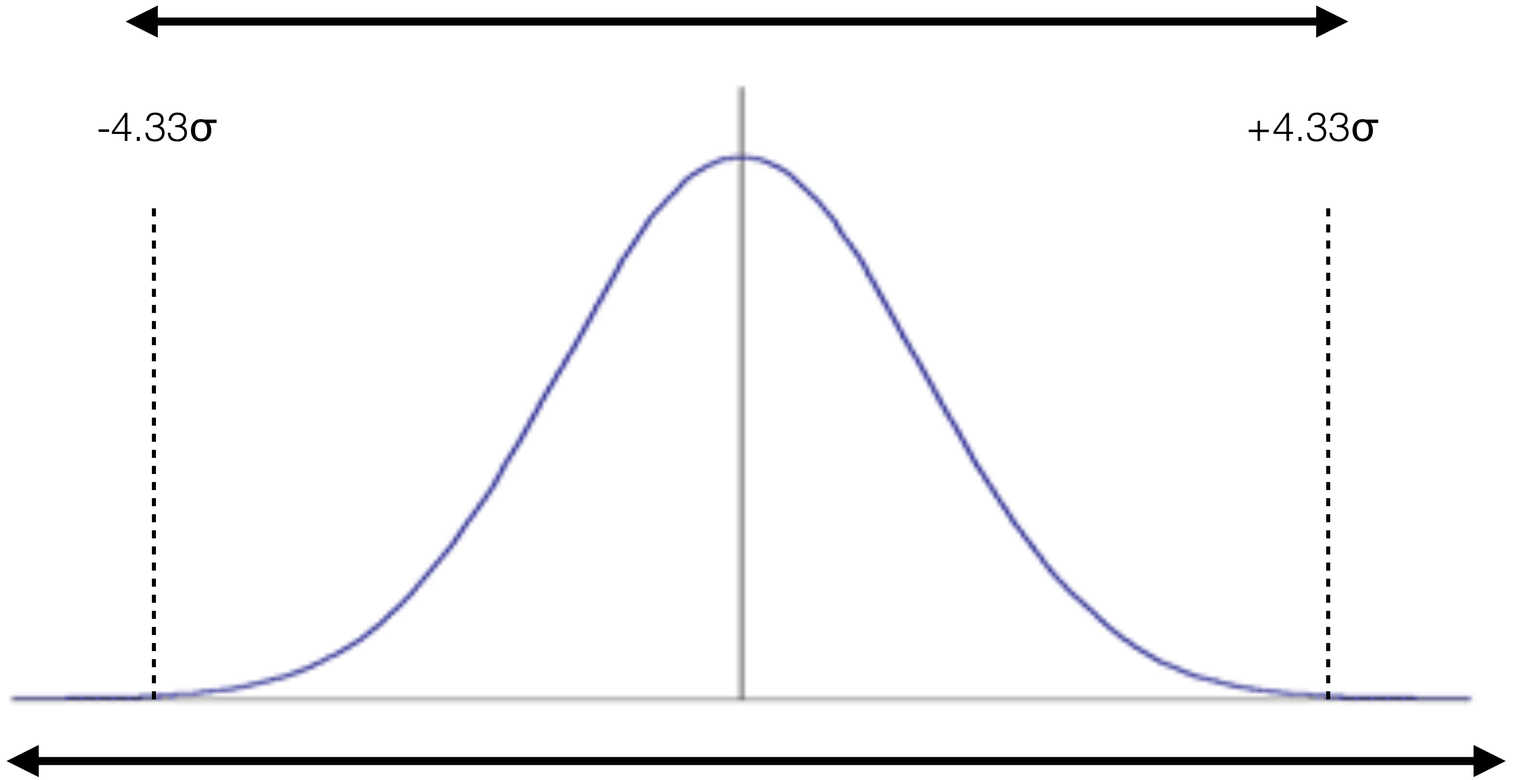


- Safely handles what it’s seen
- Learns from other AIs
- Could crash if it encounters the unknown



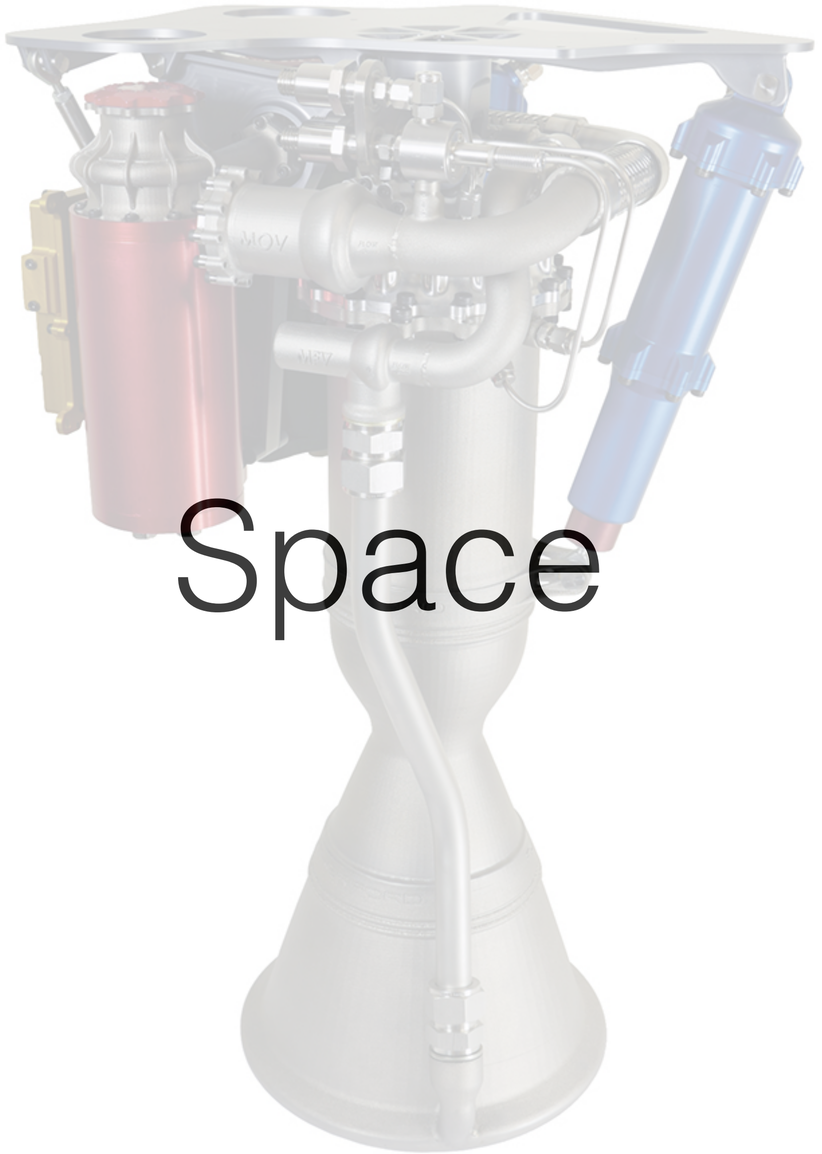
Distribution of possible events a vehicle can encounter

Portion an AI needs to encounter to be as reliable as humans



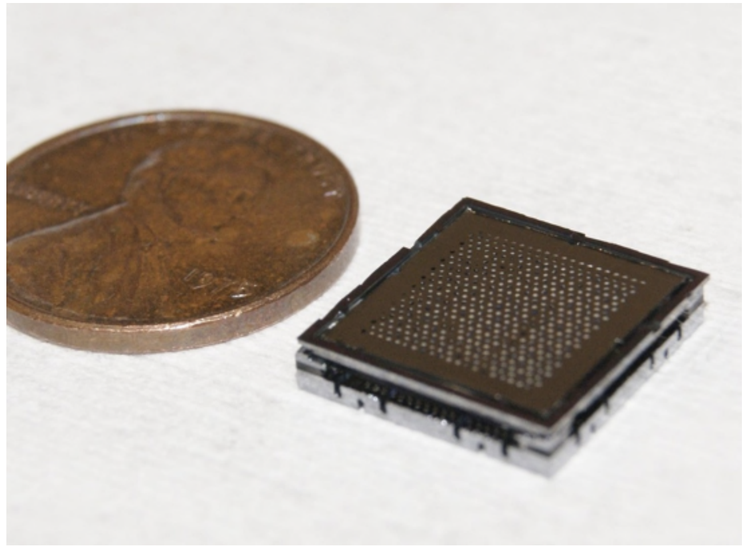
Distribution of possible events a vehicle can encounter

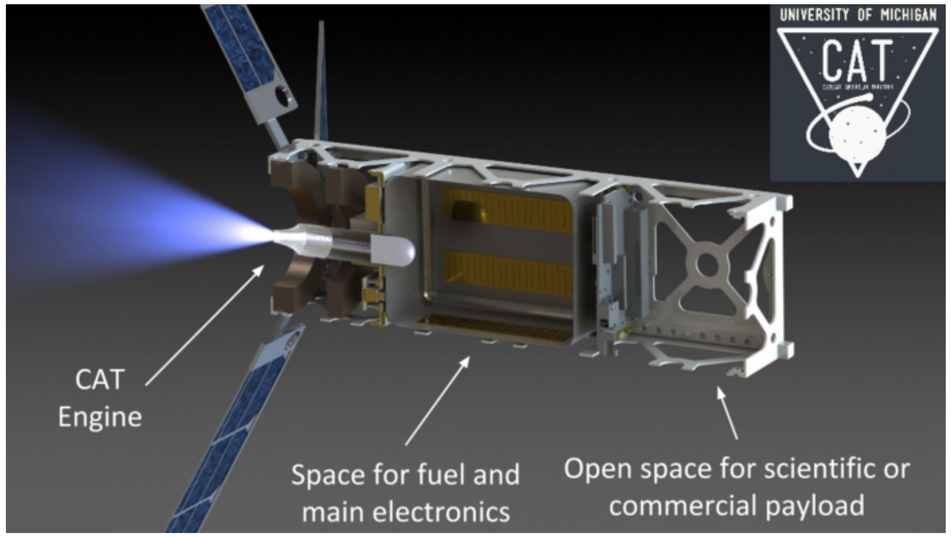
- AI-enabled products should be held to new standards
- We will save lives by adopting imperfect driverless cars
- Let’s build tools that build, subject AIs to, and measure them against these corner cases

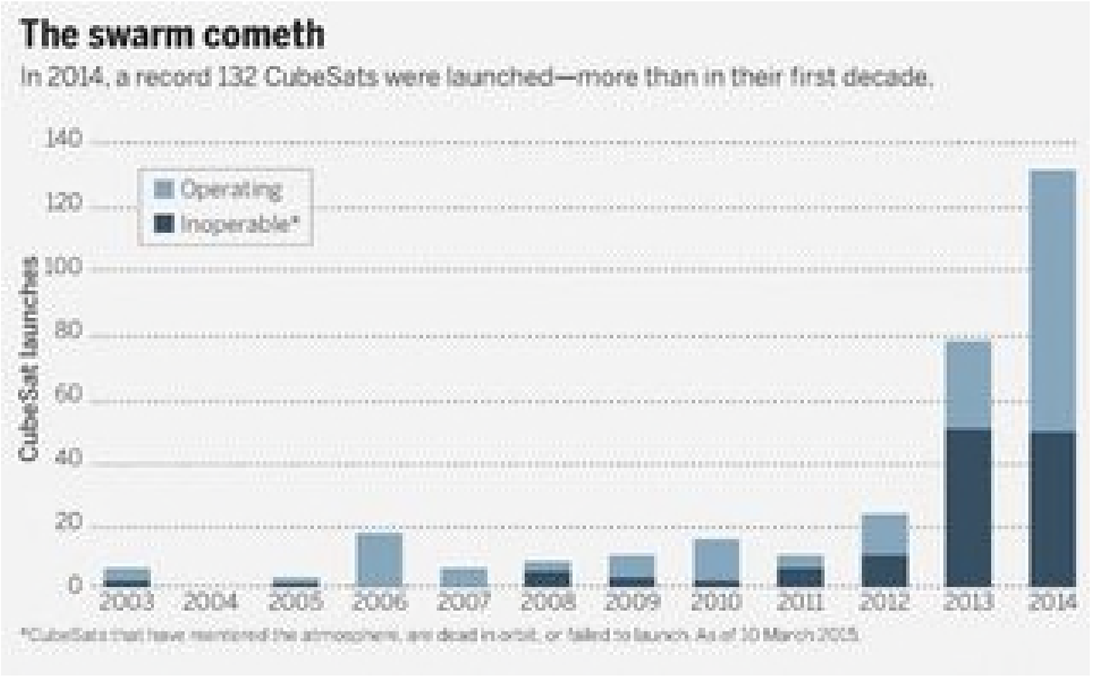


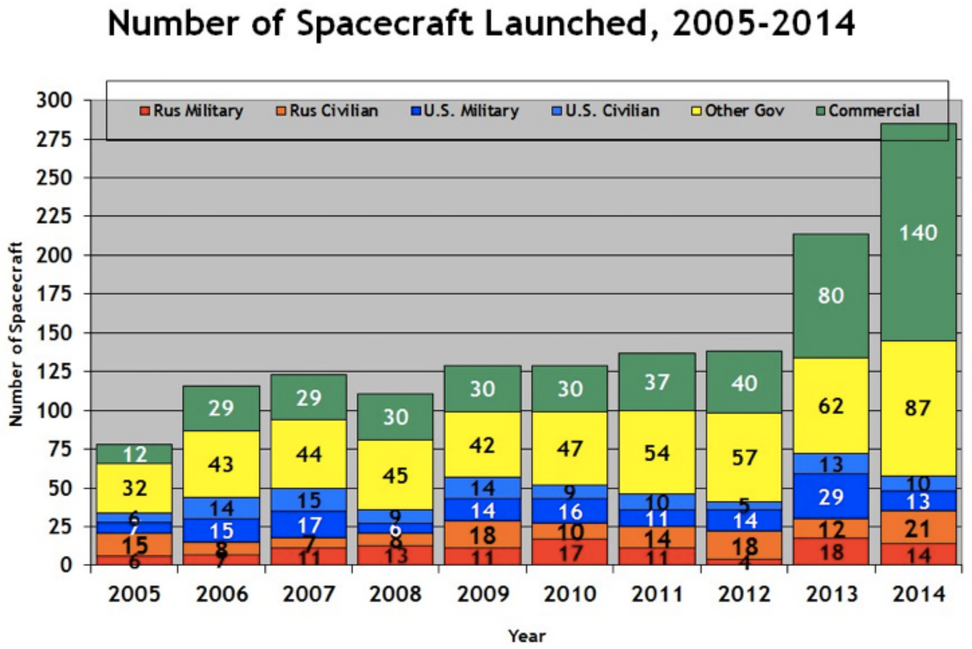
Space

Accessing space

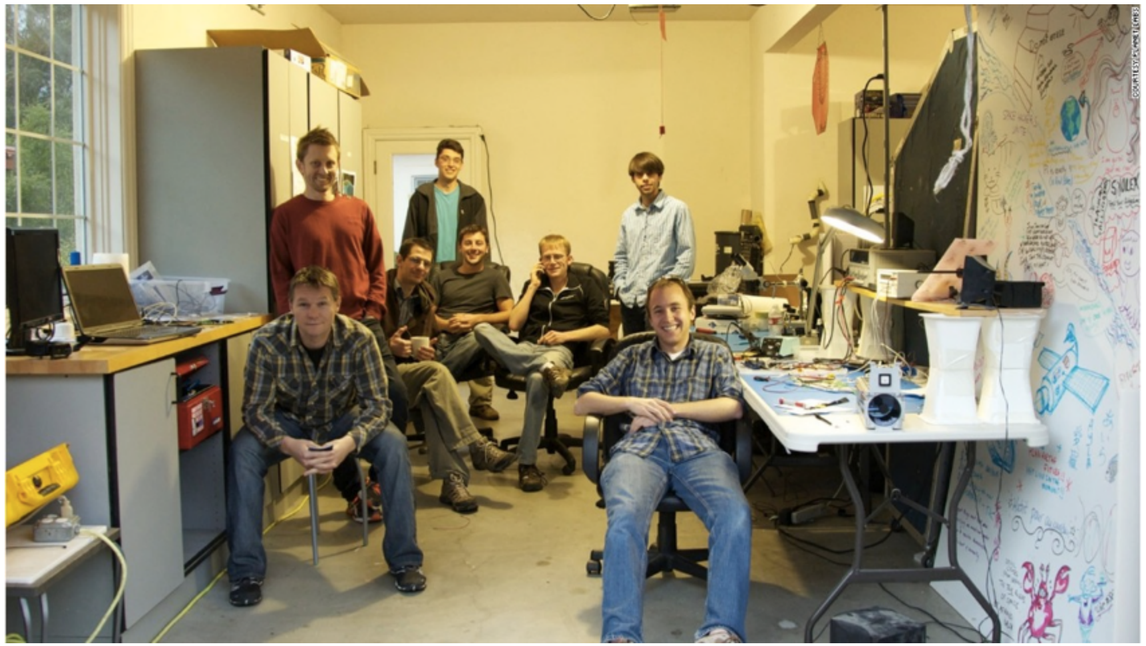


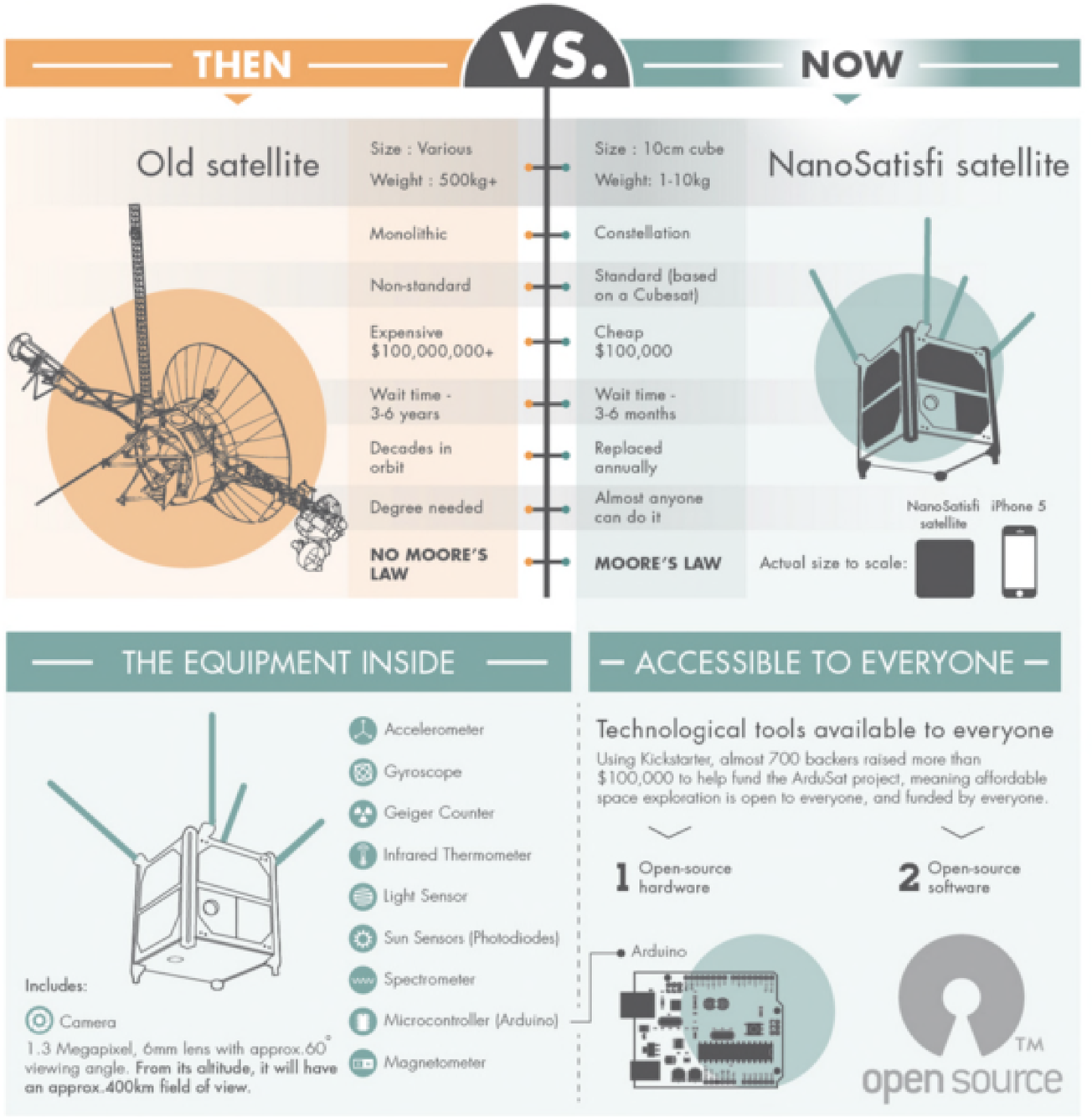




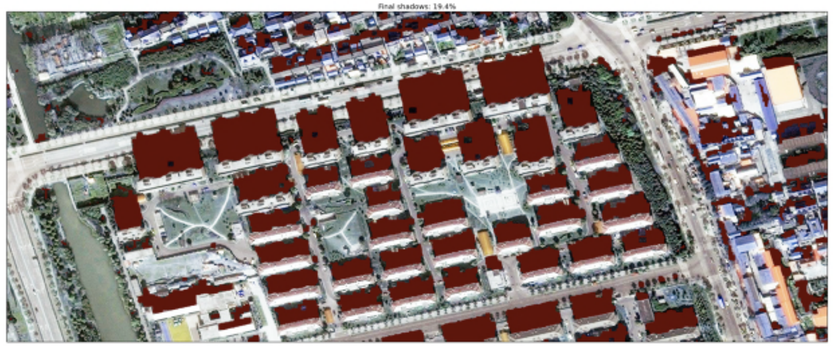


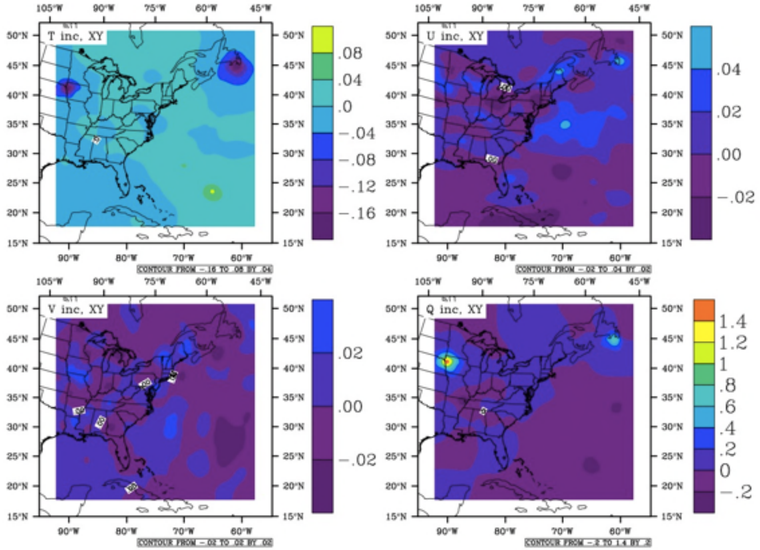
Democratizing space



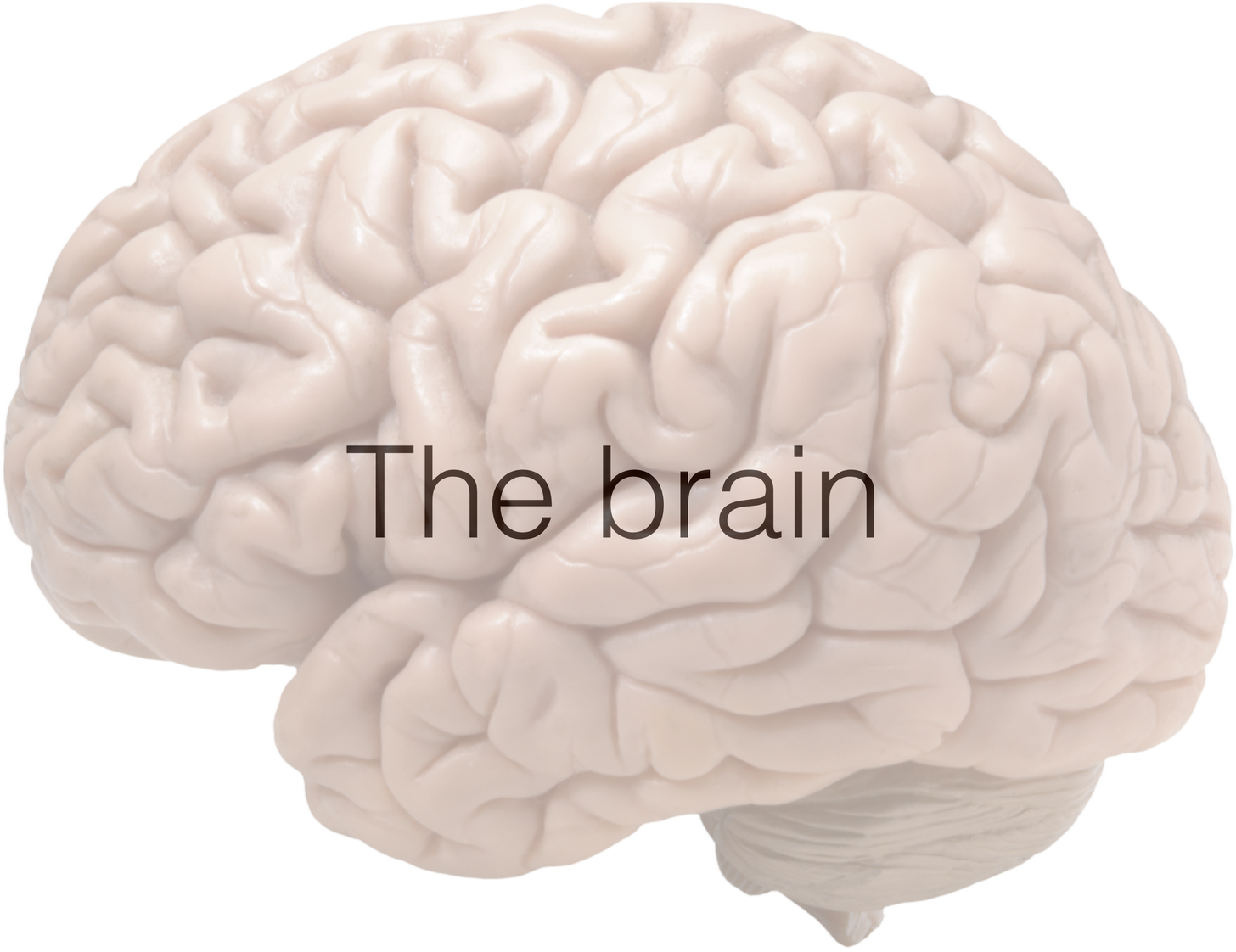


Pixels -> Signals





The brain



BUSINESS INSIDER

I controlled a robot arm with my brain, using this high-tech headset

Tanya Lewis
Dec. 7, 2015, 12:14 PM 11,493 1

Newsweek

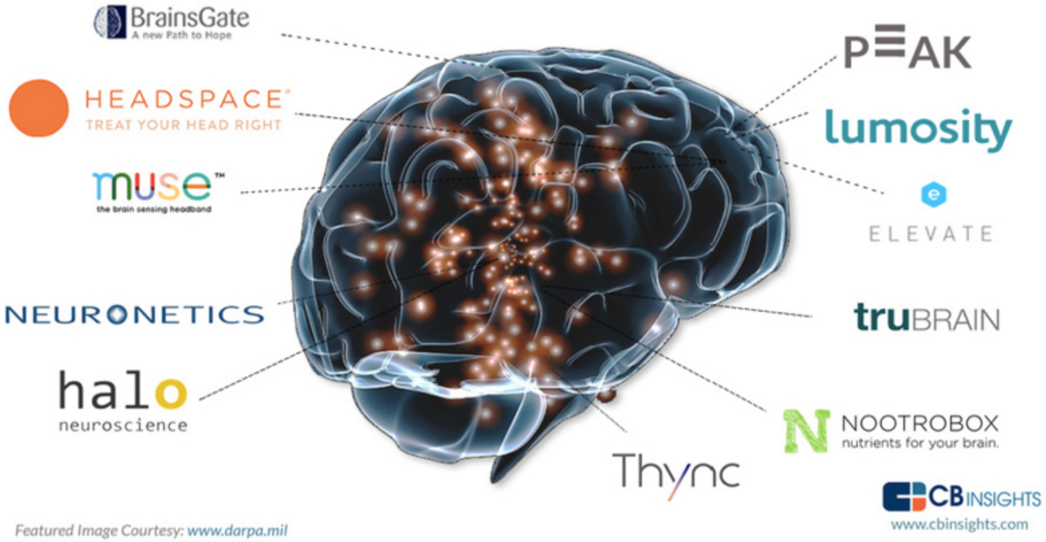
TECH & SCIENCE

U.S. MILITARY PLANS CYBORG SOLDIERS WITH NEW DARPA PROJECT

BY ANTHONY CUTHBERTSON ON 1/21/16 AT 9:20 AM

FEBRUARY 11, 2016

Meditation Apps, Nootropics, And Mood-Enhancing Wearables: 11 Startups Boosting The Brain



Featured Image Courtesy: www.darpa.mil

FORTUNE

MindMaze Snags $100 Million for Virtual Reality Push

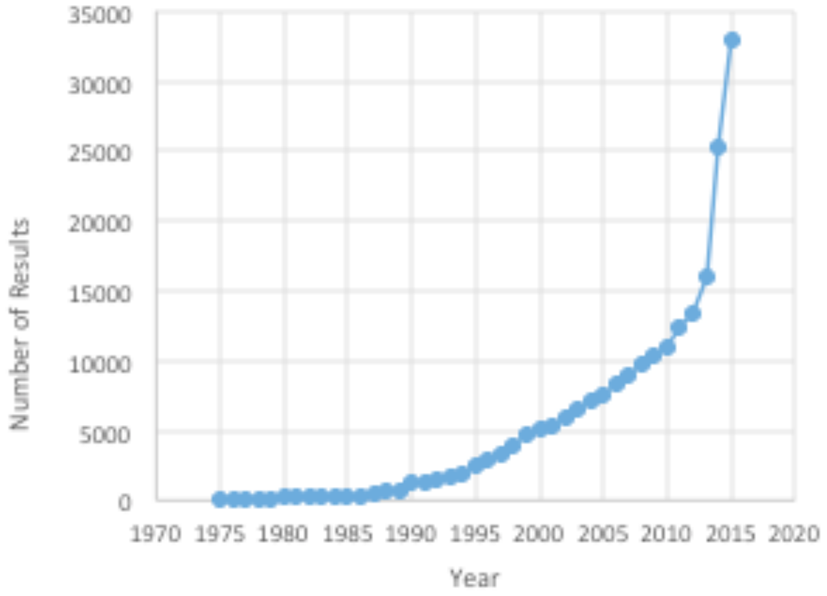
by Barb Darrow @gigabarb FEBRUARY 17, 2016, 8:56 AM EST

The New York Times

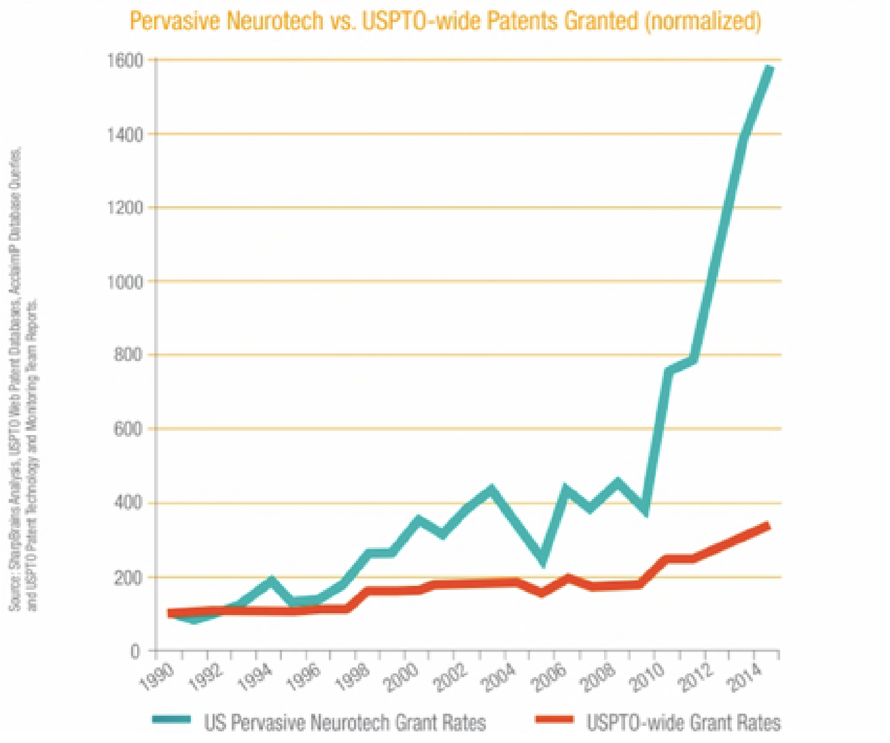
Computer-Brain Interfaces Making Big Leaps

By NICK BILTON AUGUST 4, 2013 1:39 PM 94 Comments

The tools are being built:



Pubmed results growing exponentially



Similar trend on patent grants

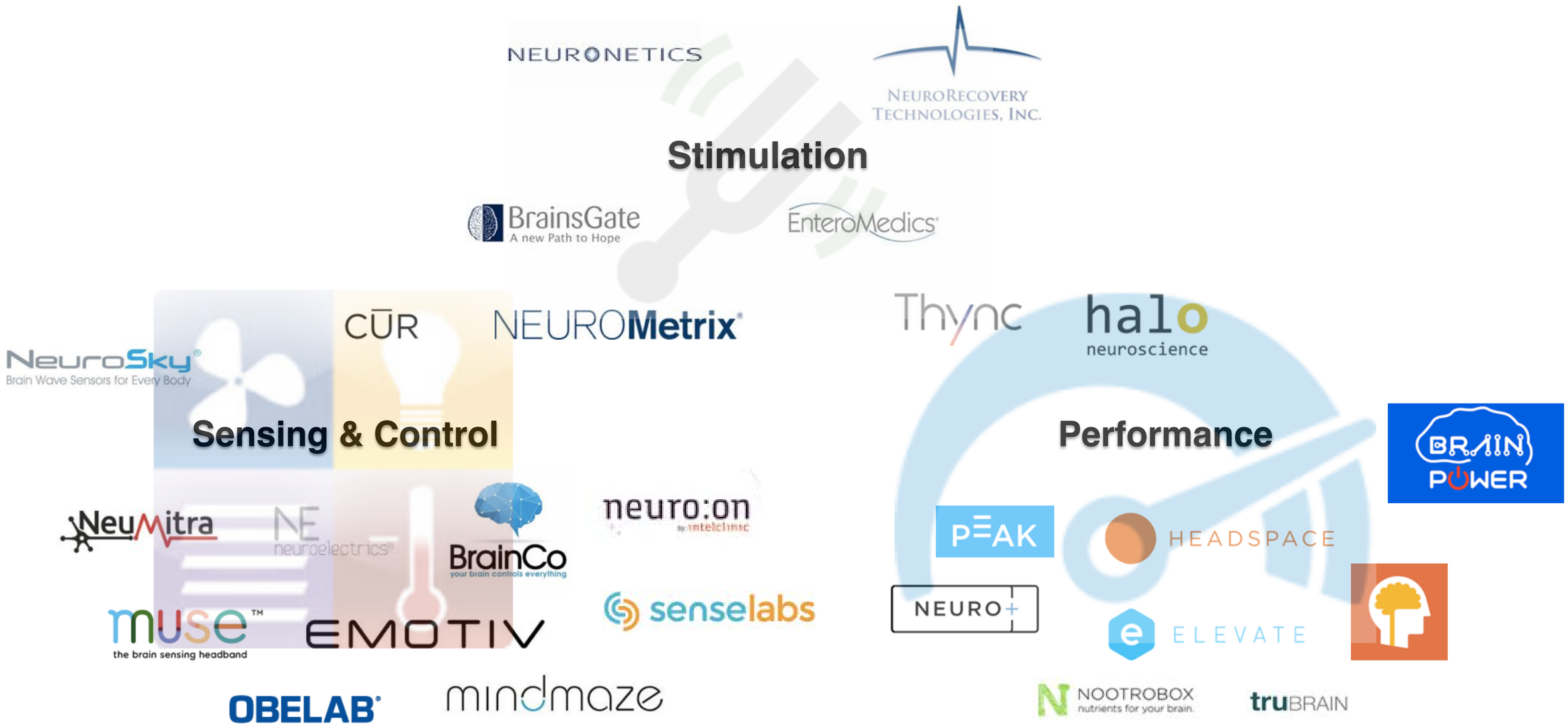
BRAIN RESEARCH THROUGH ADVANCING INNOVATIVE NEUROTECHNOLOGIES
BRAIN INITIATIVE

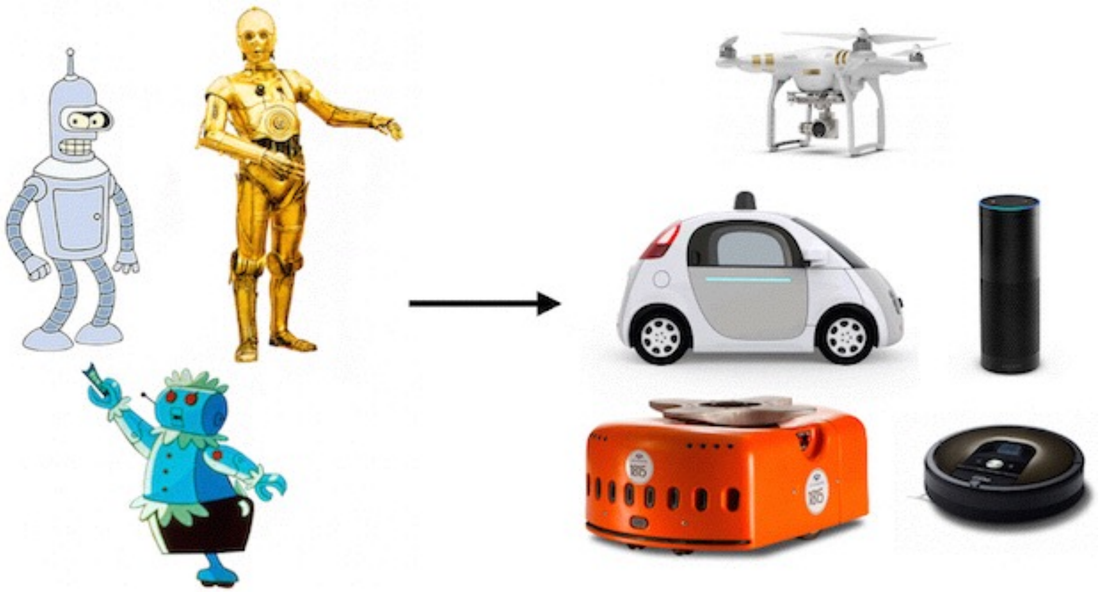
NIH

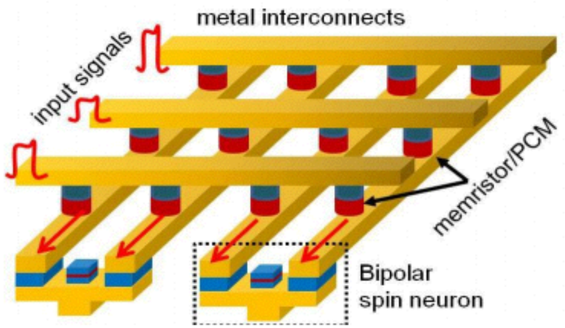
NSF

FDA

Neuro is much more than just medical devices:






metal interconnects
input signals
memristor/PCM
Bipolar
spin neuron

Lux Capital

Point of contact
Shahin Farshchi
Partner
(925)323-2784
sf@lux.vc