



**Hewlett Packard
Enterprise**



Research to Development

Industry viewpoint: Ideas
to Value

Janice Zdankus, HPE

Chandrakant Patel, HP Labs

Kirk Bresniker, HPE Labs

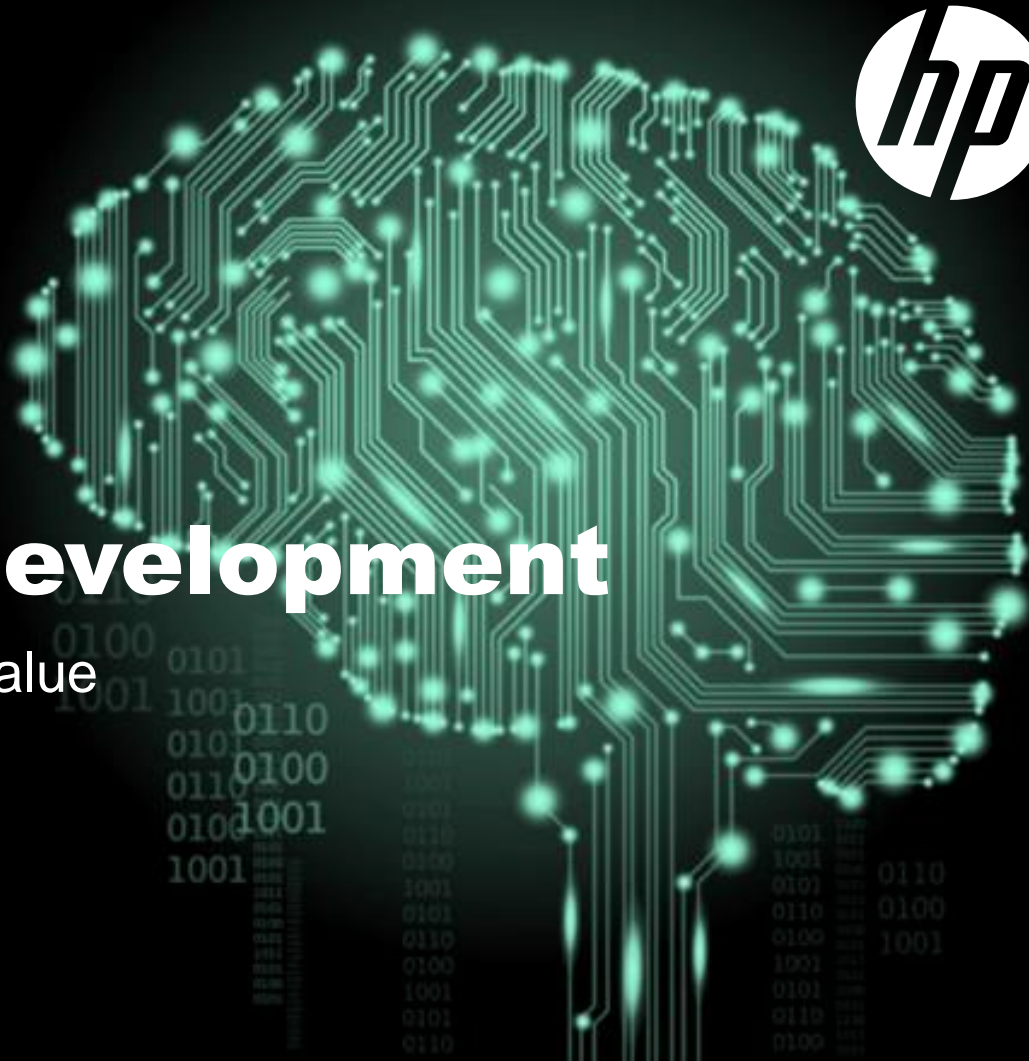


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FROM THE AMERICAN PEOPLE





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May 7, 2019

Tech Impact 2030: Building an Ecosystem

HPE and World Economic Forum have created **Tech Impact 2030** to bring together industry, technology, academia and government to solve several key societal challenges.

We believe that technology has the potential to drive real change if we are able to harness it effectively. Like the Forum, we recognize that open collaboration with sustained commitment is necessary to quickly innovate and implement change.

Through **Tech Impact 2030**, we'll work with customers, partners, employees and leaders from around the world on several key challenges and achieve meaningful change by 2030.



Innovation with Impact

Steve Jobs knew it then.....

"You can't start with the technology and then figure out where to sell it..."



Breakthrough Innovation

The infamous 1991 Radio Shack ad: 13 products worth over \$5k replaced by a single integrated product for under \$200

Radio Shack
AMERICA'S TECHNOLOGY STORE

PRESIDENTS' BIRTHDAY SALE!

DON'T DELAY! 3-DAY SPECIALS ABOVE GOOD SATURDAY THRU MONDAY ONLY!

0% INTEREST!
NO PAYMENTS UNTIL MAY!
NO DOWN PAYMENT!
HURRY! OFFER ENDS TUESDAY FEBRUARY 19

COME IN AND TAKE ADVANTAGE OF THESE OTHER FANTASTIC VALUES!

INTRODUCTORY SPECIAL!
Save \$670
\$1599
TANDY 1000 TL13 Computer System
• 286-Based PC Compatible
• Color Monitor
• 100MB SmartDrive™ Hard Drive
• Easy-to-Use 10-in-1 DeskMate™ Software
• Bonus Package:
• DeskMate GSA Writer
• Quickset
• 2-Button Mouse

VHS Camcorder
Save \$100
\$799
Realistic Model 62 camcorder with light for better shooting. 2 in. built-in video monitor, VHS only.

3-Way Speaker With Massive 15" Woofer
Save \$110
\$149.95
Optimum Music™ 15" woofer with 3-way speaker system. 100Watt, 100V, 100Hz.

Mobile Cellular Telephone
Save \$100
\$199
Link to 400 No. 1000

Tiny Dual-Superhet Radar Detector
Save \$60
\$79.95
Realistic Model 8700 radar detector with 2000MHz, 2400MHz, 2600MHz, 2800MHz, 3000MHz, 3200MHz, 3400MHz, 3600MHz, 3800MHz, 4000MHz, 4200MHz, 4400MHz, 4600MHz, 4800MHz, 5000MHz, 5200MHz, 5400MHz, 5600MHz, 5800MHz, 6000MHz, 6200MHz, 6400MHz, 6600MHz, 6800MHz, 7000MHz, 7200MHz, 7400MHz, 7600MHz, 7800MHz, 8000MHz, 8200MHz, 8400MHz, 8600MHz, 8800MHz, 9000MHz, 9200MHz, 9400MHz, 9600MHz, 9800MHz, 10000MHz.

Mobile CB With Channel Controls on Mute
HALF PRICE!
\$49.95
Realistic Model 8700 mobile CB radio with 20 channels, 100Watt, 100V, 100Hz.

20-Memory Speed-Dial Phone
Cut 33%
\$29.95
Realistic Model 8700 speed-dial phone with 20 memory, 100Watt, 100V, 100Hz.

Deluxe Portable CD Player
Save \$40
\$159.95
Link to 400 No. 1000

Compact 10-Channel Desktop Scanner
Save \$30
\$99.95
Realistic Model 8700 desktop scanner with 10 channels, 100Watt, 100V, 100Hz.

Our Easiest-to-Use Phone Answerer
Cut 17%
\$49.95
Realistic Model 8700 phone answerer with 10 channels, 100Watt, 100V, 100Hz.

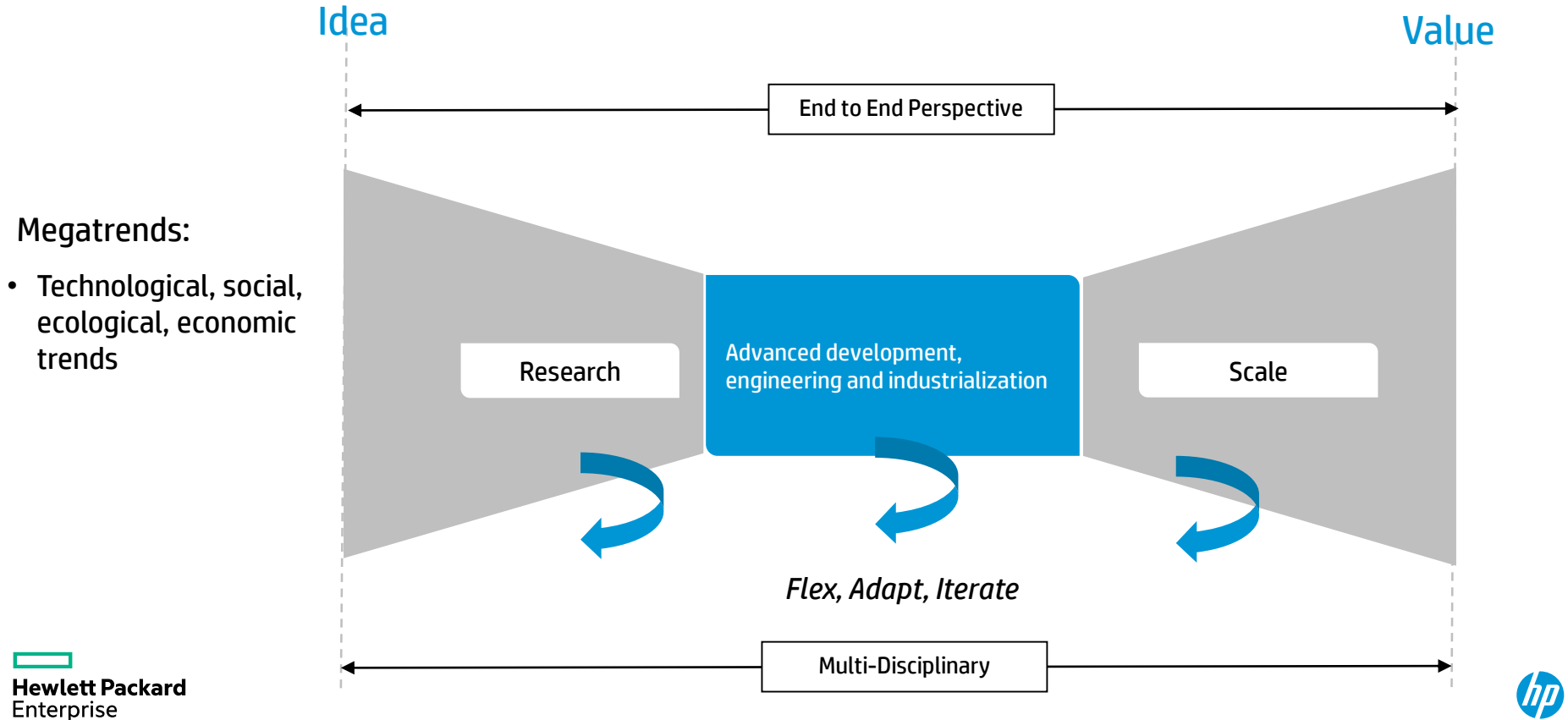
Handheld Voice-Activated Cassette Tape Recorder
40% Off
\$29.95
Realistic Model 8700 handheld voice-activated cassette tape recorder with 10 channels, 100Watt, 100V, 100Hz.

Check Your Phone Book for the Radio Shack Store or Dealer Nearest You.



Idea-to-Value innovation framework

A holistic perspective

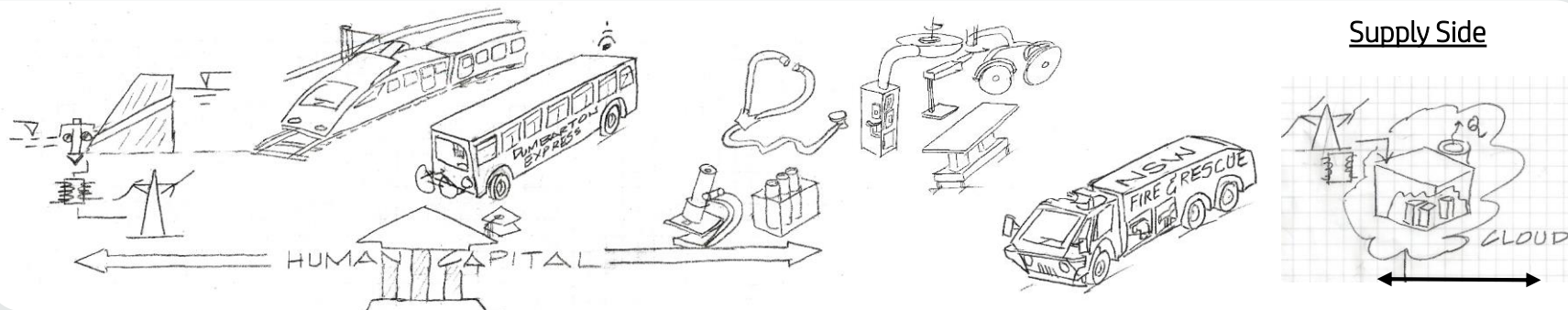


Megatrends & the Rise of the Cyber Physical Age

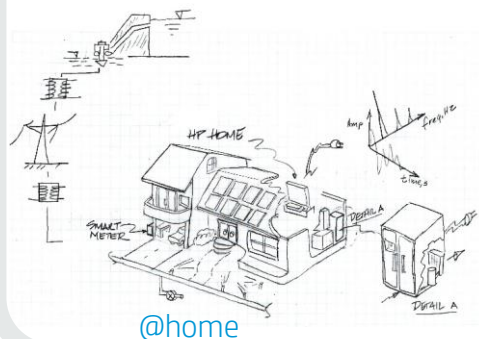
Social, economic, ecological and economic megatrends



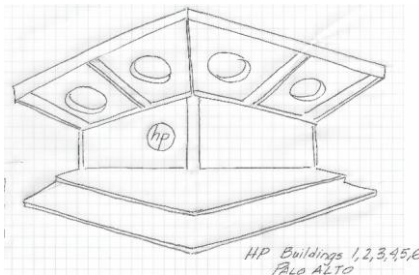
Supply Demand: Buffeted by Social, Economic and Ecological Megatrends



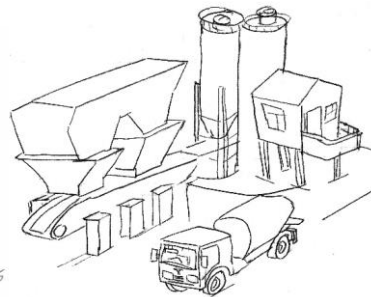
What is the role of technology given the perturbations from the megatrends



On the Go



@work









Demand Side

- Food, Clothing, Shelter
- Power, Water, Waste
- Transport
- Health
- Finance
- Training
- Community
- Entertainment
- Safety (Cyber Physical)
- Cyber security & Privacy

What is the role of technology given the perturbations of the megatrends?

Core beliefs

-  **1 Data is the new intellectual property**
-  **2 Intelligence will be everywhere from edge to core**
-  **3 The security paradigm will be redefined**
-  **4 Consumption based models will dominate**
-  **5 Experiences will be delivered as-a-service**
-  **6 Infrastructure will self-manage and self-service**

Technology trends

Rise of Cyber-Physical Systems

Machine (Physical) Age

19th Century

Domain Driven

Tech Depth

Information (Cyber) Age

20th Century

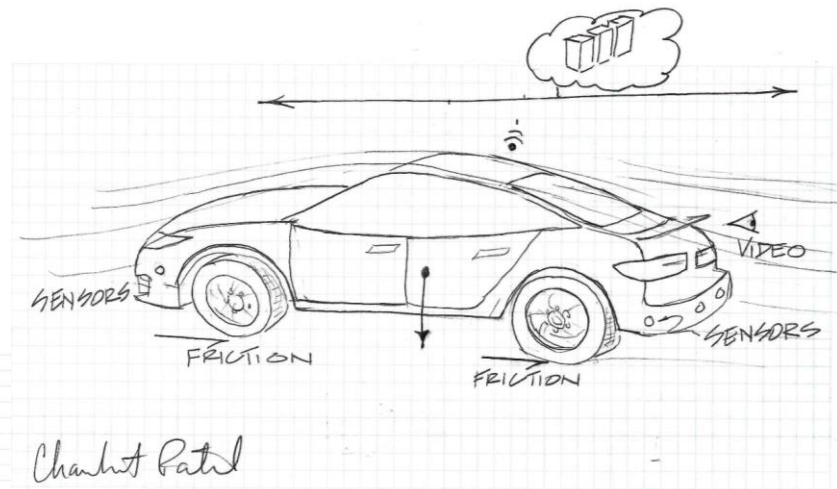
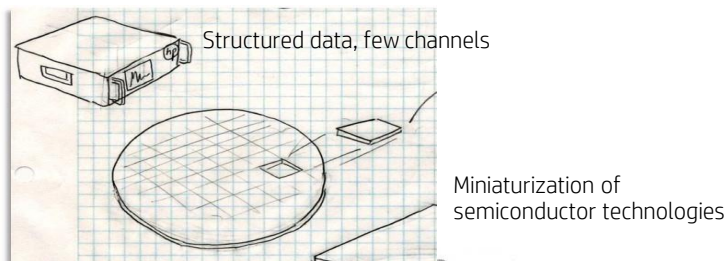
Data Driven

Tech
Breadth

Cyber Physical Age

21st Century

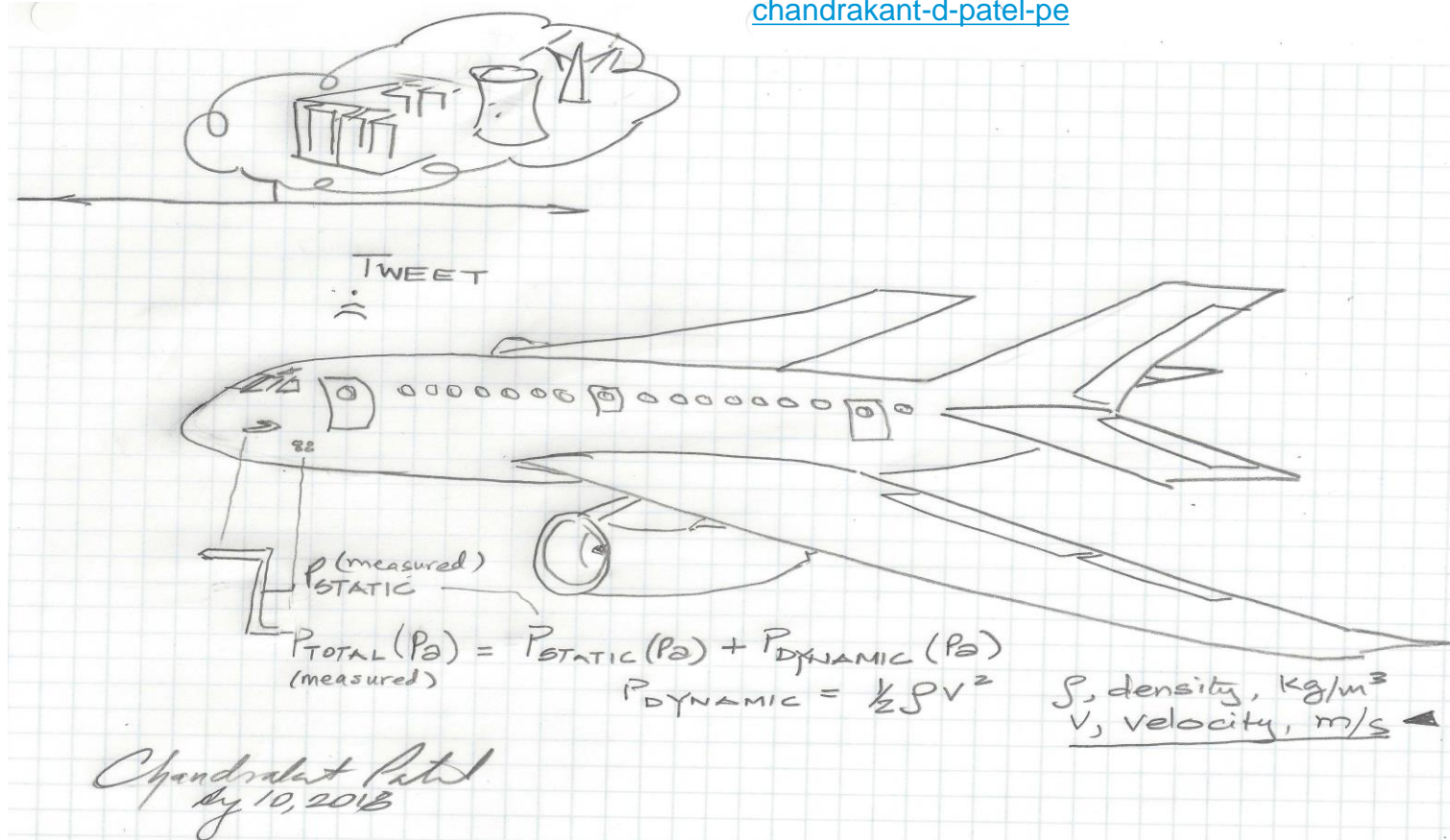
Domain + Data Driven
Depth + Breadth



The promise of the Cyber Age was not Realized

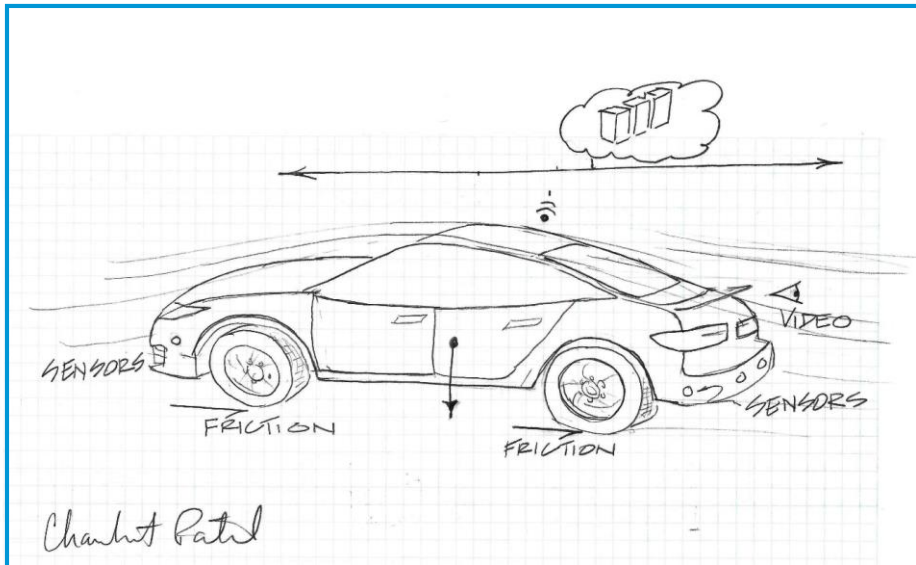
Failed to connect critical physical systems that matter

<https://www.linkedin.com/pulse/computing-way-we-were-chandrakant-d-patel-pe>

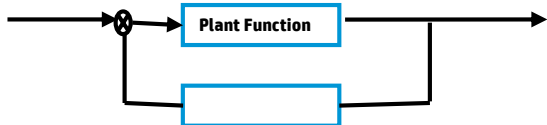


Cyber Physical Systems require Systemic Multi-Disciplinary Perspective

Auto Steer



Multi-input, Multi-output closed loop control



Historical Data Mining, Thousands of Vehicles, Motif Mining

Policy Based Control System

Knowledge Discovery

Machine Generated Data Management

(rich data, velocity, variability, volume)

Connectivity: GIS, People, Vehicle and Disparate Field Devices

Rich Sensing: LIDAR, RADAR, structured data

Flexible Actuators: Steering, Braking, Motor Control

Physical Domain Knowledge

First Principles:

Energy Supply, Motor Design, Dynamics of Structures
Charging System, Fast Charging/Thermal Management,
Charging Infrastructure

An Exciting Future

at the crossroads of people, profit, planet and petabytes of data

21st Century Cyber Applications present an exciting course ahead. Success necessitates a multi-disciplinary systemic perspective and domain knowledge that combines the past with the present

Success necessitates:

1. Depth in fundamentals
2. Multidisciplinary perspective
3. Systemic innovations through multidisciplinary collaboration
4. Storytelling (vision, experience, results)

Multi-disciplinary systemic breadth

Depth

