Creating Disruptive Products
A Drones-Eye View
Just as we planned it 15 years earlier!
Disruptive Products

• Technology
  • Strong Axes
  • Cost
  • Modular/Reuse
  • Road Map
  • Human Interface

• Humanity
  • Passionate People
  • Getting Lucky
  • Pursue Your Passion
  • Consequences
Technology
**Strong Axes**

- Time
- Frequency
- Floor coverage

**Weak Axes**

- Power
- Waste storage
- Non-floor coverage
Strong Axes - Electric Lawnmowers

**Strong Axes**
- No gas smell
- Cordless
- No gas hassle
- Seasonal maintenance

**Weaker Axes**
- Power
- Run-time
Cost

- Take cost goal seriously
- Margin requirements
- Price is market/capability/volume dependent
Cost
Cost

• Roomba
  • Launched for $200 in 2002
  • Bill of material <$100 including assembly
  • Spreadsheet
  • Inventions for cost- reliable IR sensing
Modularity

• Testing ease
• Debugging ease
• Ease of service
Modularity

Generation 1 Roomba

• Not modular
• Malfunction = whole robot replacement
• E.g. Treads
Modularity

Generation 3 – Modular Roomba

• Debugging
• Statistical testing
• Warranty replacement
• User self-serve
Roadmap

• Product to market is always priority
• Cost and schedule killer
• Roomba recharging station, navigation, voice control
• Future generations
Human Interface

- Buttons
- WiFi/Smart Phone
- Voice

- Autonomous
Humanity
Passionate People

Small Groups With Passion…

Can Change The World
Passionate People

- Rosie
- Dirtanator
- CyberSuck
- Muck Master 2000
Getting Lucky
Corner Cases

• Tough real world issues
  • One tall reed
  • Bullnose stairs
  • Snow and hail
  • Higher than US steps
  • GPS outages
  • Interference from other systems
  • Multiple extremes simultaneously

“All sensor suck in their own way” HG
Consequences

- Tesla on Autopilot Decapitates driver
- Uber Self Driving Vehicle Kills Cyclist
- Tesla Autopilot in Fatal Crash

Consequence must be factored into design, test, and deploy decisions
Human Robot Cooperation

• Humans make incredible primary systems
• Humans make terrible real-time backup systems
  • Over-reliance on technology
  • Boredom
  • Fatigue
• Humans make great “phone a friend” support
Too science fiction

Not an Internet company, We don’t have time for this

Pick a vertical

Too early stage

Too late stage

We don’t make investments in this space

My partners would kill me

I gave at the office

Pursue Your Passion
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