Tribute to Bryan Preas
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Time Period from 2000 - 2012
(The Do-Whatever-It-Takes System Engineering Period)

- Bioagent Detection (~ 2006)
- Digital X-Ray System (~ 2010)
System Designers

A Berlin  J Reich  B Preas  D Biegelsen
M Fromherz  K van Schuylenbergh  P Cheung
D Goldberg  L Swartz
W Jackson
JP Lu

Real time: DSP’s
68
FPGA
Hi V drivers
RAM
Valve Board
Sensor Board
Real World

PC
Joystick
Dual Sided with Planned Path
Hypermodular TIPP
(Tightly Integrated Parallel Printing)
Director assembly (3-way)

- Rotary mechanism
- Idle roller
- Baffles
- Shark fin cam
- Processor PCB
- Flipper
- Solenoid
- Auto-ID
- Slide
- Pogo Pins
- Flipper
210 ppm with four 55 ppm engines
Planning and control
- PIC has flash to store board address, or has its own ID
- PICs communicate with nearest neighbor PICs via IRDA (e.g. $P_i$West : $P_j$East, etc.) then send to system memory the links (no physical location binding necessary)

- On input requests from DSPs on PIC I/O lines, PIC sends out on same line PIC ID plus 2 bits for orientation. Then DSPs communicate their capabilities, location and orientation to system.
- PCB can be oriented in any of the 4 directions
Dry Powder Manipulation Using Traveling Electrostatic Waves (for Printing)

Phases:
- Phase A
- Phase B
- Phase C
- Phase D

Projection Field

Gas Channel

Gating Aperture

“Surfing” mode

“Hopping” mode

ATOM Grid

Toner
Field Flow Fractionation + TW

TW moves particles to side edge

Sample well
3-Layer Scalable Traveling Wave (TW) Module

- Minimize trace voltage drop
- Minimize power consumption

Pt TW traces
Glass
4-φ Contact Pads
Vias
Insulator
System Breadboard

Operation Cycle: **Flush/Clean ➔ Prime ➔ Load ➔ Concentrate ➔ Extract**
TW Concentration: 3um & 10um beads

“Turning the corner”

“Into the concentrate ....”

Click on images to play movie
Close-up of Concentration Cell
Concentration Factor

Cavity Volume = 2.3 mL; Conc Volume ~ 2x1.5x1 = 3 μL

Concentration Factor = Cavity Vol/Conc Vol x (1-frac loss) ~ 700 x 0.25 = 175X

Before Concentration

After Concentration

Pipette tip w/ air bubble

Conc. of 3um & 6um polystyrene beads

3 mm
Bulkhead Mounted Electronics
BAC Device Production Line
PARC Direct View Digital X-Ray Camera
Bryan Preas

- The one person at PARC with **complete mastery** of end-to-end system architecture, design, fabrication and test (FPGA, Embedded Software, GUI, PCB design/layout, PC interface)

- Incredibly **versatile**

- Does **whatever it takes**

- **Selfless** contributor

- A **pleasure to work with**

- **Sought after by EVERYONE**