The Future of Paper – Making Paper More "Intelligent"

A Presentation to the United States Postal Rate Commission

January 15, 2003

Background

- The Intelligent Document Task Force was created as a joint project of the United States Postal Service and the mailing industry in 1997.
- The goal of the task force was to advise the USPS on technologies that could be used to make the mail more “infocentric” or to add value to the mail by adding more features.
- The Intelligent Document Task Force evaluates technologies that provide a way to communicate with the Internet in machine readable form.

Who Is On The Task Force

- The United States Postal Service has six representatives that come from Engineering, Legal, Metering, Postal Inspection Service, Technology, and Technology,
- Industry has three chief scientists (Escher Laboratories, International Paper and Pitney Bowes), two Engineers (Neopost and MeadWestvaco Corporation), one distribution specialist (Williamhouse, Inc.) and a project leader (Envelope Manufacturers Association).
- The project is managed by the Vice President for Product Development and his staff.

On Going Work At Laboratories Which We Have Reviewed

- Bell and Howell Mailing Systems
- Dow Labs
- Escher Labs
- E-Stamp Research
- HP Labs
- IBM Labs and High Speed Printing
- International Paper Corporate Research
- Kodak Labs
- MIT Media Labs
- Motorola Labs
- Pitney Bowes Research
- Sitex Labs
- Xerox PARC

What Is An Intelligent Product?

An “Intelligent” product has a machine readable Language interface that enables it to be read by either Mail processing equipment or an Internet input or output Device.

Examples of Intelligent Products

- The “Postnet” Barcode (Legacy)
- The OCR Reader (Legacy)
- The Two Dimensional Barcode (Legacy)
- RFID (Emergent)
- Data imbedding or data hiding (Emergent)
- Interbody Network Products (Emergent)
- Fiber Fingerprints (Emergent)
- Printable IC (Experimental)
- Printable Displays (Experimental)
- Remote Sensing (Experimental)

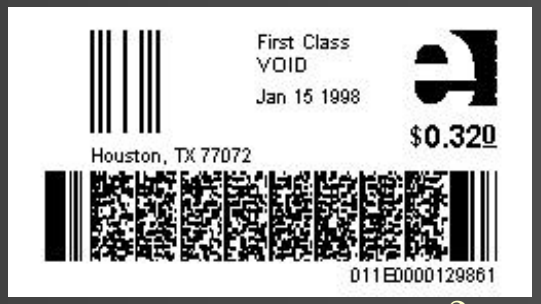
The Postnet Barcode

- Been around since the mid 1960's as ZIPCODE
- Narrow information range
- Non-standard, numeric
- Simple, cheap and efficient
- Wider deployment as CONFIRM and PLANET
- Can be used in Track and Trace
- Fully supported by current equipment infrastructure
- Very robust

OCR

- Technology which goes back to the 1950's
- Has limited capability to interpret information
- USPS must have well defined specifications
- USPS has also led in some developments in "on the fly" correction.
- Much of the market is in interpreting UPC with laser codes.
- A legacy technology.

What Have We Learned So Far and What Is In It For The USPS ?

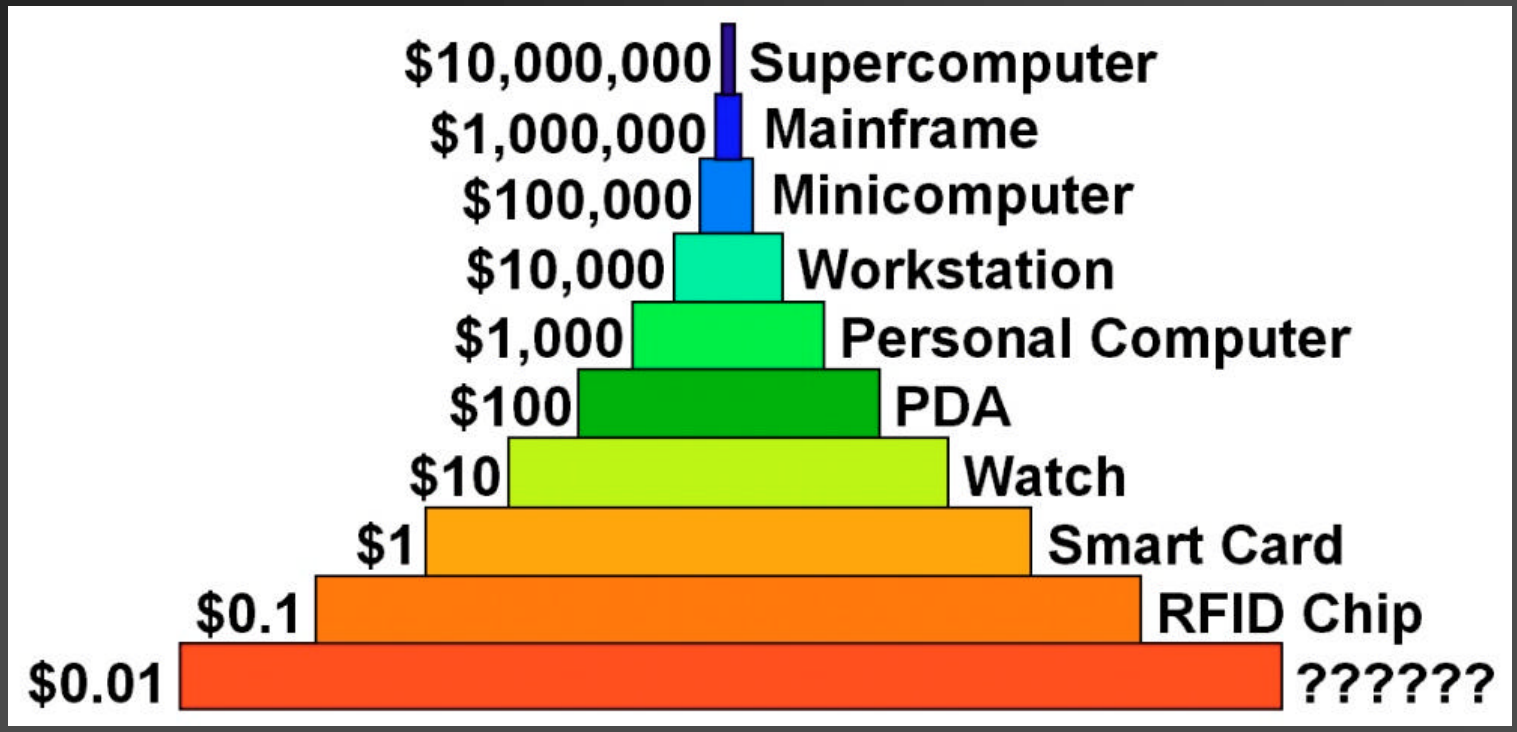


Stamp Permit Meter SmartStamp?

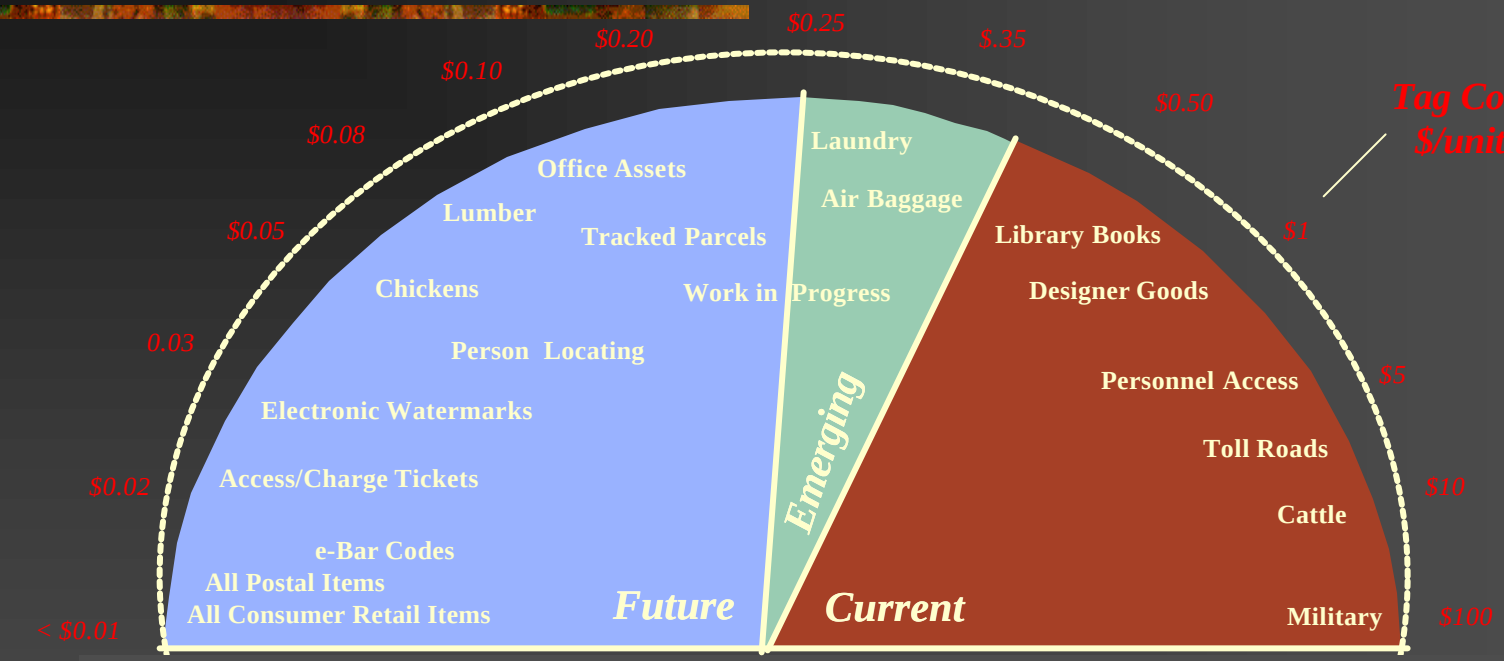
1847 1904 1920 1998

- **When retail and processing are both engineering new opportunities – how will they come together?**

As The Cost of IC Gets Cheaper, Information Gathering Gets More Cost Effective



RFID "Rainbow" of Opportunities



Global

Open System

Standards Driven

Ubiquitous Infrastructure

Trillions of Tags

Local

Closed System

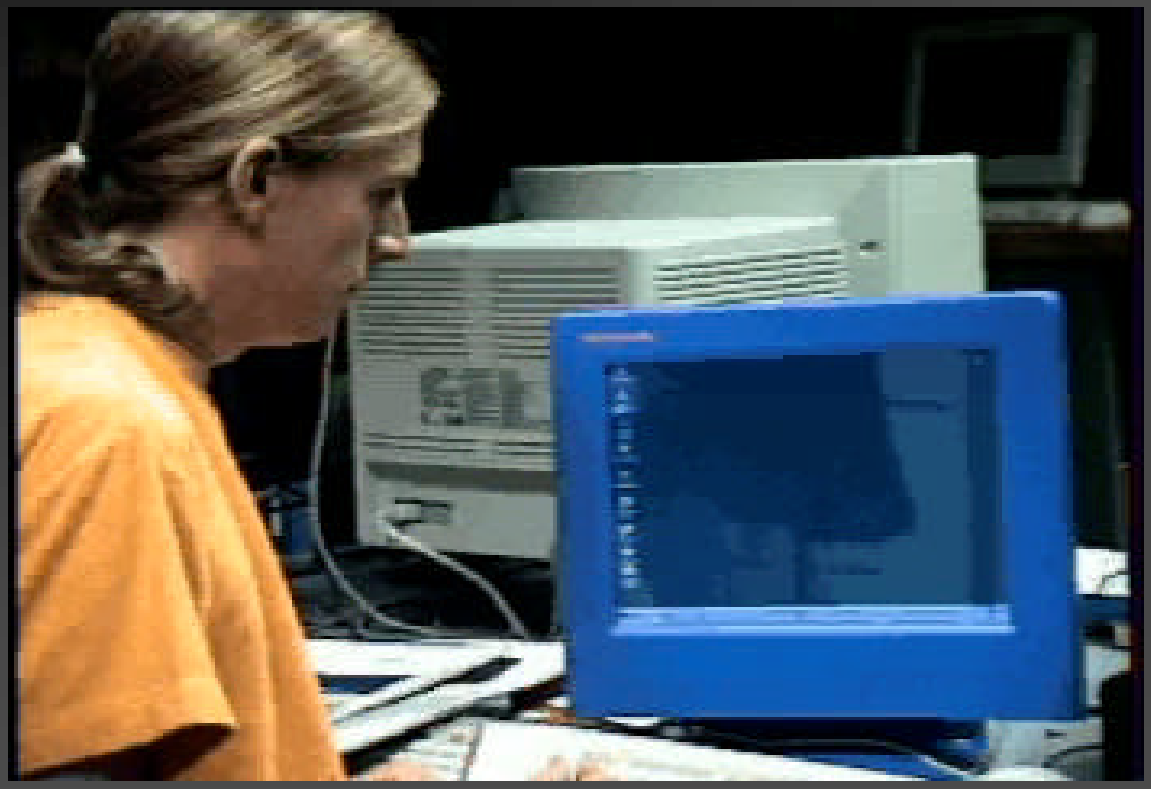
Application Driven

Limited Infrastructure

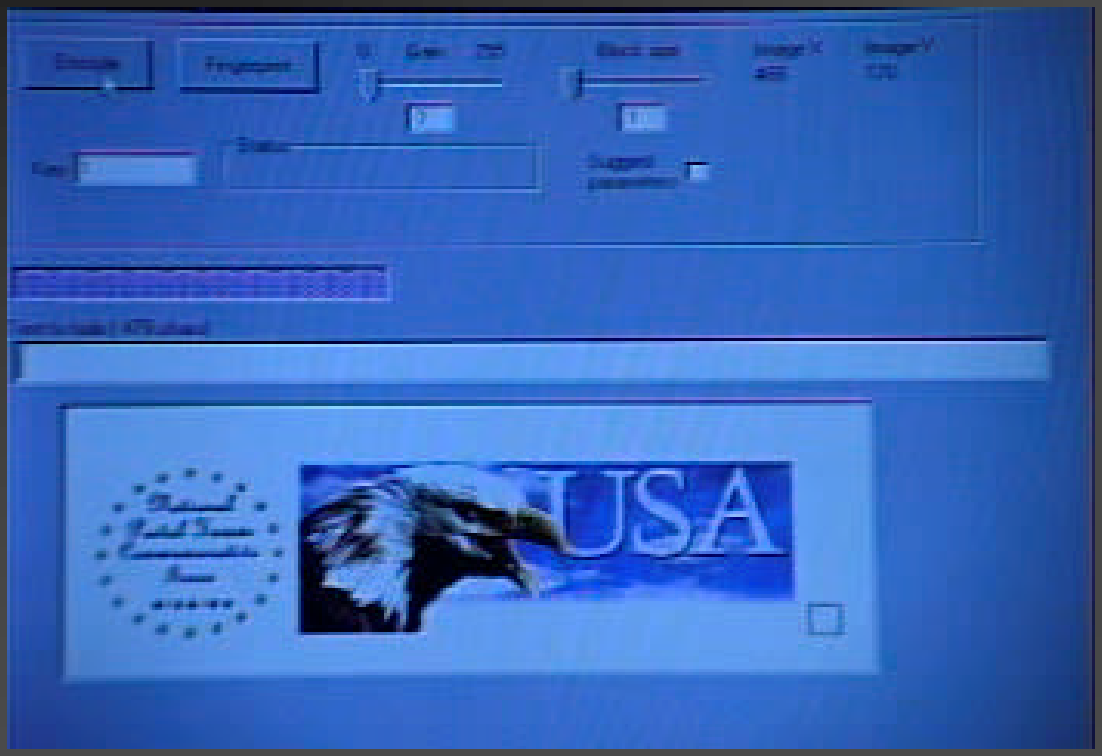
Millions of Tags

Reference: Peter Harrop IDTechEX

Screen “Tagging” Using RFID



Data Hiding

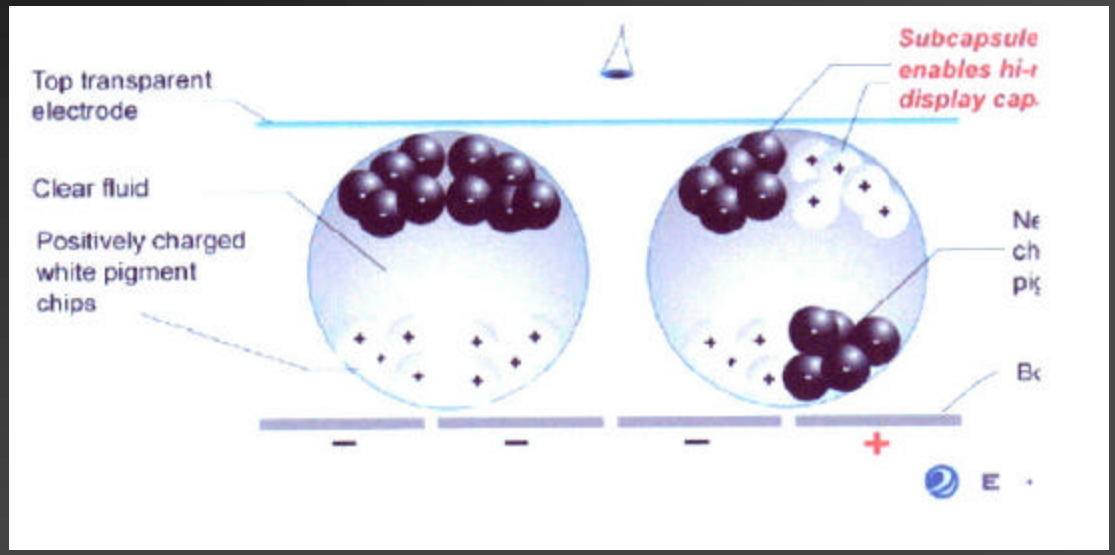


The “Zip Button”

The Fiber “Fingerprint”

Interbody Networks

Electronic Ink



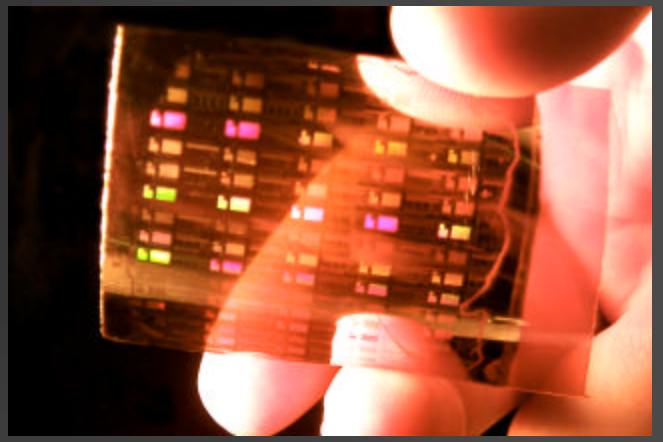
Fab in a Box

NanoTectonics

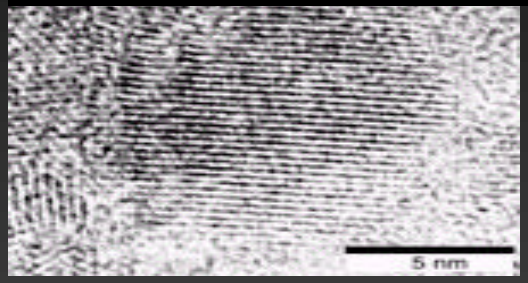
All Printed-All Inorganic 3D

nm Building Blocks – Seconds Per Layer

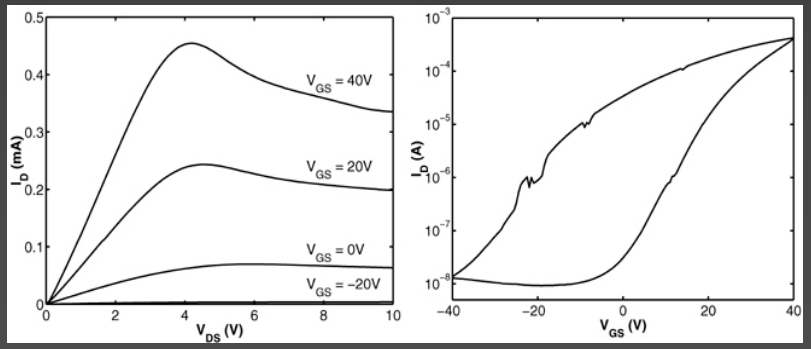
Liquid Processed Chips



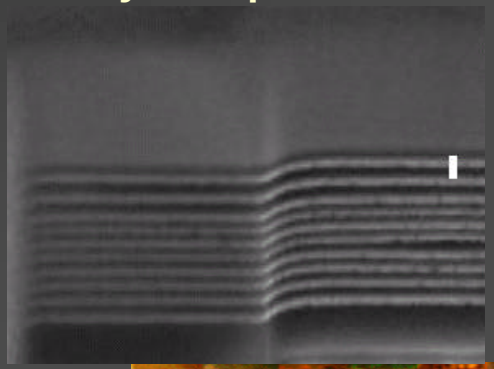
Nanocluster Building Blocks



TFT Devices

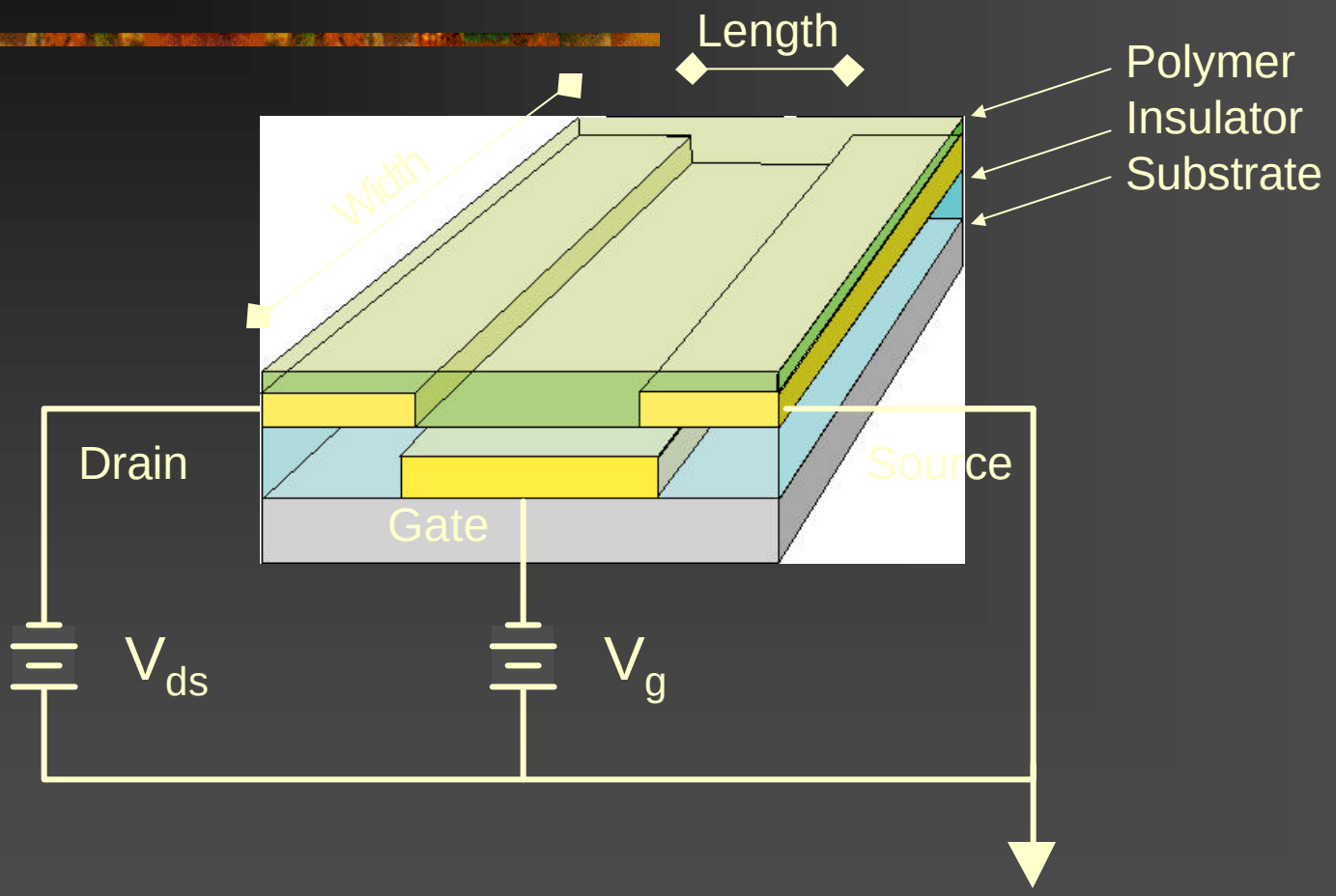


Multilayer Liquid Assembly

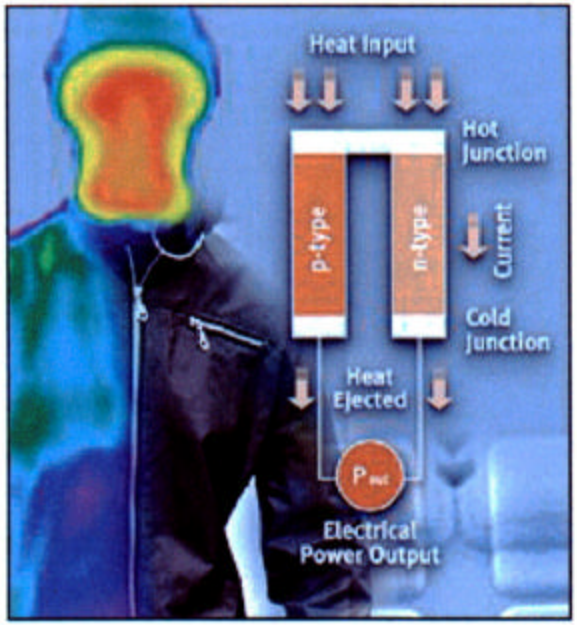


Molecular Machines (Jacobson) Group

Coplanar Electrodes – Thin Film Displays



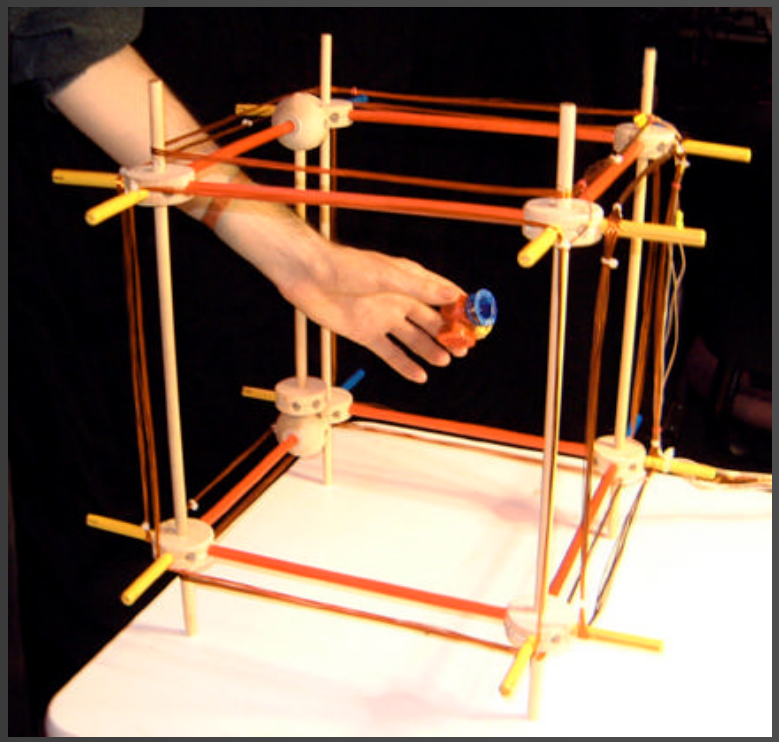
The Postal Uniform of Tomorrow



HUMAN WATTAGE: Infineon has developed a thermo-generator chip that can produce enough electricity to run a watch, using the difference between the body's temperature and the surrounding air.
COURTESY OF INFINEON TECHNOLOGIES AG

Remote Sensing

3D Volumetric Sensing Using Resonant RF Tags



- Locate and uniquely identify an ensemble of tags to describe meaningful 3D shapes
- Detect passive resonant tags inductively coupled to coil
- Do this in real-time to allow an interaction between the physical model and virtual model

Creating An Integrated System

You Got Questions?