I-CubeX

A sensor toolkit for developing interactive media applications

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Contents

Sensor applications

- Industrial automation: machine health, packaging, ..
- Biomedicine: prostheses, diagnosis, monitoring, ..
- Science: measurement, ..
- Transport (aerospace, automotive): speed, altitude, ..
- Energy: power consumption, ..
- Environment: weather, crop monitoring
- Home & Car: automation, security, position (GPS), ..

- Human interfacing
- Motion capture

Sensors in interactive media

- Phone: Multi-Touch, Camera, GPS, ..
- Virtual environment: 6DOF sensors, ..
- Interactive installations: Presence, Proximity, ..
- DJ/VJ: Control Surface (Touch, Dial, Switch, ..)
- Electronic Music (perform, compose): Touch, ..
- Contemporary Dance, Theatre: Acceleration, ..
- Robotics: Proximity, Light, ..
- Toys: Touch, Tilt, ..

Sensor technologies

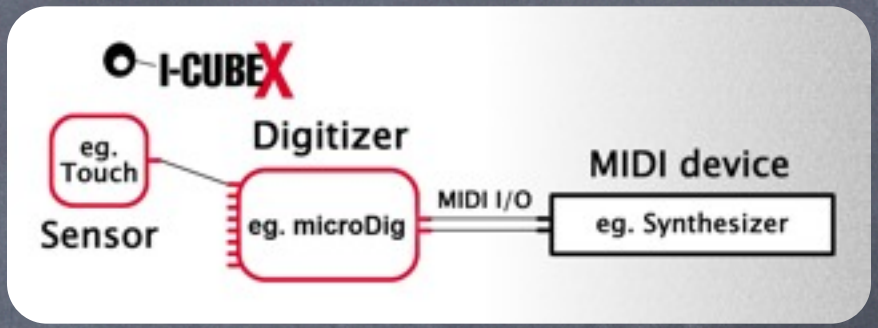
- Piezo-resistance (FSR, straingauge)
- Piezo-electricity (also PIR)
- Ultrasound TOF
- RF TOF (radar)
- Bio-potentials (EMG, EEG, EOG)
- Hall effect
- Electro-magnetic field (capacitance, inductance)
- Electro-optical (camera, LED)
- Microwave radiation

http://ICubeX.com

Sensors, Interfaces & Software since 1995

I-CubeX basics

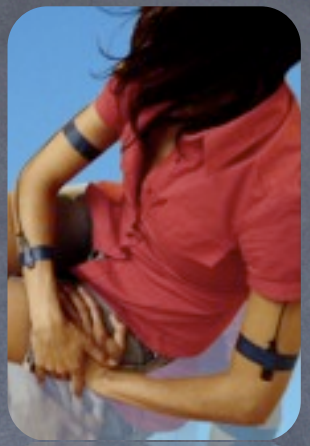
Let me show you that live ...



See also http://icubex.com/about

I-CubeX applications

Music

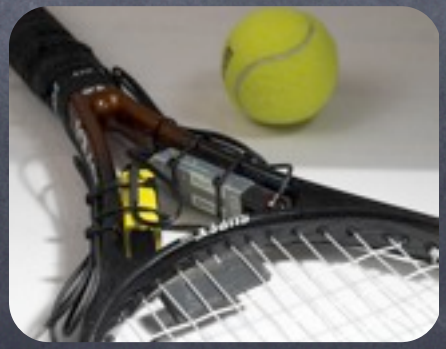


Dance

Installation Art

Exhibit Design

Game Dev



Biomechanics

need picture !

Behaviour Research

I-CubeX origins

PhD goal

Enable creation of musical instruments that can be adapted to motor skills a performer may ..

.. already have eg. cellist changing to trumpet

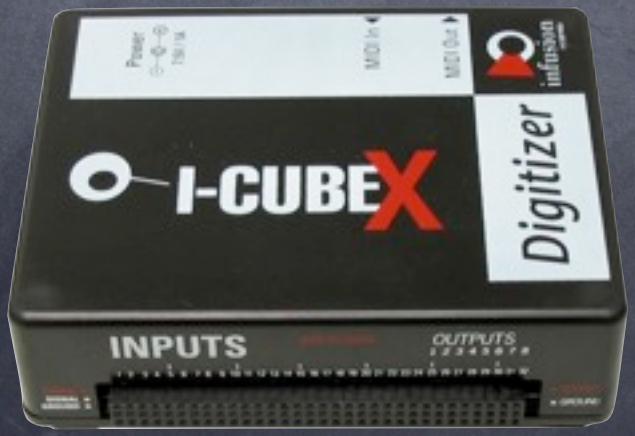
.. prefer eg. novice prefers cellist gestures, but trumpet sound

.. be limited to eg. dwarf wanting to play upright base

Video available at http://xspasm.com/x/sfu/vmi/ss

Vancouver: startup

- Market to research colleagues
- Promotion via the web (1995 !)



Montreal: growth

Promotion at events (since 2003)

Internal organization via internet

- email: 1995, forum: 2006, wiki: 2009

Transactions via internet

- ordering: 2003, payment: 2009, bookkeeping: 2010 ?

Competition

- physical computing, eg. basic stamp, arduino

The I-CubeX approach

- Appeal to artists (non-engineers) first and engineers second
  - Focus on translating or hiding complexity
- Allow maximum configuration flexibility
  - Primary access to a few choices and representations (eg. through presets and standalone-mode)
  - Secondary access to all choices and representations (eg. through software APIs such as Max objects and host-mode

Interfaces

- Wi-microDig: wireless
- USB-microDig: USB
- microDig: MIDI
- Digitizer: MIDI, hi-res

microDig

MIDI sensor interface

8 inputs, 10 bit resolution, 1562 Hz sample rate (max), I^2C capable

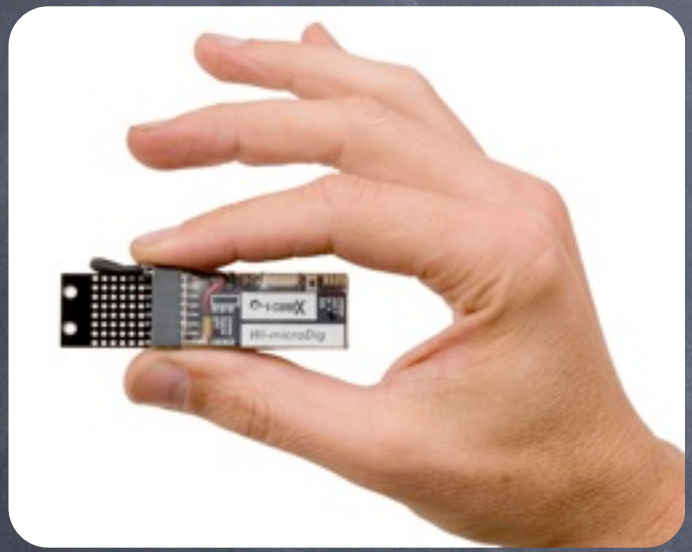
USB-microDig

USB sensor interface

8 inputs, 10 bit resolution, 6250 Hz sample rate (max), I^2C capable

Wi-microDig

Wireless sensor interface



8 inputs, 10 bit resolution, 5760 Hz sample rate (max)

100 meter range (Bluetooth class 1), I^2C capable

Sensors

- Contactforce, Buttons
- Knobs, Sliders
- Distance, Position
- Acceleration, Orientation
- Biopotential
- Environment

Contactforce, Buttons

- Touch
- TouchMicro-3
- TouchMicro-5
- TouchMicro-10
- TouchMini
- TouchMiniOn
- TouchStrip
- TouchStripOn
- TouchGlove
- TapTile
- ReachOn

TouchMicro-10, -3

force sensor

Response curve approximates human perception of force.

Knobs, Sliders

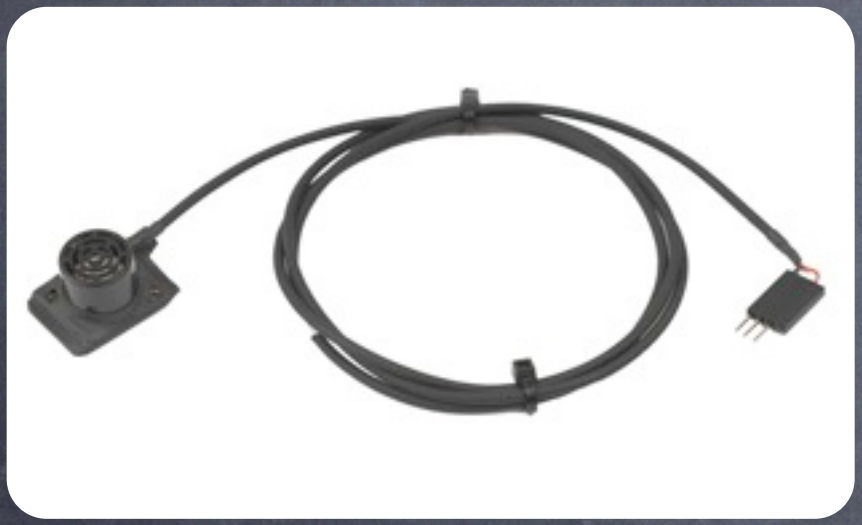
- Turn
- Turn&Spin
- Push
- Push2D
- Slide
- SlideLong
- SlideWide

Distance, Position

- Magnetic + magnet
- Reach
- ReachClose
- Advance-645
- FarReach
- Flash + SeeLaser
- MoveOn
- ReachOn
- BendMicro, -Mini, -Short

Advance-645

distance sensor



0.152 - 6.45 m range, 36° - 50° cone (dependent on distance)

2.5 cm resolution, 20 Hz update rate

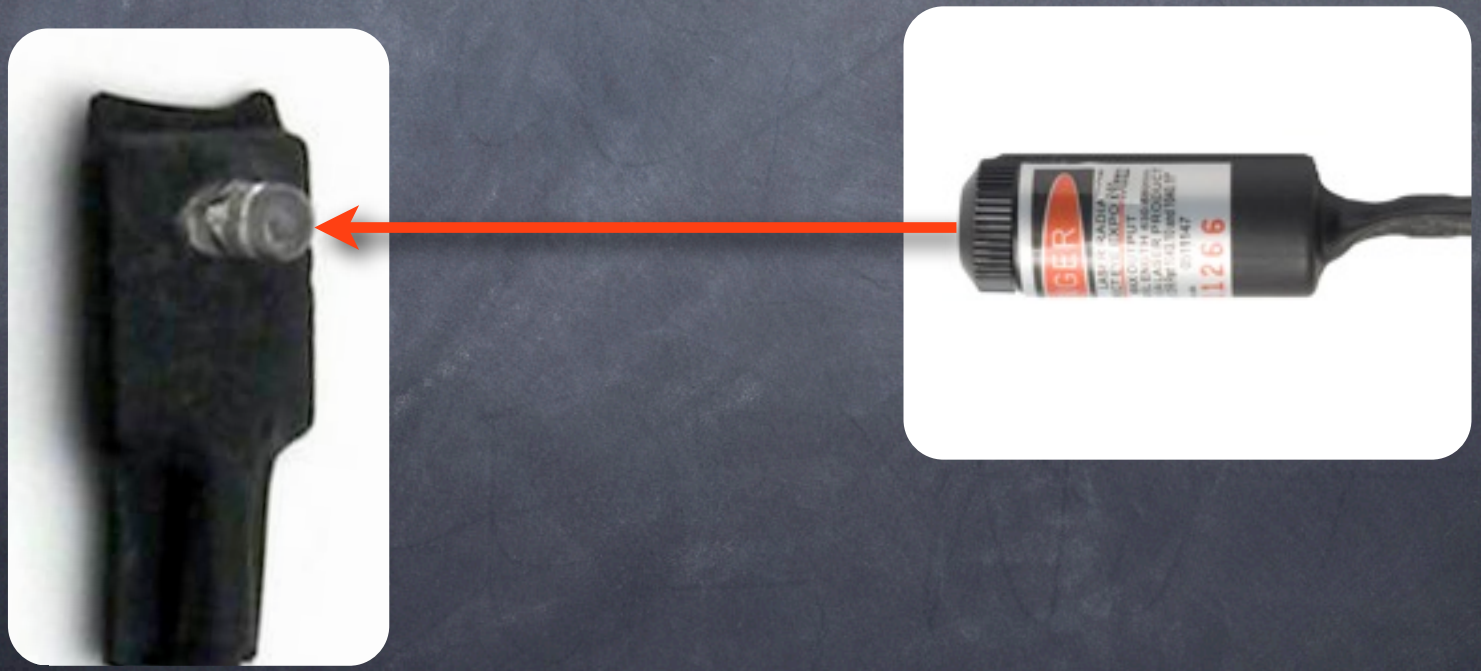
Flash, SeeLaser

motion trigger

SeeLaser-Red

SeeLaser-IR

Flash



Acceleration, Orientation

- Bang
- Vibe
- GForce-2D-2, -18
- GForce-3D-3
- TiltOn
- Spin2D-500
- Orient
- Orient3D

GForce3D-3

acceleration sensor

3g and -180° to +180° range, 18-28 mg resolution

Spin2D-500

angular velocity sensor

500 °/s range, < 0.2 °/s resolution, 140 Hz bandwidth

BioPotential sensors

BioFlex: EMG

BioWave: EEG, EOG, facial EMG

BioEmo: GSR

BioBeat: EKG

Environment

- Air
- Hot
- Hot&Humid
- Light
- Loud
- Magnetic