Quantum Leap

Evaluating the Usefulness of Touchless Natural User Interfaces and the Leap

TY CLARK | TCC6100 | 05 DEC 12

Pop Quiz

How old are the following computer components?

QWERTY Keyboard	Mouse	Graphic User Interface
???	???	???
YEARS OLD	YEARS OLD	YEARS OLD

Pop Quiz

How old are the following computer components?

QWERTY Keyboard	Mouse	Graphic User Interface
138	???	???
YEARS OLD	YEARS OLD	YEARS OLD

INVENTED IN 1874 FOR THE SHOLES AND GLIDDEN TYPEWRITER.

Pop Quiz

How old are the following computer components?

QWERTY Keyboard	Mouse	Graphic User Interface
138	49	???
YEARS OLD	YEARS OLD	YEARS OLD

INVENTED IN 1963 BY DOUGLAS ENGLEBART (STANFORD RESEARCH).

Pop Quiz

How old are the following computer components?

QWERTY Keyboard	Mouse	Graphic User Interface
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YEARS OLD	YEARS OLD	YEARS OLD

CREATED IN 1973 BY THE XEROX PALO ALTO RESEARCH CENTER.

Pop Quiz

How old are the following computer components?

QWERTY Keyboard	Mouse	Graphic User Interface
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YEARS OLD	YEARS OLD	YEARS OLD

User interfaces have not changed in 40 years.

If we are so familiar
with our computer interfaces,
why should we change?

And what will
the new interfaces
look like?

What will new interfaces look like?

Recent science fiction movies have often included futuristic computer systems.

MINORITY REPORT (2002)

IRON MAN 2 (2010)

THE AVENGERS (2012)

What will new interfaces look like?

The *Minority Report* interface is often referenced as an amazing, only-in-the-movies idea.

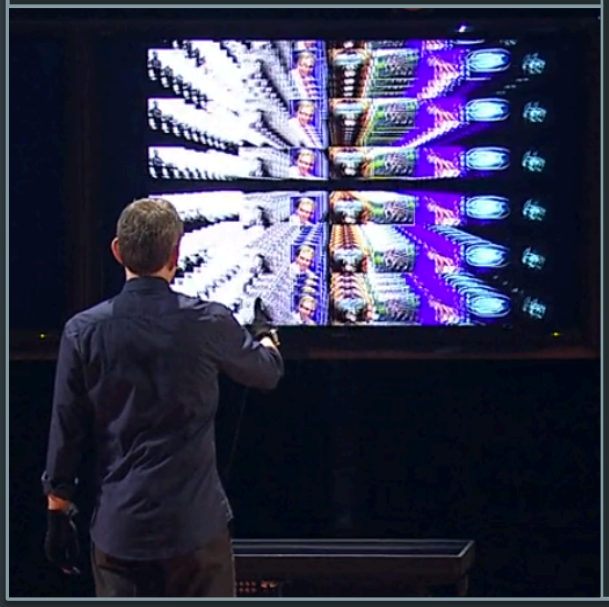
MINORITY REPORT (2002)

What will new interfaces look like?

The *Minority Report* interface is often referenced as an amazing, only-in-the-movies idea. However, it was seen in action at the TED 2010 conference.

MINORITY REPORT (2002)

TED 2010



VIEWS TO DATE

788,079

(BE THE NEXT ONE!)

MOST COMMON TAGS

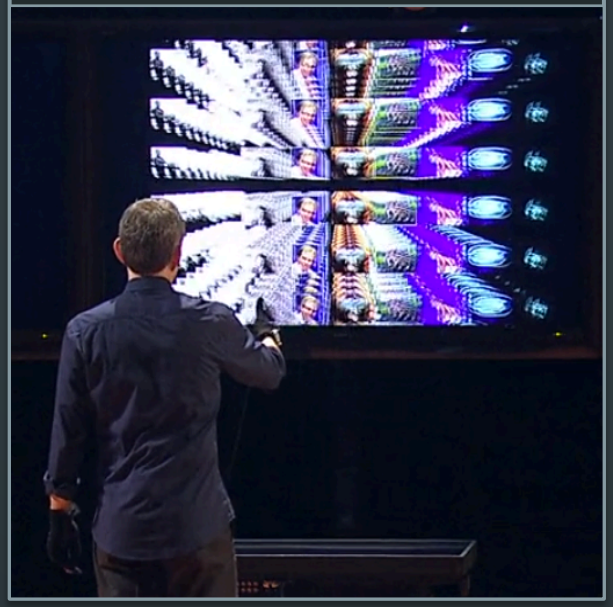
Jaw-dropping
Fascinating
Ingenious
Inspiring

What will new interfaces look like?

The presenter, John Underkoffler, designed the interface as a research project after discussing it with Steven Spielberg.

MINORITY REPORT (2002)

TED 2010



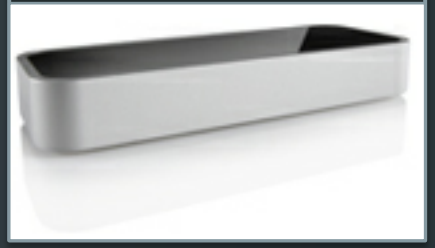
JOHN UNDERKOFFLER

What will new interfaces look like?

Two years later, a similar system called the Leap was introduced in a YouTube video. The video has been watched almost 7,000,000 times in six months.

THE LEAP IN ACTION

THE LEAP



What do you
call something
like that?

What is it?

The Leap and Underkoffler's system are examples of a touchless gesture-based natural user interface.

What is it?

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- NOT CONTROLLED BY TYPING OR CLICKING

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- COMMANDS ARE BODY MOTIONS

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- NOT CONTROLLED BY TYPING OR CLICKING
- COMMANDS ARE BODY MOTIONS
- USES INTUITIVE ACTIONS RELATING TO HUMAN BEHAVIOR... BUT THERE'S A LOT OF DISAGREEMENT ON THIS.
  - What is intuitive to one person may not be intuitive to another.
  - A natural behavior in one culture may be an offensive gesture in another.
  - Every person's experience is different.

What is it?

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It may not be accurate, but "natural user interface" is now commonly accepted.

We will use "touchless natural user interface (TNUI)" since it's accurate and common enough to be understood.

Are TNUIs
useful for our
current tasks?

TNUIs: Strengths and Weaknesses

Strengths

- SPATIAL CONTROL

APPLICATIONS
Computer-aided design (CAD)
Architecture
Engineering
Sorting large amounts of data
Graphic design
Navigation/maps

TNUIs: Strengths and Weaknesses

Strengths

- SPATIAL CONTROL
- HANDS-FREE OPERATION

APPLICATIONS

Sterile environments
Production-line operations
Food industry
ADA compliance

TNUIs: Strengths and Weaknesses

Strengths

- SPATIAL CONTROL
- HANDS-FREE OPERATION
- INTUITIVE

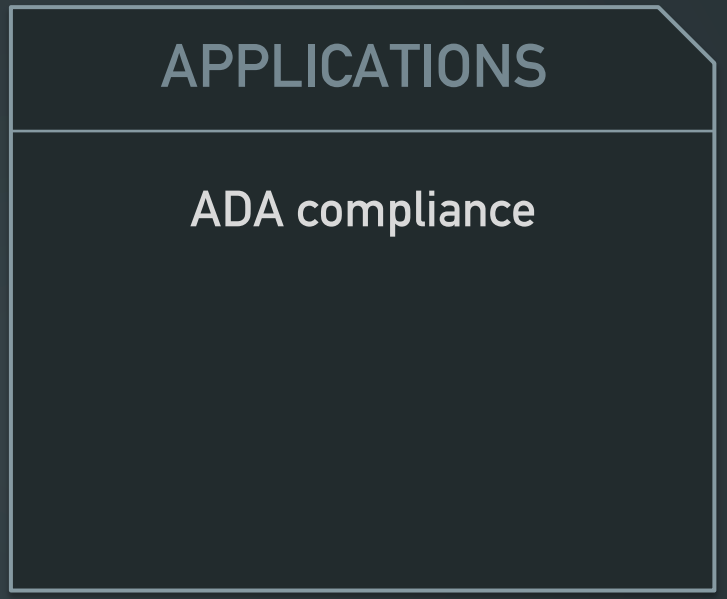
APPLICATIONS

Commands are easier
to learn and remember

TNUIs: Strengths and Weaknesses

Strengths

- SPATIAL CONTROL
- HANDS-FREE OPERATION
- INTUITIVE
- SIGN LANGUGE INPUT?
  (DISCUSSED BUT UNOFFICIAL)



TNUIs: Strengths and Weaknesses

Strengths

- SPATIAL CONTROL
- HANDS-FREE OPERATION
- INTUITIVE
- SIGN LANGUGE INPUT?

Weaknesses

- LACK OF KEYBOARD INPUT

APPLICATIONS
Writing
Emails
Data entry
Technical Communication
User Interface commands

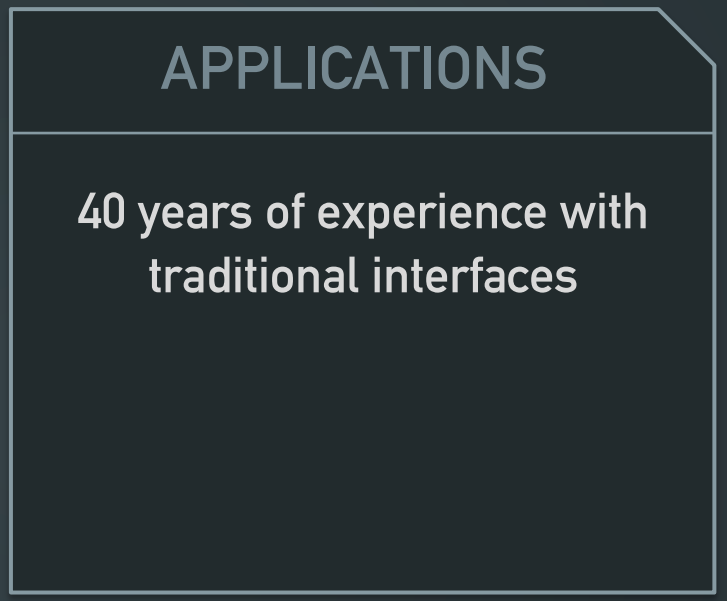
TNUIs: Strengths and Weaknesses

Strengths

- SPATIAL CONTROL
- HANDS-FREE OPERATION
- INTUITIVE
- SIGN LANGUGE INPUT?

Weaknesses

- LACK OF KEYBOARD INPUT
- USERS ARE UNFAMILIAR



TNUIs: Strengths and Weaknesses

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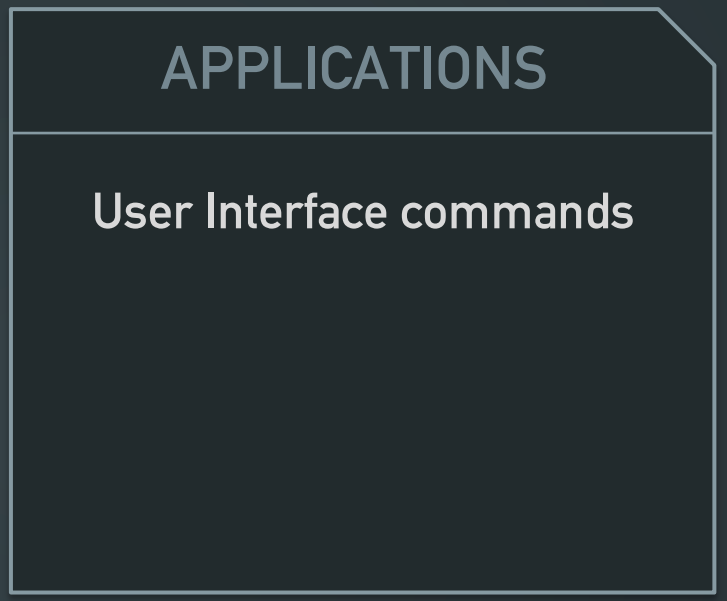

Weaknesses

- LACK OF KEYBOARD INPUT
- USERS ARE UNFAMILIAR
- GESTURES MUST BE INTUITIVE

What can TNUIs do?

Not every job will benefit from a TNUI.

"WRITERS WILL LIKELY BE WELL SERVED BY THE KEYBOARD FOR THE FORSEEABLE FUTURE, BUT THOSE WHO DESIGN SHIP HULLS OR AIRPLANE WINGS WOULD BE BETTER SERVED BY THREE-DIMENSIONAL NUIS."

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But some jobs will see large benefits.

What can TNUIs do?

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In an operating room, a surgeon cannot use a computer to access x-rays, MRIs, or other patient information without removing his or her surgical gloves or walking someone else through the process.

This computer uses Microsoft Kinect, a TNUI device first designed for the Xbox 360 gaming platform. With Kinect, a surgeon can operate the computer by waving his or her hands, avoiding inconvenience.

COMPUTER WITH KINECT

If we are so familiar
with our computer interfaces,
why should we change?

If we are so familiar

with our computer interfaces,

why should we change?

Because TNUIs are much better than

current interfaces at certain tasks.

What are
the best TNUIs
available today?

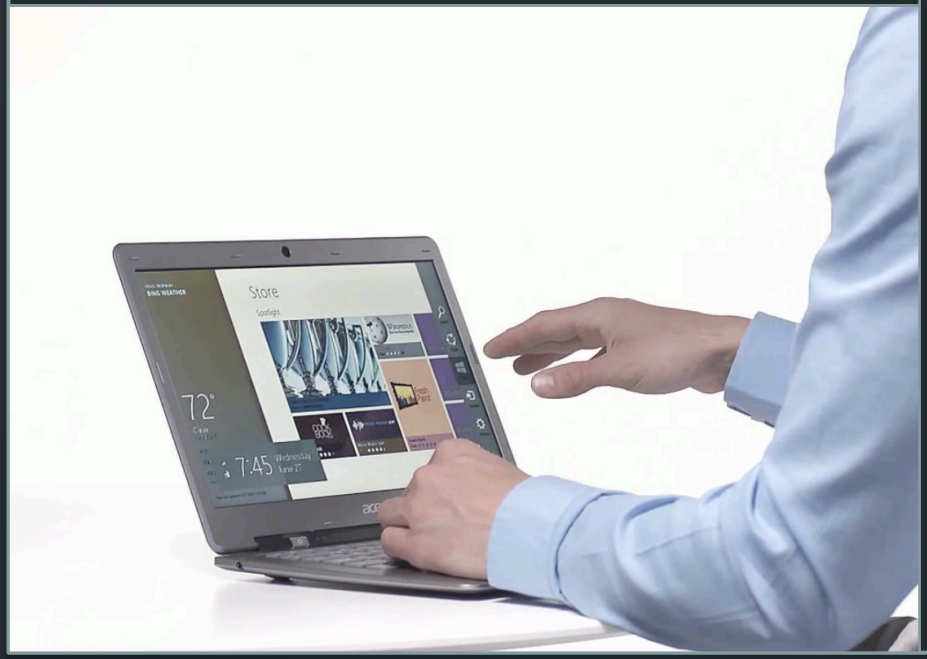
What TNUIs currently exist?

Microsoft Kinect was introduced in 2010 and has sold well. The Kinect tracks a large area with adequate accuracy but is not well-suited for small precise measurements.

What TNUIs currently exist?

Elliptic Labs has announced a Gesture Suite for Windows 8 devices. Unlike other TNUIs, which are powered by infrared cameras, Elliptic Labs' device uses low-power ultrasound.

THE GESTURE SUITE IN USE



COMPONENTS

Ultrasound system
8 microphones
2-6 transducers

BENEFITS

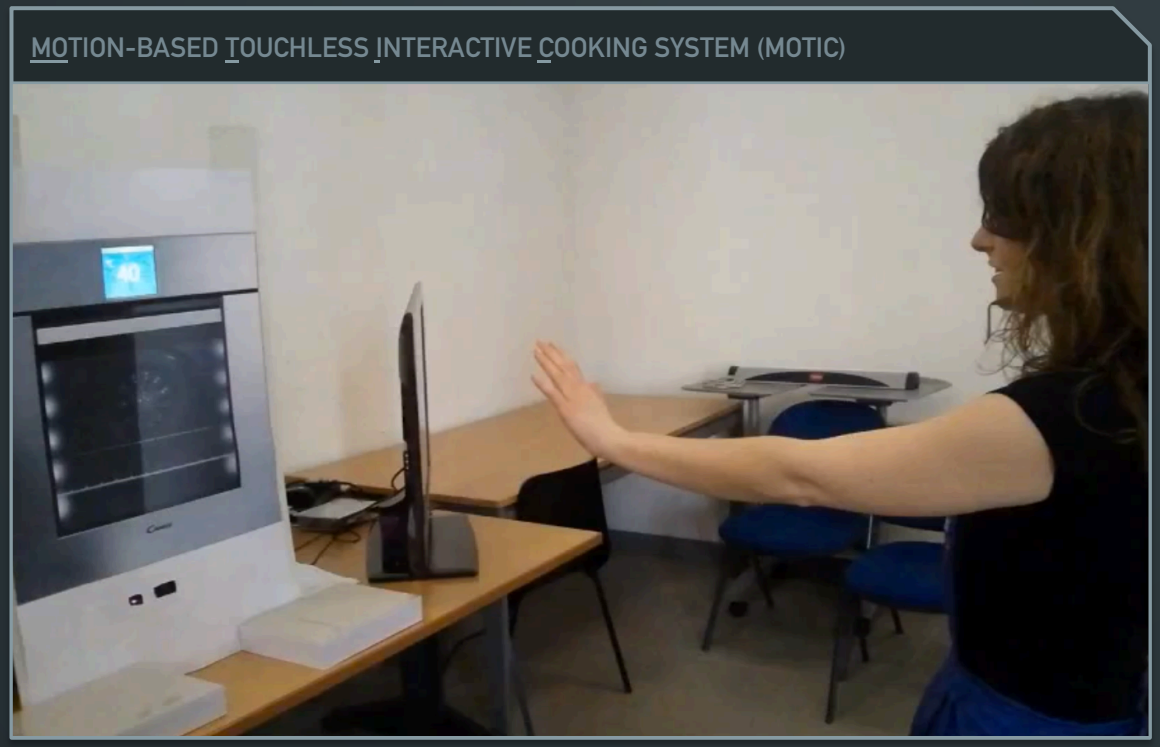
Uses 95% less power
(good for laptops)

DRAWBACKS

Not a plug-and-play device

What TNUIs currently exist?

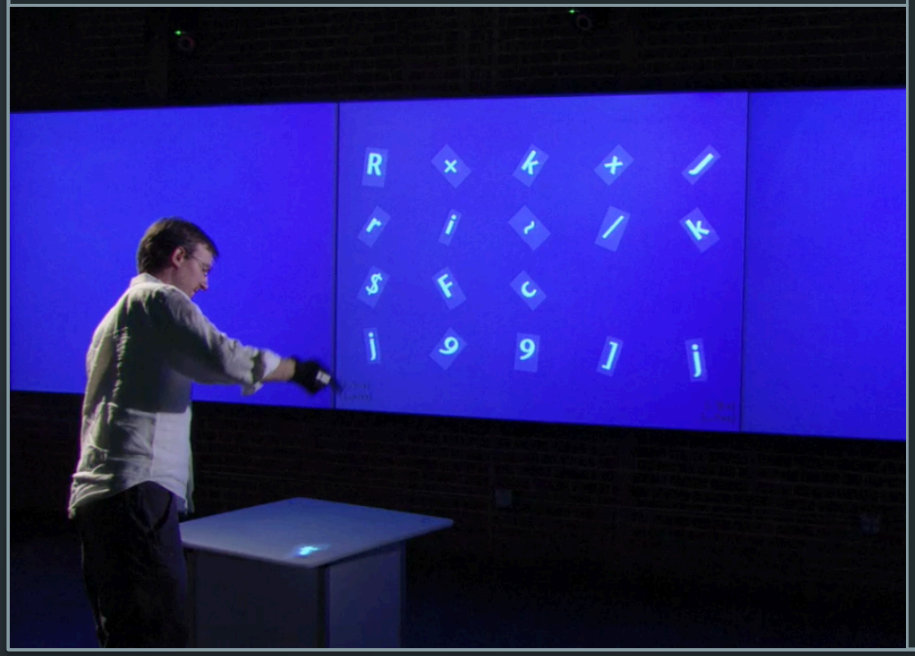
Two researchers added a TNUI to an oven, allowing people to turn on and control the oven without touching it.



What TNUIs currently exist?

John Underkoffler turned his *Minority Report* system into a massive product called g-speak. It is a niche/research product, but it pushes at the boundaries of this technology.

G-SPEAK



UNIQUE FEATURES

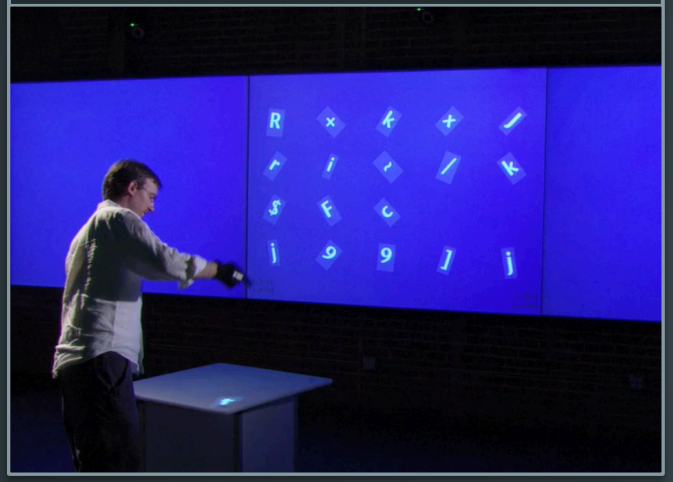
Multi-user control
Room-sized interaction space
Data can be dragged onto table
TNUI operating system

DRAWBACKS

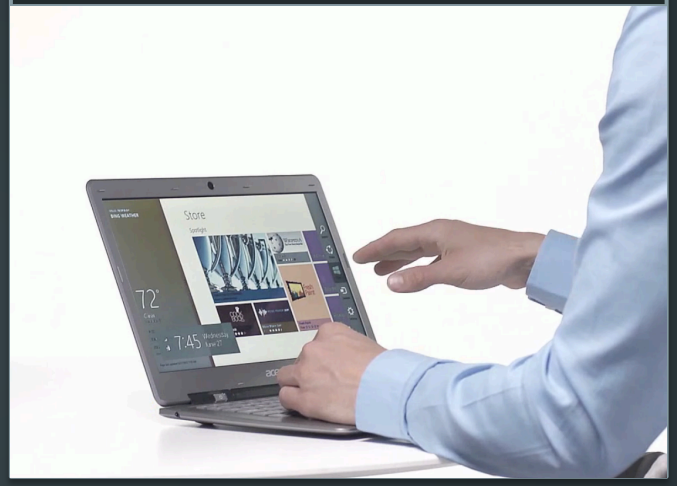
Huge system
Requires gloves to operate
Few demonstrated applications

The current field of TNUIs

G-SPEAK



ELLIPTIC LABS GESTURE SUITE

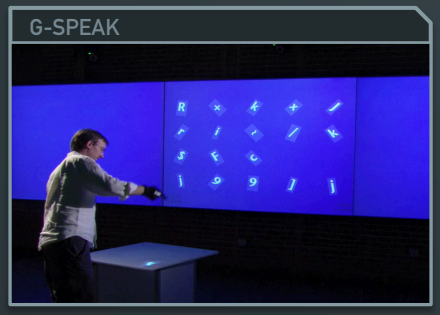


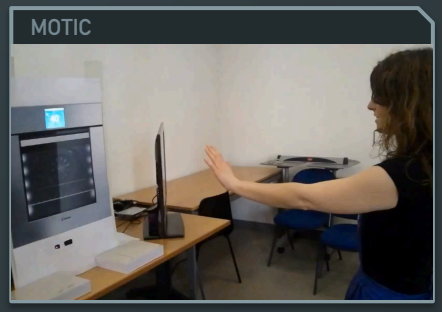
KINECT

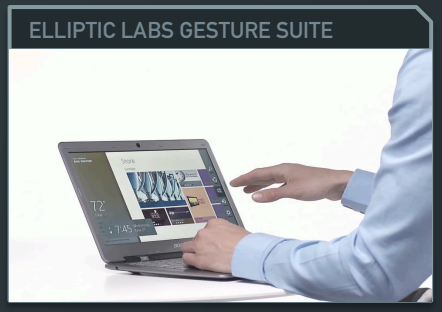
MOTIC

The current field of TNUIs

These four TNUIs are all promising but flawed. The MOTIC has strange controls. Kinect doesn't pick up small movements well. g-speak is massive and requires special gloves. Elliptic Labs Gesture Suite requires extra products.







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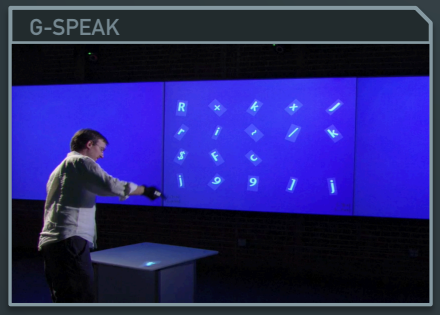
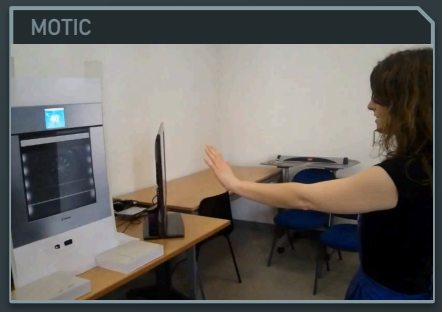
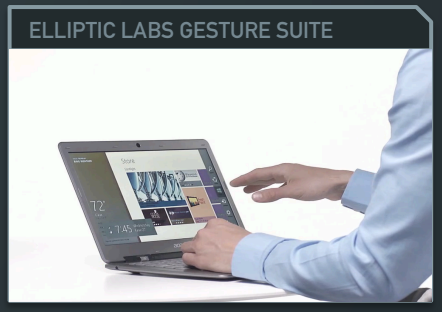






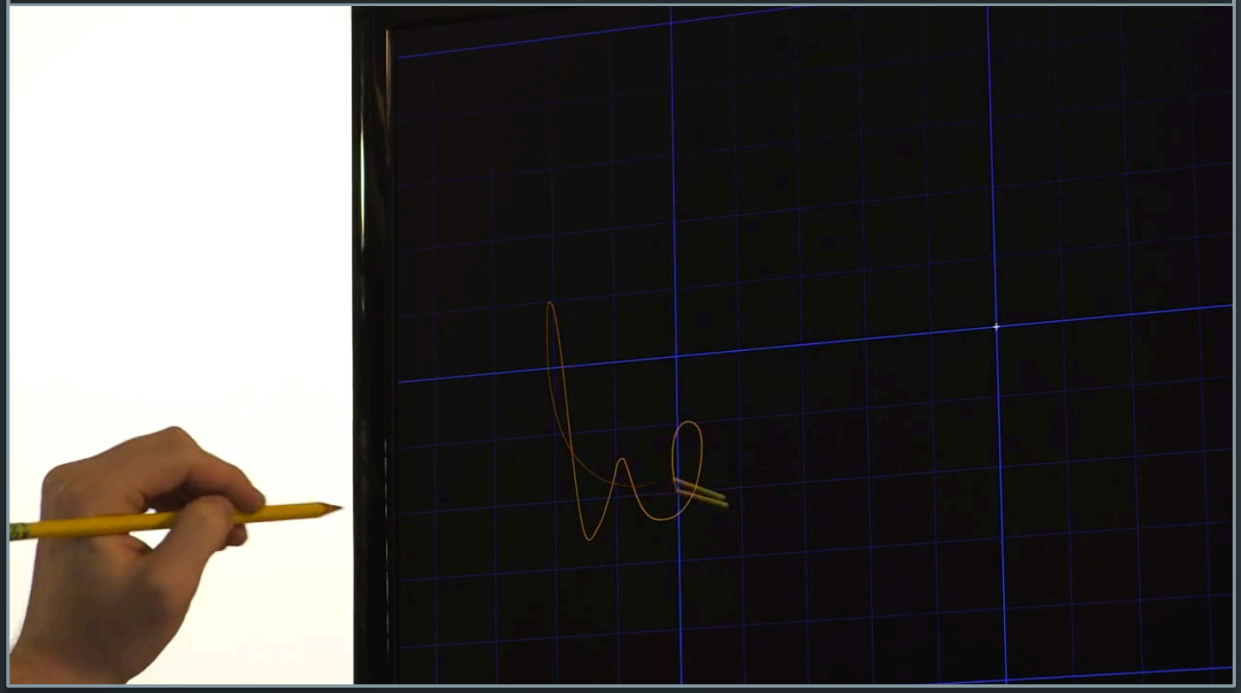
These systems are not the answer.

What about
the Leap device
you mentioned?

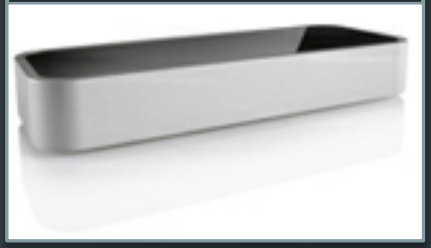
The Leap

LeapMotion was founded in 2010. In May 2012, they released a demo video of their new product, the Leap, a small USB peripheral the size of a harmonica.

THE LEAP IN ACTION

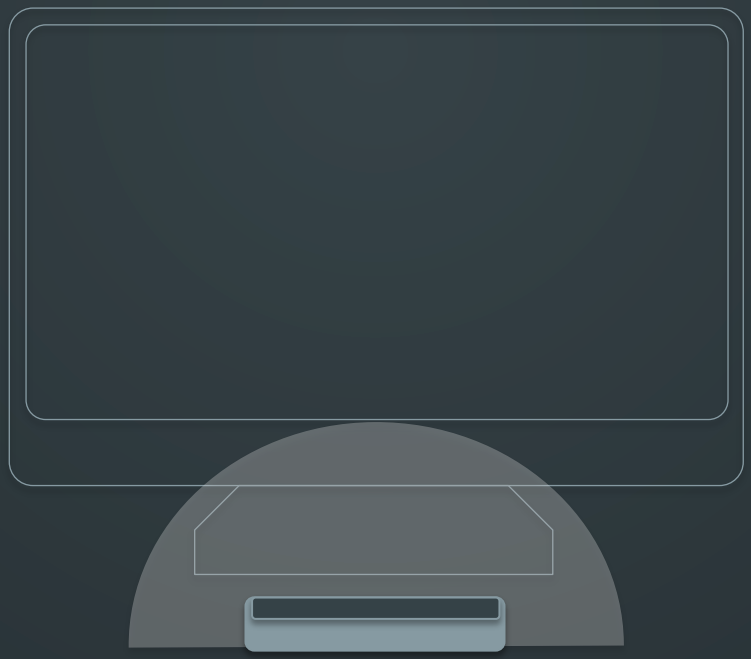


THE LEAP



The Leap

The Leap creates a small interaction space in a two foot arc.

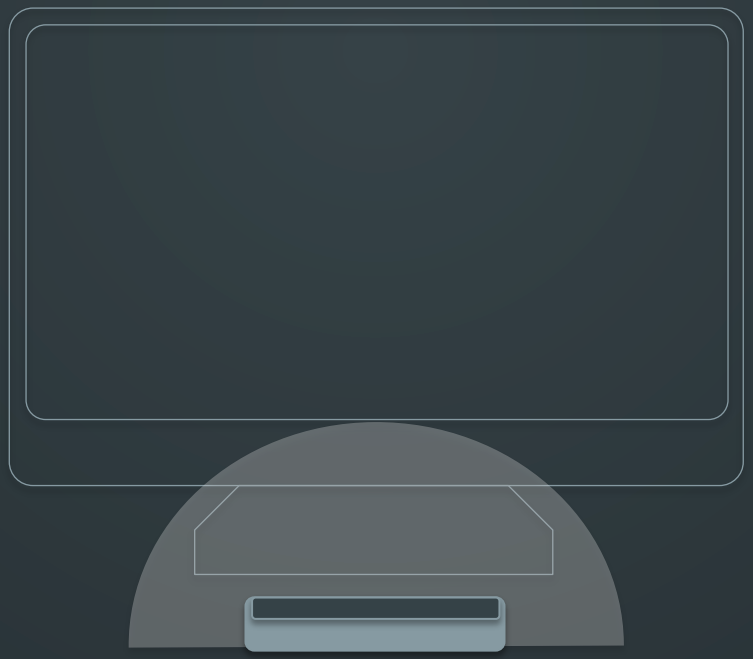


The Leap

The Leap creates a small interaction space in a two foot arc.
Its precise control and low latency set it apart among TNUIs.

CONTROL WITHIN

1 mm



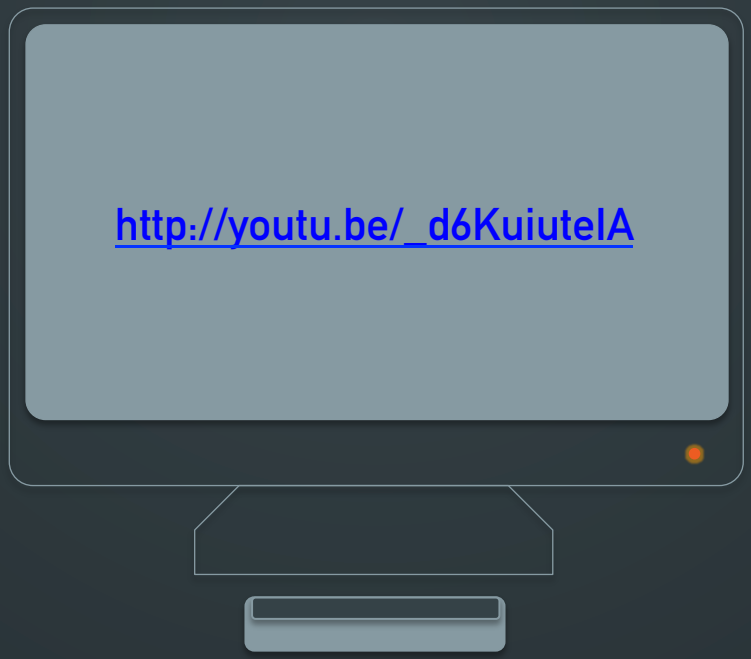
NO DISCERNIBLE

DELAY

BETWEEN GESTURE
AND ACTION

The Leap

To fully appreciate the Leap, you need to see it in action.
Click the link to watch the demo video before continuing.



The Leap

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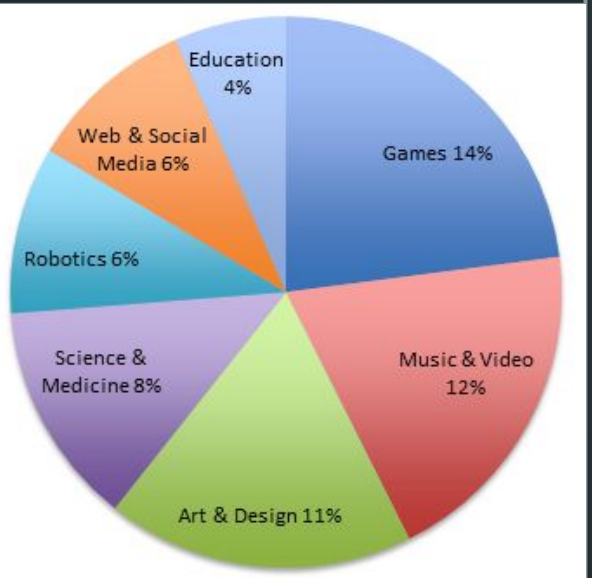
SUBMISSIONS, FIRST WEEK

1.55/min

SUBMISSIONS, TO DATE

40,000

SUBMISSIONS BY CATEGORY



The Leap

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Buying the Leap is a risky proposition.

So what
conclusions
can we draw?

Conclusions

TNUIs have a place in computing. Their strengths (spatial control, hands-free usage, and intuitiveness) will allow them to endure, even if they never reach a large audience.

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Conclusions

TNUIs have a place in computing. Their strengths (spatial control, hands-free usage, and intuitiveness) will allow them to endure, even if they never reach a large audience.

However, these devices are not useful right now. No current software takes advantage of TNUI capabilities.

Unfortunately, TNUIs will not be useful to general office workers because they cannot do text-based work effectively.

Conclusions

TNUIs have a place in computing. Their strengths (spatial control, hands-free usage, and intuitiveness) will allow them to endure, even if they never reach a large audience.

However, these devices are not useful right now. No current software takes advantage of TNUI capabilities.

Unfortunately, TNUIs will not be useful to general office workers because they cannot do text-based work effectively.

But the Leap is a huge breakthrough: the first affordable TNUI with no delay between gesture and action.

So should I

order some Leap units

for my company?

Recommendation

No, we shouldn’t order multiple units. Office workers and many other employees will not benefit from it.

However, we should apply for a developer kit and start work on specialized applications, especially in handsfree settings. This is part of computing’s future, and we should be ready.

Recommendation

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However, we should apply for a developer kit and start work on specialized applications, especially in handsfree settings. This is part of computing's future, and we should be ready.

We should test the waters, not wade in over our heads.

Thank you!

Are there any questions?