深圳大学物联网研究中心
The IoT Research Center

Oinput: a Bone-Conductive QWERTY Key-board Recognition for Wearable Device

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Demo

Background

WEARABLE DEVICES

Simplicity
Convenience

Background

Disadvantage

However, the small form-factor, low-profile hardware interfaces, the input scheme for such wearable devices becomes a bottleneck and even sabotages their functionalities.

Related work

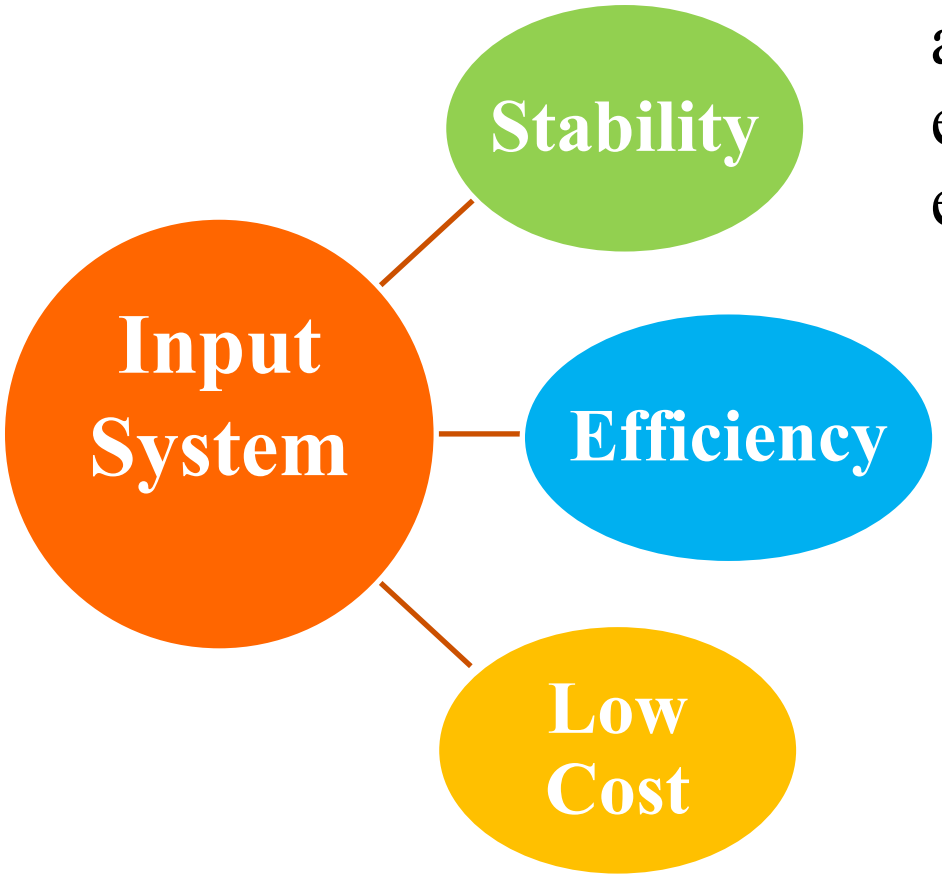
Voice Input

- Depending on the user's accent, speech rate, and the network environment.
- Fragile to external noise and lack of privacy protection.

Acoustic based input

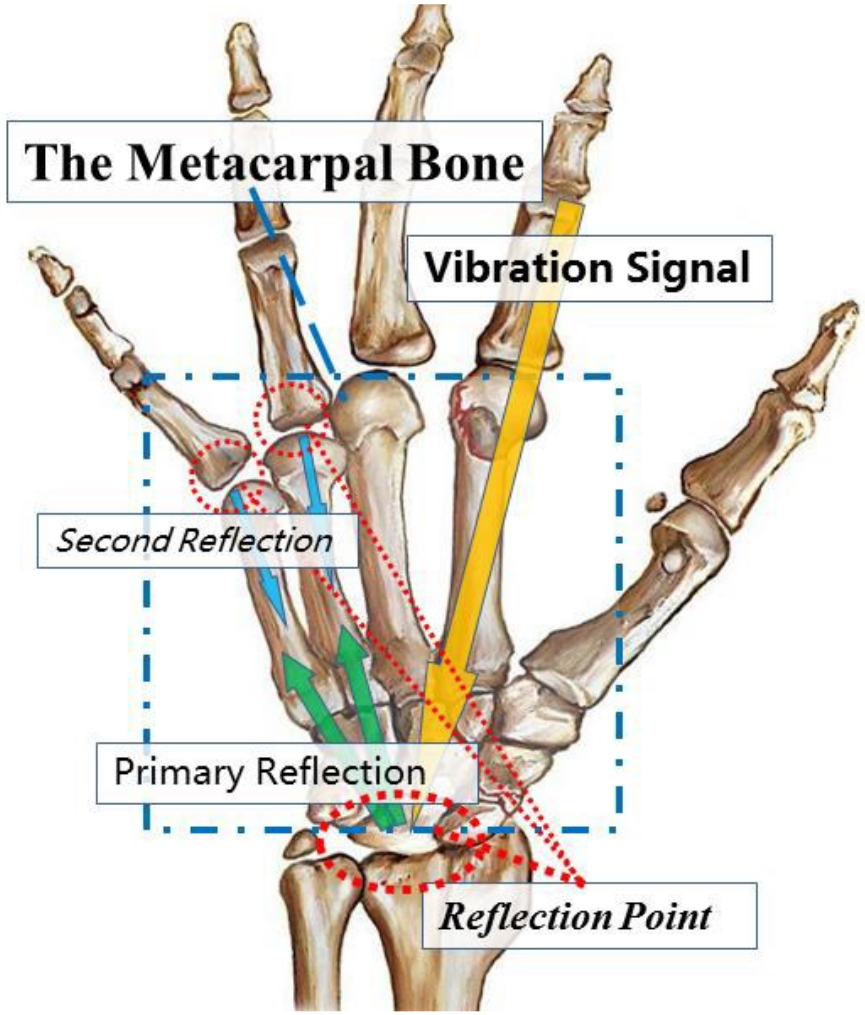
- Gesture input is slow, and sometimes troublesome when the environment is not stable.

Motivation



- Stability means that the system is not easily affected by other external variables, such as environmental noise, scene changes or environmental factors.
- Efficiency means that the system does not need complicated operations, such as extra training or tedious settings.
- The system should be low cost and easy to carry.

Motivation


The Metacarpal Bone
Vibration Signal
Second Reflection
Primary Reflection
Reflection Point

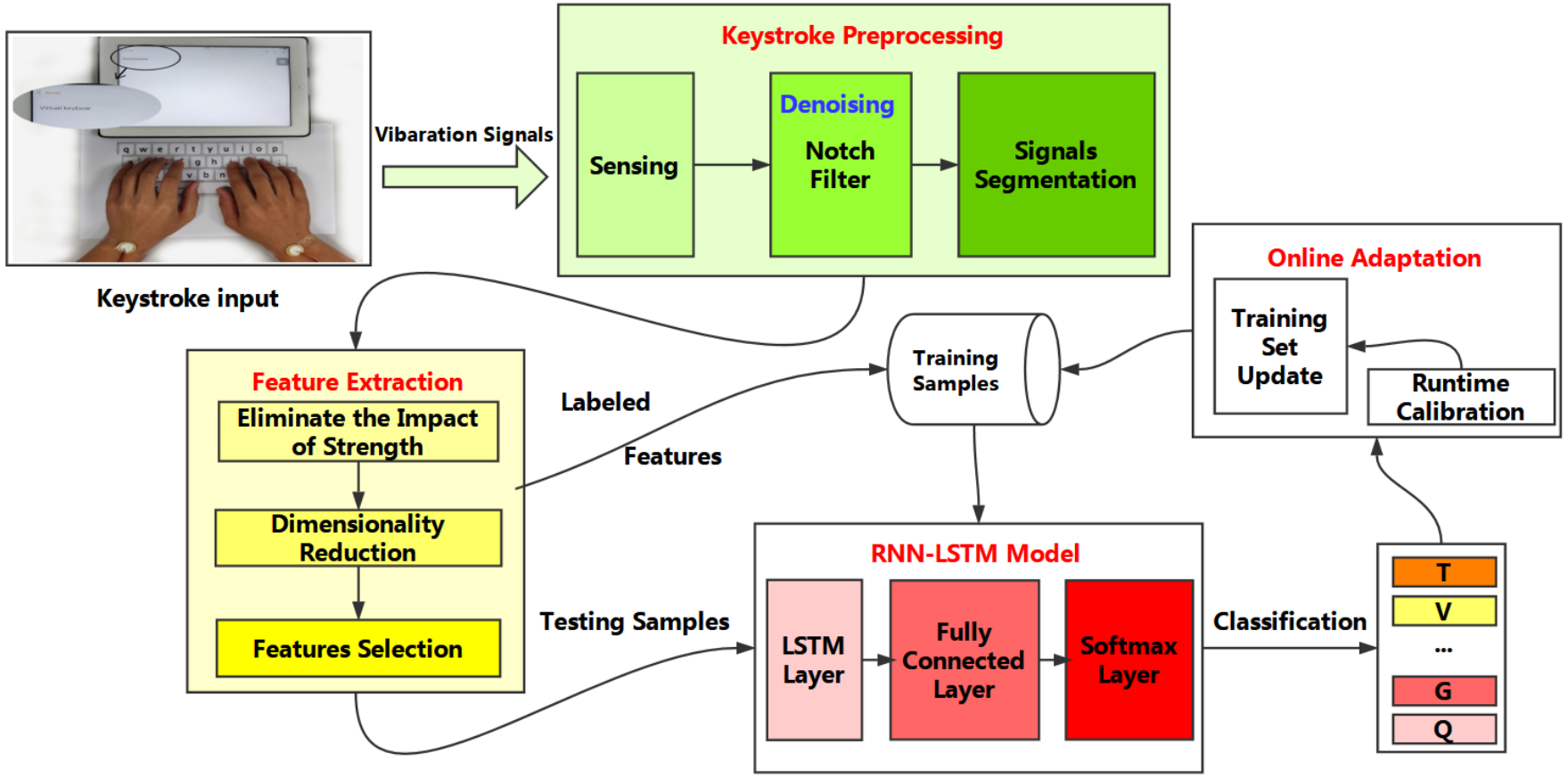

Virtual keyboar
q w e r t y u i o p
g h
v b n

Challenges

- What kind of features do we need to achieve a precise recognition?
- How to realize a QWERTY keyboard with only ten fingers.
- How to design a practical input system with minimum energy consumption?

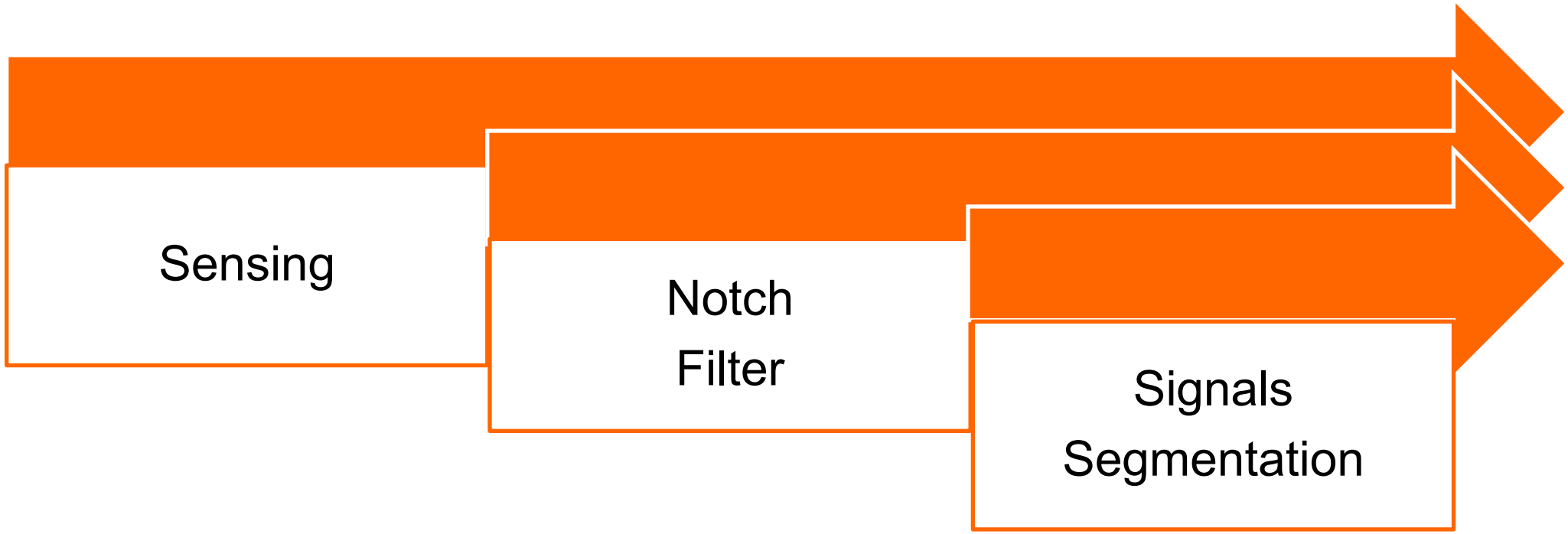
Implementation Methodologies

Architecture of Oinput



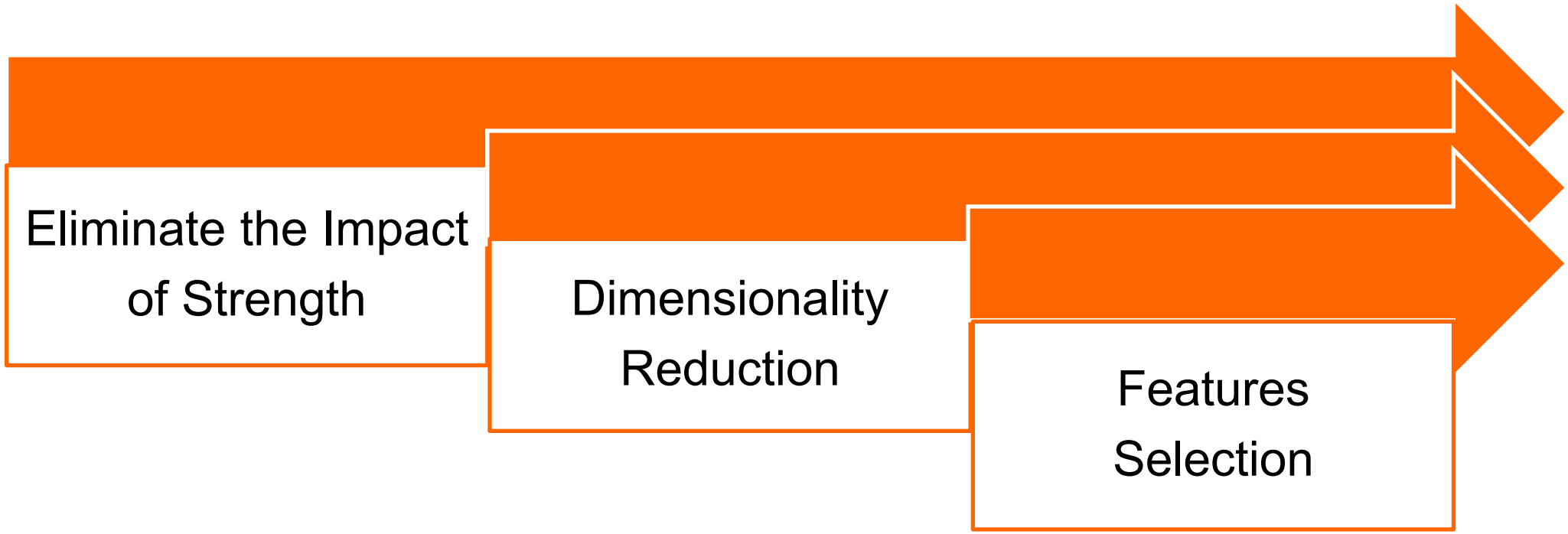
Implementation Methodologies

Keystroke Preprocessing



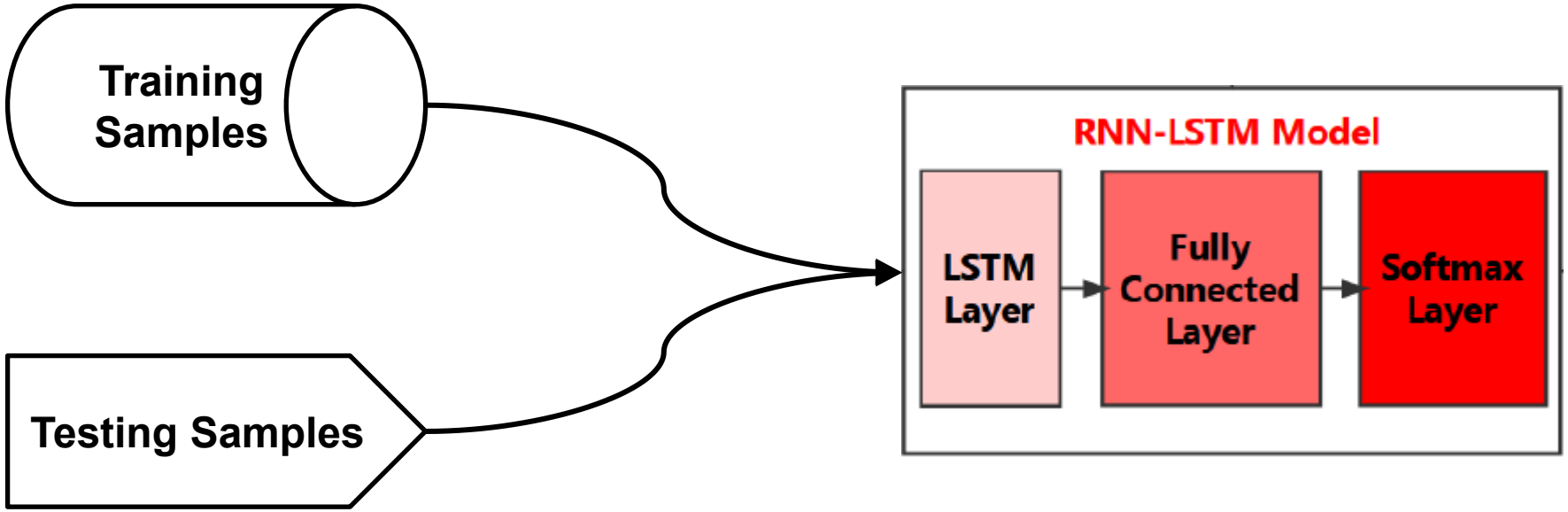
Implementation Methodologies

Feature Extraction



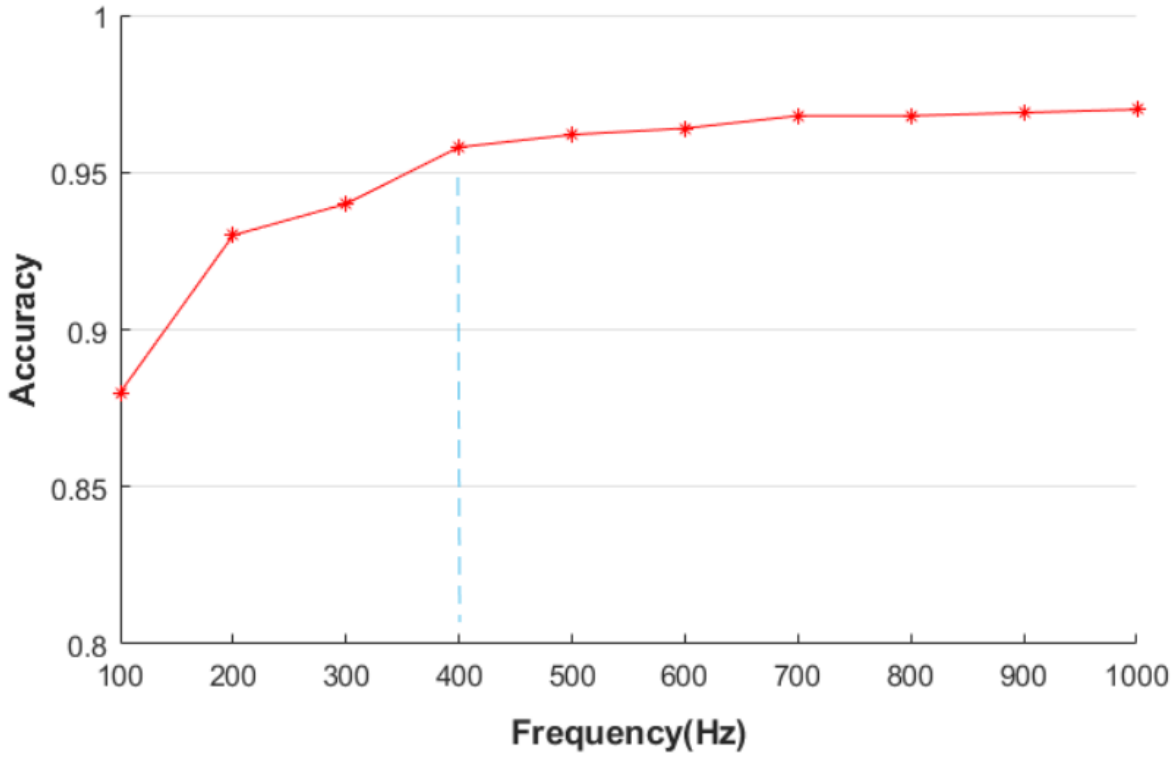
Implementation Methodologies

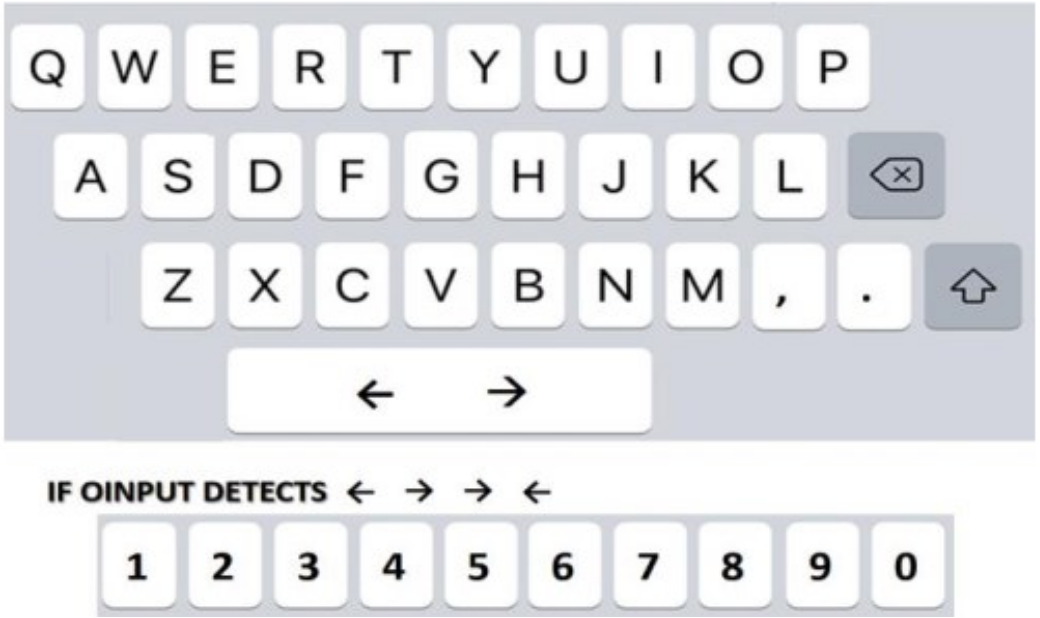
Key Content Recognition



Implementation Methodologies

Dimensionality & Energy Consumption Reduction





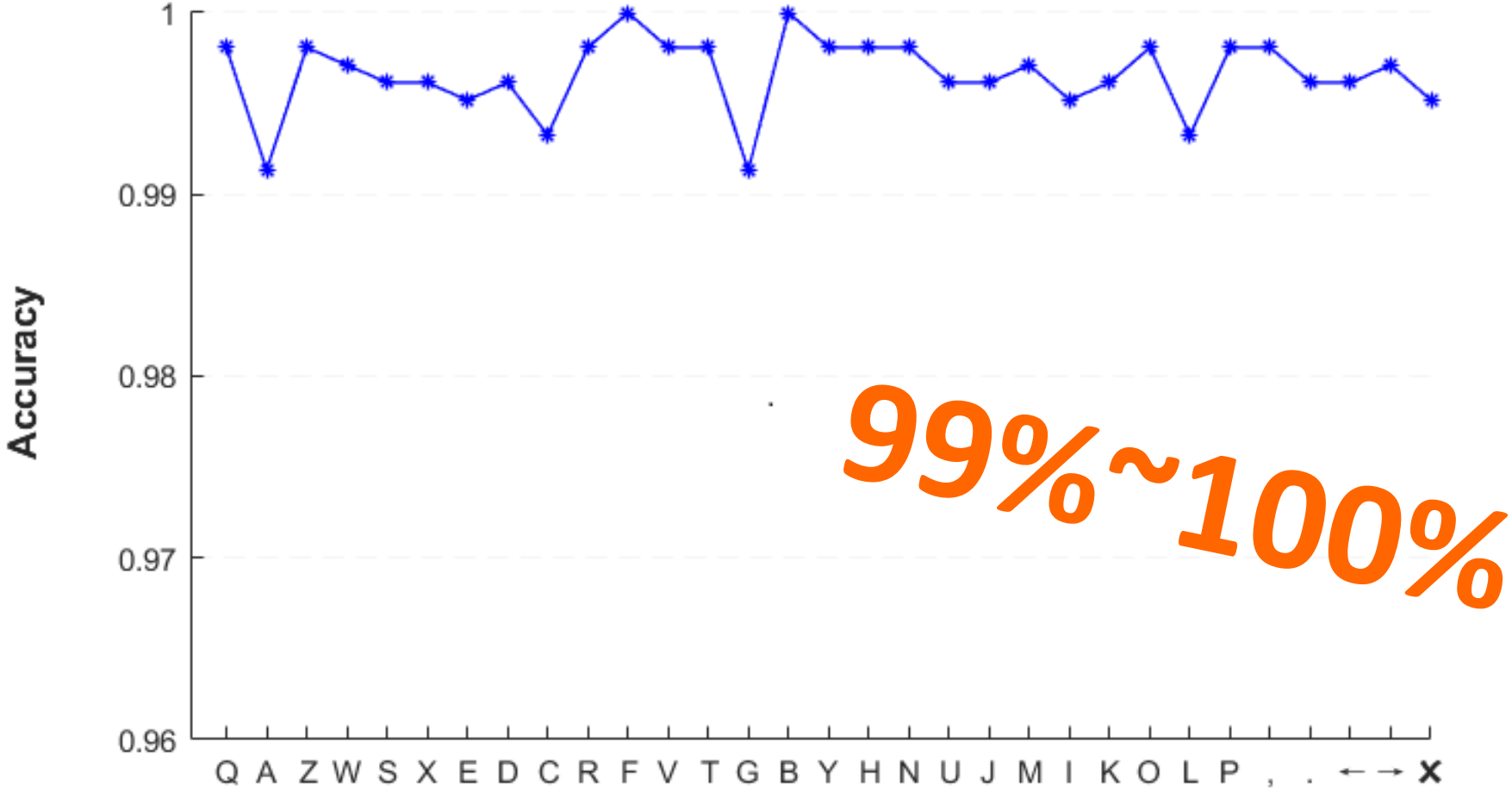
Experimental Setup

30 volunteers between the ages of 19 and 22 (15 males and 15 females)

Experiment was carried out in a traditional office environment with a paper keyboard on the desktop.

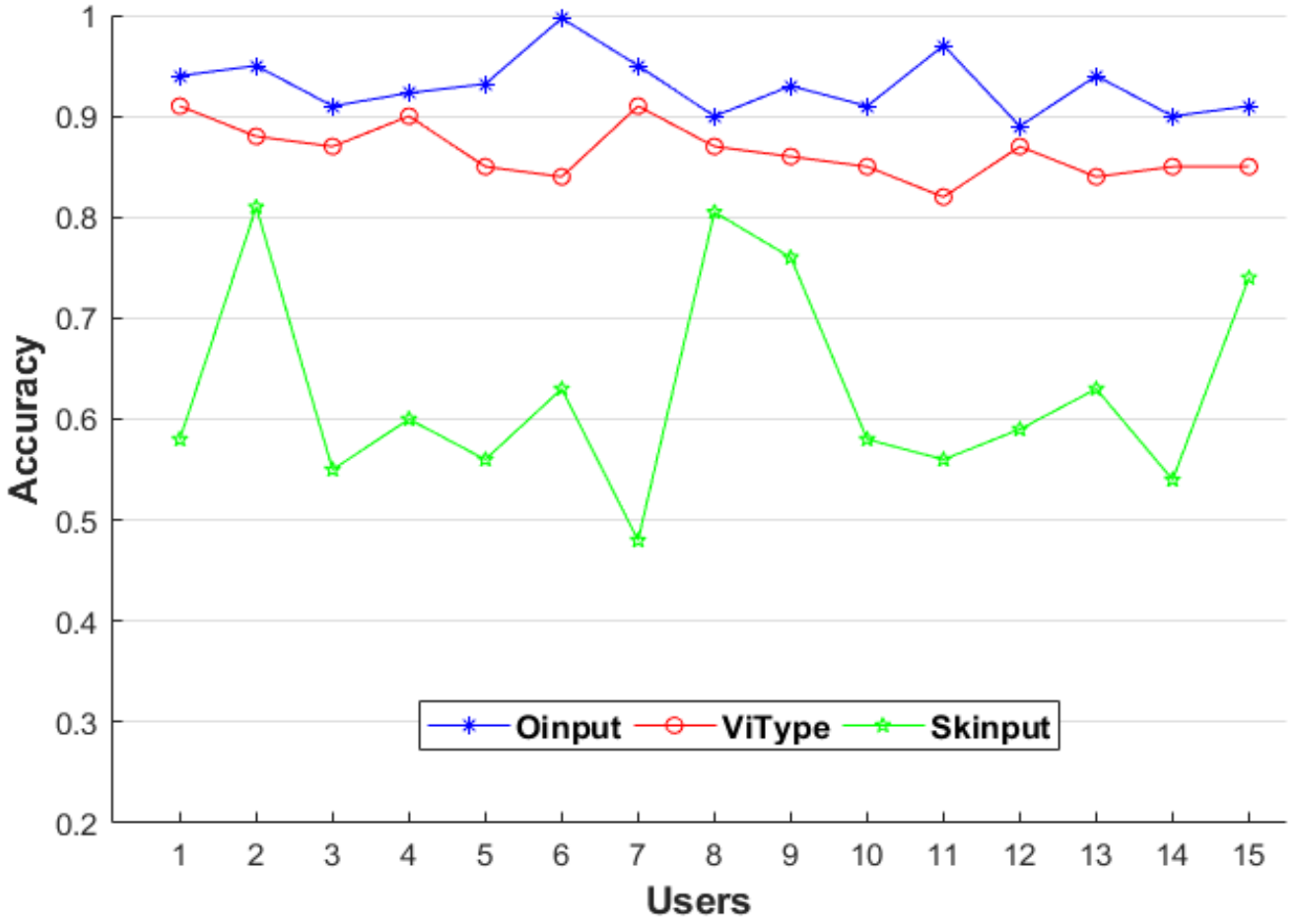
Do the **Oinput**, Vitype and Skinput experiments.

Oinput System Performance

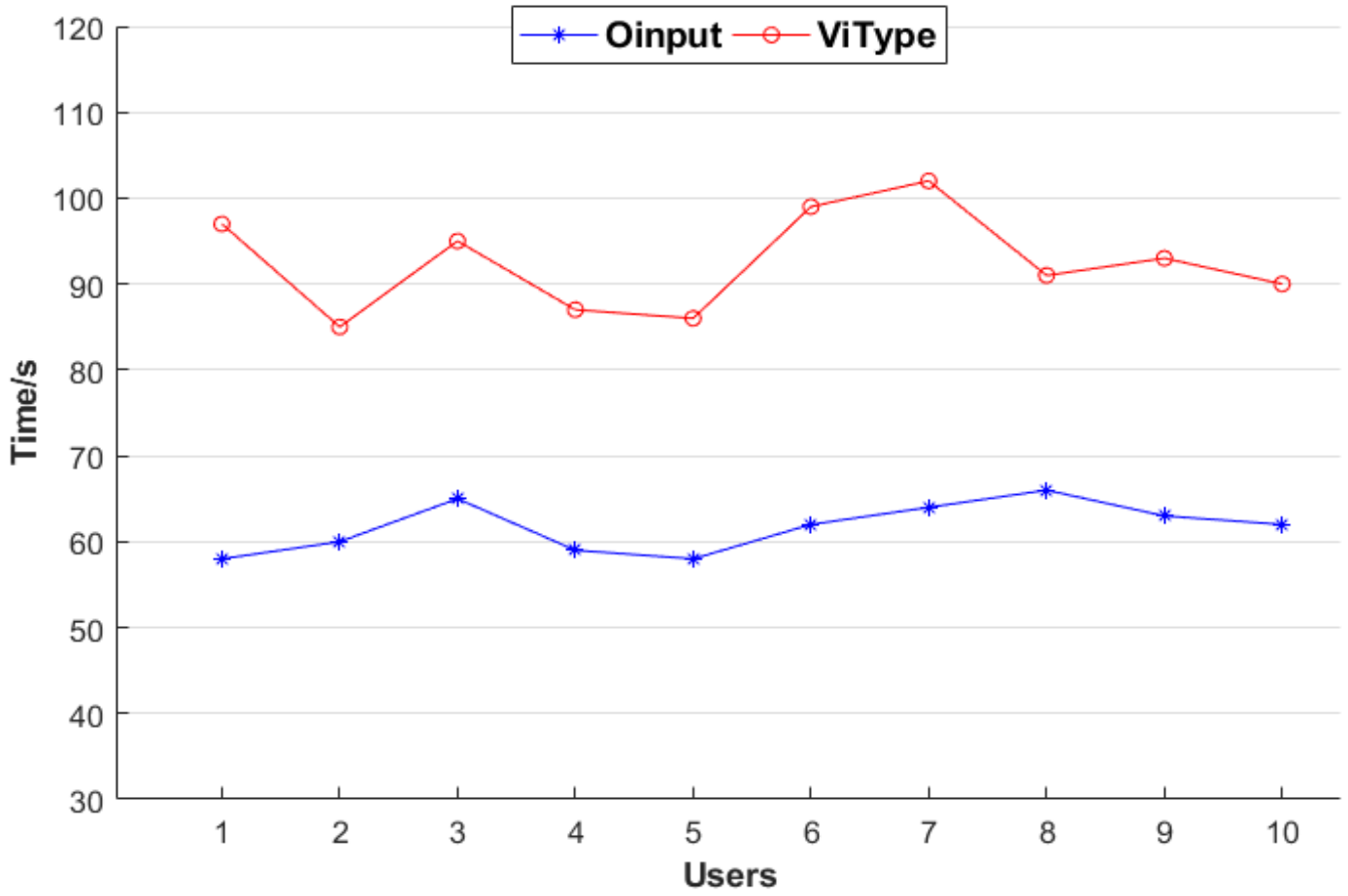


Oinput System Performance

93.3%



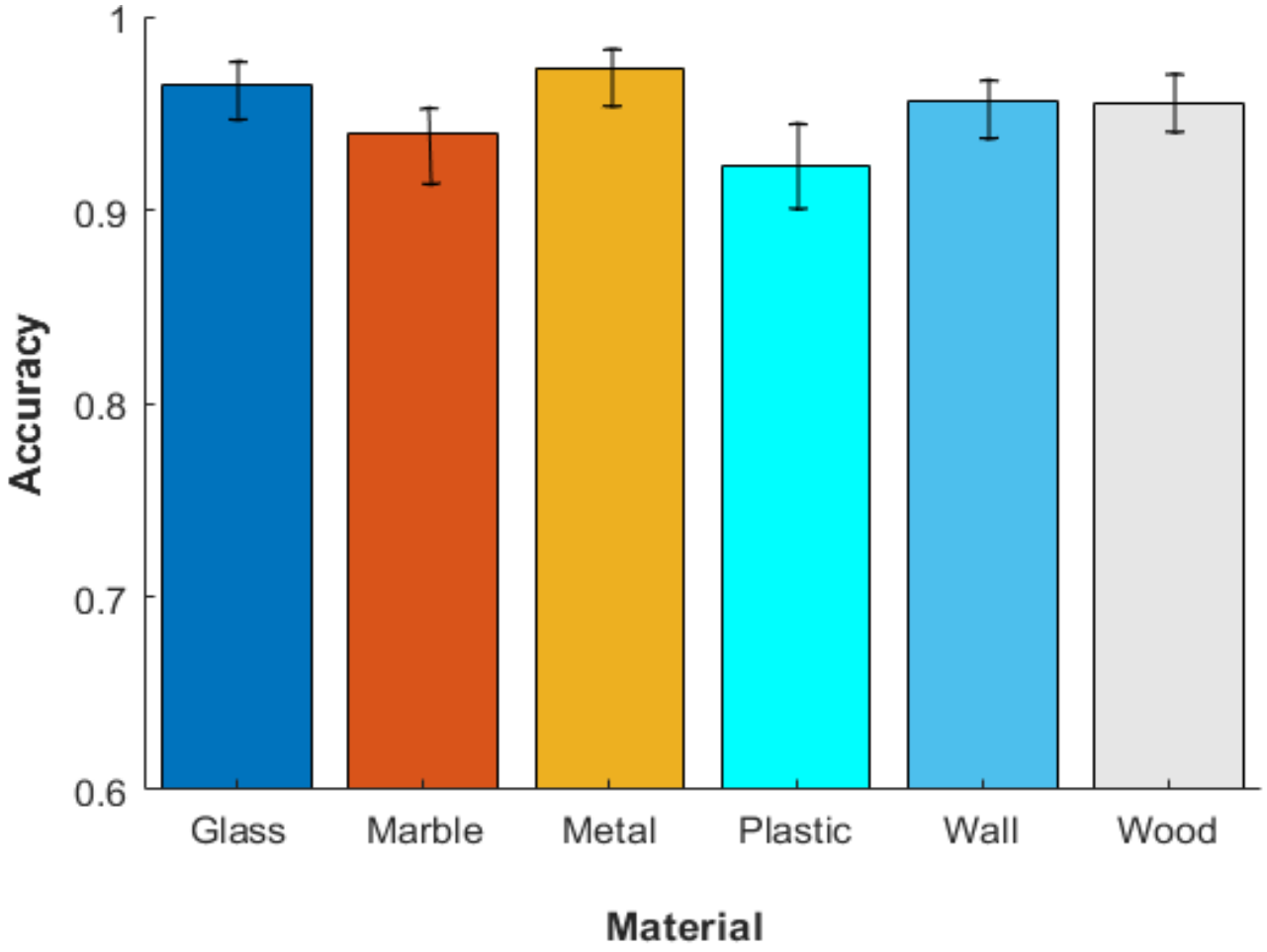
Oinput System Performance



Less Time

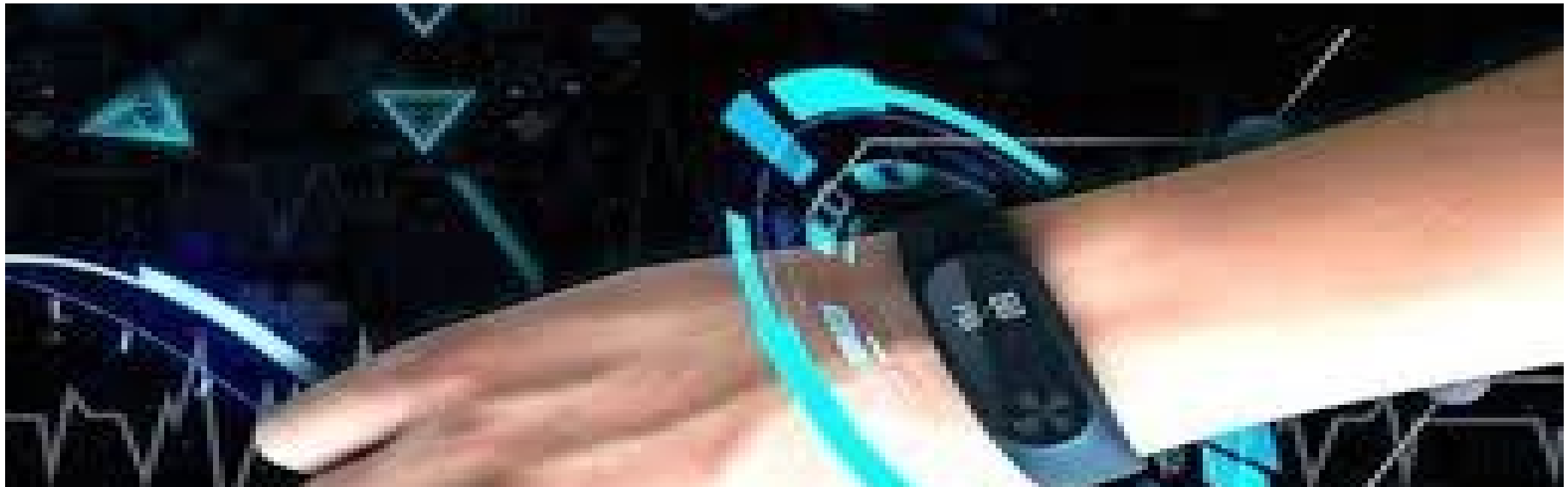
Robustness of the Oinput System

90%



Conclusion

- Oinput is a novel text input system that attempts to discard physical keyboards.
- Oinput uses a small, inexpensive vibration sensor that can be embedded in a watch and a low-energy method to achieve high-precision recognition of 93.3% in average.



Thank you!

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