



# the Vocal Joystick

## A Human-Computer Interface for Individuals with Motor Impairments

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<http://ssli.ee.washington.edu/vj>



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### Objective

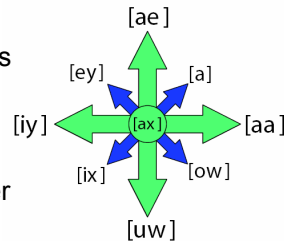
A general software infrastructure – enable people with motor impairments to use vocal parameters to control objects on a computer screen and ultimately electro-mechanical instruments (e.g., robotic arms, wireless home automation devices).

### Approach

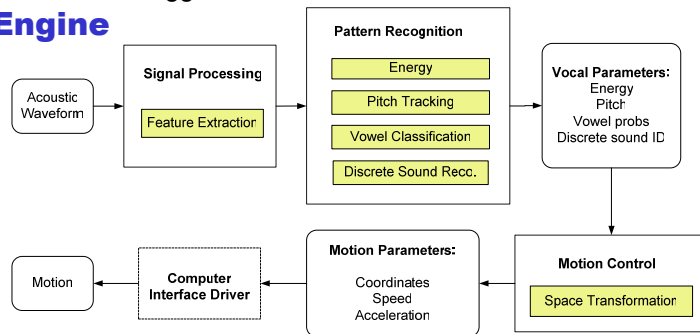
Use continuous vocal parameters to control continuous motion including direction, speed and acceleration, and use “spoken language” to control discrete actions

#### A cursor control example:

- Vowel quality controls direction; curves are realized by adaptive filters
- Intensity controls speed. The cursor keeps moving as long as you hold the sound; the louder your voice is, the faster it moves
- Discrete sounds, like [k] and [ch] launch clicks and toggles



### VJ Engine



**Adaptation:** to improve performance, the VJ system can be adapted to a specific user's voice quality and volume

### Broader Impact

- Natural languages can be quite inefficient for continuous control tasks and are often recognized poorly by speech recognizers.
- Assistive devices, such as sip and puff switches, have extremely low communication bandwidth.

The **Vocal Joystick** exploits a large set of vocalizations optimized for automatic recognizability and communication bandwidth, and latency in existing vocal control systems can be reduced!

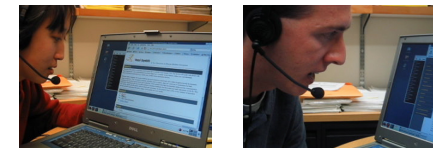
### User Study

150 users were asked to play simple computer games, browsing news websites and using electronic maps. Nearly all of them successfully completed their tasks using the VJ. Their overall impression is:

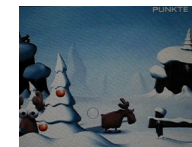
- Easy to learn
- Helpful to people who cannot use hands
- Would do better given more training time

### Applications

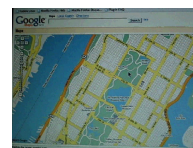
#### Using Vocal Joystick



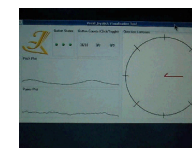
Browsing news websites



Playing computer games



Browsing Google maps



Voice visualization