

Air

User Guide

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Overview

The project

Air goal is to build an NI (Natural Interaction) interface for controlling Windows and Ubuntu operating systems, using a Kinect sensor.

The project is originally a MSc project for the University Of Kent.

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Features

The current version support two kinds of gestures:

- Hand gestures : used for global controls.
- Fingers gestures: used to manipulate the mouse pointer only.

Resources

Website: <http://doobled.github.com/Air/>

Technical documentation: <http://doobled.github.com/Air/>

Sources: <https://github.com/DoobleD/Air>

Prerequisites

Air is based on the OpenNI framework for Natural Interactions. It also uses NITE's OpenNI middleware for some gestures recognition. Therefore, the following software is needed to run Air :

- OpenNI framework: <http://www.openni.org/>
- NITE middleware: <http://www.openni.org/downloadfiles/opennimodules>
- SensorKinect driver for Kinect: <https://github.com/avin2/SensorKinect>

Air also uses the SFML media library: <http://www.sfml-dev.org/>

Other components may be required depending on the platform you use. Please refer to the README for a complete list: <https://github.com/DoobleD/Air>

You may either install these components by yourself, or choose an installer to do it for you.

- ➔ To install each component by yourself and/or compile the project, please refer to the README file at the root directory of the sources: <https://github.com/DoobleD/Air>
- ➔ The installer is currently only available for the Windows platform. You can download it here: <https://github.com/DoobleD/Air>, by clicking on the “Downloads” button, and select “AirInstaller - Win32.exe”. You may need to reboot your system after installation. Please refer to README if any troubleshoot.

Environment

Place a Kinect above your computer screen, at around 1 meter distance from your hand.

You may adjust the distance depending on how good is the fingers detection on the debug window. A good detection obviously detect all fingers, without flickering.

Tutorial

A video tutorial is available at <https://github.com/DoobleD/Air>, click on the “Downloads” button and select “Tutorial.avi”.

This visual tutorial might be the better way to learn how to use Air, since it is a program based on human gestures.

Run Air

To launch Air, simply double click on Air.exe on Windows, or use the command line `./Air` on Linux. Please make sure a Kinect is correctly plugged both to your computer via the USB connector, and to a power outlet.

As the current version is still a development version, a debug window should appear, showing a depth image of the scene in front of the Kinect sensor.

Notice that Air interacts with three elements :

- The operating system (the mouse, the screen, and the keyboard)
- The debug window, showing a depth histogram of the scene, and some other information, as fingers position
- The console window, mostly to print messages on it

Start a session

To start a session, perform a wave gesture in front of the Kinect. If your gesture starts being detected, a message should be printed on the console window, indicating the progress.

The session has started when you see your fingers on the OS screen, and on the debug window.

Hand gestures for general control

Here are the hand gestures and their corresponding actions:

- Swipe left or right: switch between open applications (equivalent to 'Alt + Tab')
- Swipe up: maximize current application
- Swipe down: minimize current application
- Circle gesture: show desktop (minimize all windows) or restore all windows
- Push gesture: kill current application (equivalent to 'Alt + F4')

Perform swipe and push gestures quickly and on a pretty long distance to make them detected. See video tutorial to have a better vision of the gestures.

Fingers gesture for mouse control

General information

The fingers can control the mouse. The control is actually based essentially on two fingers. One finger, the longer one, is used as the pointer to move the mouse and perform clicks. The other finger, the shorter one, is used to change the current button used by the pointer finger.

The ideal case is clearly to use the index finger as the pointer, and the thumb as the finger to change active button.

By default, the current active button is the left button.

How to enter in pointer mode

To activate the control of the mouse, close your hand, raise only one finger (ideally the index), and wait a few seconds in this position. When the control starts, you will see a yellow square on the screen surrounding the mouse pointer.

Moving you finger will move the mouse.

Clicks gestures

Once you are in pointer mode, quickly lower and raise the finger will perform a click: lower the finger until it touches your closed hand to make the finger disappear from detection, and then raise it up again.

Actually, lower the finger to hide it from detection performs a button press. Raise it after this, release the button. So lower the finger and raise it, performs a click.

Change current button (right click)

You can also perform a right click. To do this, you need to change the current active button.

Raise another finger, ideally the thumb, for a few milliseconds or seconds. When the button changes, the color of the square surrounding the mouse pointer changes. It turns to red for right button, and yellow for left button.

Hold the thumb raised will successively switch between buttons. To perform a click, hide the thumb, and perform a click a usual.

Note: after a right click, the active button will automatically be switched to the left button (yellow square).

Grab click

You can also grab an item. This is equivalent to keep the left click pressed and move the mouse (e.g. to move an icon on your desktop).

To perform a grab click, lower your index finger and keep the hand closed a few milliseconds/seconds. The element you clicked on will be gabbged by your hand and moved as you move your hand.

To release the element, simply open the hand.

Scroll

To scroll, open your hands, to quit pointer mode. Then, close your hand and wait a few milliseconds/seconds. This will active the scroll (equivalent to press the mouse middle button).

Then, move your hand up, down, left or right, to scroll in the desired direction.

To release the scroll, simply open the hand.

End the session

The session stops when the hand is no longer detected. To make Air lose your hand, simply hide it, either by put it outside of the field of view of the Kinect sensor, or by hiding it behind something.

Once a session ends, all status and controls are lost.

To start a new session, show your hand, and eventually perform a wave gesture.

Troubleshooting

The current version of Air is not stable at all, and still generates a lot of errors of gesture recognition. It is not really usable for day to day use. Improvements may come in the future.

If you experiment troubleshooting during installation or compilation, the first thing to do is look into the README file in the sources (<https://github.com/DoobleD/Air>).

If you still have problems, please send an e-mail to the author at pa211@kent.ac.uk .