

Linkat and Accessibility software

Jordi Sanchez Riera. jsanc237@xtec.net
Computer Accessibility Group.2006.

I. INTRODUCTION

The aim of our group is develop and adapt software applications for several types of impairments such as visual and mobility disability, and modify hardware if its necessary, to obtain a product suitable for our needs.

From the beginning of the project of Linkat we were worried about to do the distribution accessible for people with disabilities. An our Linux distribution (Linkat) includes the default gnome desktop accessibility programs translated to catalan.

II. SOFTWARE INCLUDED

II. a. General gnome applications

Fonts and Desktop themes

Fonts and Desktop themes translated to catalan. Text size and color can make a big difference in legibility for people who have low vision. The themes allow improve the vision of window system desktop.

JoyMouse

A program, or daemon for Linux, which converts incoming joystick data to mouse data, so that you can use your joystick for games as a mouse device.

ORCA

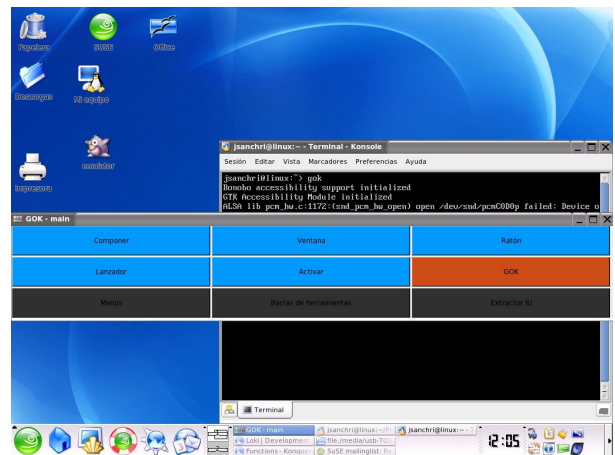
Is an integrated screen reader and magnifier with support for scripting, optimized for the gnome desktop.

Dasher

Rapid text entry system alternative to keyboard.

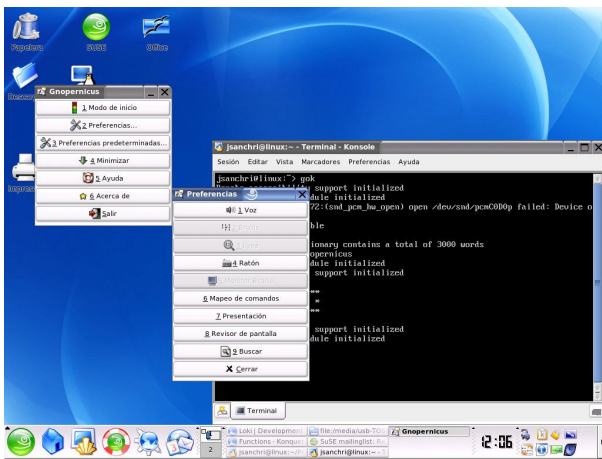
Gnome Onscreen Keyboard

GOK aims to enable users to control their computer without having to rely on a standard keyboard or mouse. Many individuals have limited voluntary movements and must control the computer using alternative input methods. These input methods may be controlled by a switch.



Gnopernicus

The Gnopernicus project aims to enable users with limited vision, or no vision, to use the Gnome desktop and applications effectively. By providing automated focus tracking and fullscreen magnification. Gnopernicus aids low-vision Gnome users, and its screen reader features allow low-vision and blind users access to standard applications via speech and braille output. Gnopernicus is based in gnome-speech server that allow configure the program with multiple voices.



II. b. Text to Speech synthesis

A complete text to speech system is indispensable to guarantee the accessibility to blind people in computer technologies. This technology allows navigate to the Desktop system, read documents and application menus and more else, even, must be interesting to non blind people helping to learn a new language. For these reasons, one of the main handicap we have had is incorporate a free text to speech synthesis in our language, Catalan, for Linkat. This synthesis must be compatible with gnome-speech server and if its possible using FESTIVAL synthesis system. The signal processing group of UPC is developing a catalan voice, presented before, to incorporate in Linkat distribution. And we are collaborating with the MBROLA project, and modifying some Festival scripts to help to understanding the text to speech process and integrate more easily to Linkat distribution.

II. c. Computer Vision applications

Computer vision is an emergent technology which allows create multiple and different applications such as hand tracking, background subtraction, move tracking, color tracking and more else. With the processing capacity increasing every day, and the improvement of the CMOS sensors we can create an small and quick programs that helps human computer interaction, creating another way of communication with our machines.

We are mainly working with two technologies, color tracking and move tracking and we are planning to incorporate pattern recognition in our applications. With color tracking we create a mouse, single switch, joystick and board emulator, and only needs a color and a webcam, which is cheaper than a camcorder needed for most sophisticated applications like eye tracking systems and other software that need optical zoom. The other application is a game like EyeToy for PlayStation, more simple, but configurable by the user permitting create different games.

Emulator

Emulator it can be configured with four modalities of emulation, a single switch, a mouse, a joystick and a board.

One of the main problem with this application is choose an adequate color which not interfere or not exist in the background image. By this purpose we have three buttons: one button is for see the color selected, with the other button we can see the colors of background image, and with the third button we can see a black and white image corresponding to the vision of application. To choose a color we must do a left-click with the mouse over the color that we have selected. If we choose a color that already exists in the background the application will not work correctly.

It's very important to configure the system correctly to have a good results with the four modalities emulations. Once,when we have the system calibrated we can start to play with one of the mode emulation.

Single-switch emulation:

One of the advantages of this emulated switch is it does not break and no need repair or maintenance. We can configure for presence or for absence so that we take an action when the color is shown or when the color is not detect. If we have had configured for presence, every time that application see the color, takes an action. There are four types of actions: we must have a click, a double click, a right click, and

no click. We also, can control the time of every click to adjust to our needs.

Mouse emulation:

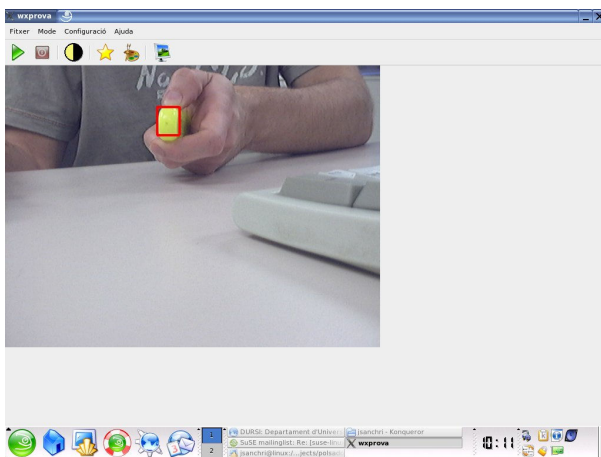
We can emulate a mouse device. Moving the color selected, we can move the mouse pointer on the whole screen. The click options are the same as single-switch emulation.

Joystick emulation:

Emulates a Joystick of nine positions, dividing the image captured by the webcam in nine zones. This zones can be configured by the user making it more bigger or smaller. Moving over this zones we move the mouse pointer on the desktop.

Board Emulation:

Allows work in perspective. If we focuses a piece of paper, the webcam not view as a rectangle, but view as a parallelogram, and we can transform webcam coordinates to screen coordinates. It performs a mathematical transformation.

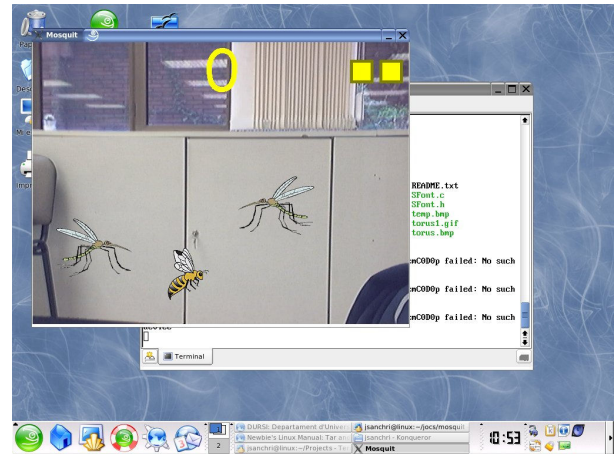


WebColorToy

WebColorToy is a game application on the user no need a keyboard and no need mouse, only with his body can interact with the game. It's based on move detection and when the object displayed on the screen coincides with the zone of movement an action is taken.

One of particularity of this game, is that you can configure at your needs. You can choose

the direction, speed, and position of objects. The action to do when the object is virtually touched (for example: lose live, increment a counter or flip screen). You can also change the object picture and the music game.



III. FUTURE

Approach the technology to disabled persons is very important to guarantee their education and the possibilities to develop their lives as normal as they could. In the other hand, the technology is every day more cheap and easy, and we can develop more specific software adapted to each disability. The software described above is only an example of the possibilities on a Linux operating system, and how we can approach the technology to several kind of persons with free software, and it's only the beginning, because a lot of people is still working in existing software and aporting new ideas to realize technology more accessible and easy to use.

IV. REFERENCES

- <http://www.xtec.cat/dnee/udc>
- <http://linkat.xtec.cat/portal/>
- <http://www.inference.phy.cam.ac.uk/dasher/>
- <http://www.cstr.ed.ac.uk/projects/festival/>
- <http://tcts.fpms.ac.be/synthesis/mbrola.html>
- <http://live.gnome.org/Orca>
- <http://sourceforge.net/projects/joymouse-linux>
- <http://www.baum.ro/gnopernicus.html>
- <http://www.gok.ca/>