

Touchpad: A versatile Input Device

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Abstract -In this paper we enhance the features of our project and how this project overcomes on other project. In this project we are developing 3 modules viz., Gesture Wizard (GestWiz), RealTouch, TouchWizard (TouchWiz).

Today while using any software we look whether the software is compatible with the OS or whether it is supported by all OS, Hardware and the most important feature is it open source or not, so at the time of planning our project we focus on Open source platform. This is the key factor of our project that it is developed under an open source platform. In market there are lots of product on text entry but only few have succeeded but they may not be supported by all OS, but our project will be supported by different OS including most flavors of Linux (viz Fedora, Ubuntu &c.), Windows(XP and above).

Touchpad : A versatile input device has been developed under Ubuntu, which we know is a popular flavor of Linux and its has also been tested on Windows platform.

Touchpad: A versatile input device takes gestures to the next level with gesture workflows. Touchpad gesture workflows enhance how you work and play.

Keywords: Touchpad, Gesture, Unistroke, Input Devices, Open source Software's.

1. INTRODUCTION

1.1 Motivation

This paper is motivated by two primary concerns, the need for better desktop computer access, particularly for people with motor impairments and the need for better data entry method, which helps disabled users and able-bodied users alike. Improving text entry and desktop access in these domains with a single versatile design is the primary goal of this research.

2. PURPOSE

Touchpad: A versatile input device enables users to define finger gesture movements for use as shortcuts to increase productivity, get work done more efficiently and it's an Open Source Platform.

Organizations have been coming up with solutions to text entry problems. But common desktop users have been deprived of these solutions due to various platform issues. Moreover, buying a touch-screen for the PC is an expensive affair for a normal user. Touchpad provides its users with a fully automated touch-pad which can help in One-touch desktop access, word-level typing and launching applications via gestures. This Project is the first such attempt at making the touch-pad an integrated input device. Touchpad opens a new platform in this area and further works can be carried out to enhance its features.

3. CURRENT WORK IN THIS AREA

Touchpad : A versatile input device technology aims to fundamentally change the man-machine interface.

Many devices exist for computer access. Alternative onscreen keyboards, head switches, sip-and-puff devices, voice recognition systems, and augmentative communication devices are few of the options available for computer access. But there can be obstacles to effective deployment. Many devices are prohibitively expensive. Others require extensive configuration or maintenance. Some might be unwieldy. Touch-pad interaction techniques have been around for some time, but surprisingly few text entry techniques exist for touchpads. None of these, however, is a generic touch-pad text entry technique like the one we are attempting to make. Most touch-pad techniques focus on control and selection tasks. Our aim in TouchWiz, by providing text entry techniques, is to lower the barriers to computer access by using mechanisms already present. TouchWiz will depend on physical edges to provide high tactility and stability of motion. Similarly, one touch access has been there for years on smartphones, but it has not been used to control PCs. As mobile phones are small in size, touching the screen to control the User Interface on a cellphone had to happen one day. But with the over-reliance on mouse and arrow keys in PCs, the development of a better screen access method had become far-fetched. Many companies are working on the gesture technology like Synaptics but there application is supported for few OS like Windows 7, and not in the lower versions. As our application is an Open Source Software it work on different OS Like (Windows XP, Vista, 7), Linux (Fedora, Ubuntu).

4. DETAILS OF THE DESIGN

Touchpad module revolves around three modules viz., Touchpad RealTouch, Touchpad TouchWiz and Touchpad GestWiz.

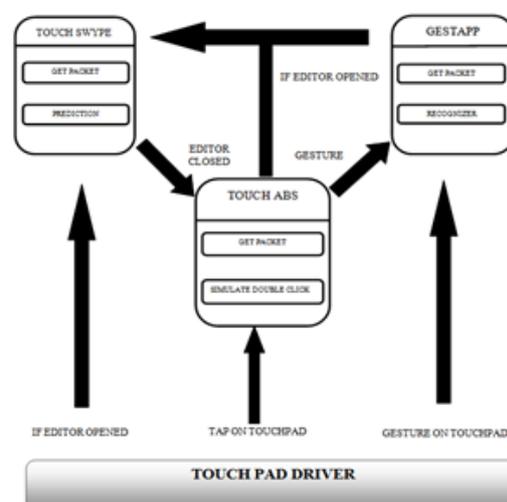


Fig. 1. Touchpad interaction with the Touchpad Driver.

5. WORKING

5.1 Working of GestWiz

GestWiz gestures can be defined to link together task-oriented workflows for any application, such as shortcuts to your favorite Websites and media apps or to increase productivity. In case the user wants to open any application like Microsoft Word or Mozilla Firefox, he generally clicks on the start menu->programs and finds the corresponding applications and clicks on it. Or else, he keeps it on the desktop for easy access. But after a while, the desktop looks cluttered. GestWiz provides the perfect alternative for users to open their applications with a letter gesture on the touch-pad.

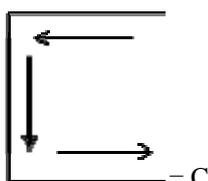


Fig 5.1.1 character Recognition logic.

For identifying the gesture we are using the motion of finger over the Touchpad. We are recognizing the direction of finger gesture.

For example, as shown in Fig. 5.1.1 we recognize the letter C. We recognize the input direction stream of finger gesture. Here for 'C' it is Left, Down, Right (L, D, R) shown by arrow in Fig.5.1.1

When the application is in Real Touch mode and the user makes a gesture "M" on the touch-pad, shown in the adjacent figure (Blue colored Indicates the finger motion), the application will switch to GestWiz mode and this module will get the Packets from the touch-pad driver and give it to Recognizer class which detects the letter. Recognizer class involves a bit of Artificial Intelligence for error recovery as the user's gesture might not be exact all the time. If the application opened after the gesture is some editor, then the mode switches to TouchWiz or the mode switches to RealTouch again.



Fig. 5.1.2. Finger motion for launching an application
Eg. Gesturing the letter 'M' will launch an application corresponding to the letter M.

5.2 Working of RealTouch

On application start-up, the control is with the Real Touch module. Whenever the user taps on the Touch-pad, Get Packet function gets the correct tapped co-ordinates from the touch-pad driver and stores it in the database. These co-ordinates are upscaled using a predefined formula which depends on the screen resolution, that we have the coordinates of the tap on the screen; the cursor can be shifted to that position directly. Now But when a user touches the touch-pad, he touches more than 1 pixel due to the finger width. This problem may create an erratic behavior with the cursor on the screen. So, the Normalizer component is used to normalize the received co-ordinates so that the behavior of the cursor is not erratic. Now that the user is on the correct file/folder, when he lifts his finger from the touch-pad, a double-click is simulated so that the file is opened.

5.3 Working of TouchWiz

When the app in focus is an editor app like Microsoft Word, Notepad, Gedit etc., TouchWiz class is in control. In this module, the touch-pad acts like a keyboard with the Qwerty keyboard structure over laid on it via software. The user can also place a transparent



Fig Virtual Touchpad Keyboard

sticker on to the touchpad with all keyboard letters engrossed on it for ease of access.

Whenever the user wants to type a word, he will put his finger on the first letter and drag his finger to the next letter from there. This way he goes on dragging finger on to the next letter of the word. In the places the finger traverses from the letters which is not a part of the word, the word id checked against a dictionary database and if matched, the word is output on to the Editor.

6. INNOVATION

The conception of Touchpad involves three major components which are, RealTouch – The Desktop on your keyboard, TouchWiz - Keyboard overlay with word stroking and GestWiz – A Gestural Application Launcher.

RealTouch–

A touch screen for our laptops might cost a fortune for a normal user. Imagine using an inbuilt technology to implement a similar innovative technology as the touch-screen which serves the same purpose. It enables the user to open any file/folder without the need for a mouse drag. This will save a lot of time and will make computer UI handling similar to smart phone touch.

TouchWiz–

It allows the user to input text in multiple ways. The user will be able to type the whole word in one swipe of the hand. It will greatly reduce typing time compared to typing words the traditional way (using keystrokes). It allows flexibility of selecting words from the dictionary in case of an ambiguity.

GestWiz –

Generally to open any application (games, web browser, utilities) we either have to follow the file hierarchy or clutter the desktop with all kinds of shortcuts. Now imagine opening your most played game or web browser from the desktop itself with just a gesture on the touchpad. GestWiz allows the user to open any app with a gesture letter on the touchpad. Touchpad has the ability to sense which application is open and which application has focus right now and auto switches to the corresponding service. So, when you open a touchpad from say

Start -> Run, the service will switch from RealTouch to TouchWiz and now you can swipe your text.

7. PRACTICAL APPLICATIONS

Touchpad offers many practical applications.

RealTouch :

Eliminate need of mouse drag : User has to drag his mouse to the file/folder before he opens it. RealTouch eliminates the need for drag on the touchpad. Eliminate need of click/dblClick: User has to double click on the file/folder after the pointer is on the file/folder.

At a point the touchpad will do both these actions. When a user taps, the mouse pointer goes to the point corresponding to the tap and when the user lifts his finger, a double click is simulated. In future, building on this concept will **eliminate the need of a mouse**.

Virtual Touch screen : With RealTouch, the touchpad acts as an inexpensive touch screen alternative free of cost.

TouchWiz:

Keyboard overlay: The touch-pad functionality will switch to provide a keyboard overlay (i.e. the touch-pad will work like a keyboard) when any editor applications (e.g. Gedit, Notepad, Microsoft Word) are open.

Word Stroking: User has to type individual letters of a word on the Keyboard to form words. With TouchWiz, the user can type a word in a single stroke. Similar applications on smart phones have reduced typing times to a great extent.

GestWiz:

Gestural access: In order to open any application, the user has to go through a series of clicks on folder/start menu or has to place an application short cut on the desktop to open any application. GestWiz saves on time and provides an innovative way to access applications through letter gestures.

People with motor impairments:

People having Muscular Dystrophy, Cerebral Palsy, and Parkinson 's disease cannot use a conventional mouse and keyboard. They may lack sufficient mobility to reach for these devices, sufficient motor control to switch accurately and efficiently between them, or sufficient endurance to use them for more than a few minutes.

8. CONCLUSION

Touchpad : A versatile input device has been developed under Linux, which is an open source OS and its has been tested on different OS like Windows(XP, Vista, 7), ubuntu, fedora, etc.

We have described three means for easy desktop access and text entry via the pre existing touch-pad on the notebook (LaptopPC).

The touch-pad (external or in-built) is small, light, inexpensive, and requires minimal configuration, giving it significant practical advantages as integrated control system over dedicated computer access technologies.

Moreover, buying a touch screen of the size of a computer screen would be cost prohibitive. We described our designs and implementations of Unistroke. While these techniques can still be improved, this work has paved the way for their future refinement, and ultimately, better computer access.

9. FUTURE SCOPE

We are planning to extend beyond normal absolute touch recognition using error prediction and integrated text entry using probabilistic logic. In Future, some sort of a small, inexpensive touch screen can be inserted directly below the touch-pad which shows a replica of the desktop while any explorer or non-editor window is open. This will eliminate the need to predict the coordinate of the touch and will result in accurate and faster touches leading to better computer access. If resistive touch screens are used instead of capacitive touch screens, a stylus can be used to point in the touchpad which will reduce the minor errors introduced while using the considerably wide human finger.

When the user shifts to an editor like Gedit, Microsoft word, etc the small touchpad will auto sense this action and switch its function to a keyboard the need to predict words and detect errors.

REFERENCES

- [1] Jacob O. Wobbrock, duenHorngChau and Brad A. Myers, "An Alternative to push, press, and Tap-Tap-tap: Gesturing on an Isometric Joystick for Mobile Phone Text Entry".
- [2] Neil R.N. Enns(University of Toronto) and I. Scott Mac Kenzie(University of Guelph), "Touchpad-Based Remote Control Devices".
- [3] Jacob O. Wobbrock, Brad A. Myers, HtetHtetAung (Carnegie Mellon University) and Edmund F .Lopresti, "Text Entry from Power

Wheelchairs”.

- [4] PoikaIsokoski, ” Model for Unistroke Writing Time”, Computer-Human Interaction Group, Dept.of Computer and Information Sciences, University of Tampere.
- [5] Herbert Schildt (McGrawHill) Java the Complete Reference.
- [6]. Akamatsu, A., and Mackenzie, I. S. Movement characteristics using a mouse with tactile and force feedback, International Journal of Human-Computer Studies
- [7] SynapticsTouchpad Interfacing guide 510-000080 – A Second Edition.
- [8] Synaptics Gesture Technology(Scrybe).