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DRAG AND DROP:DATA TRANSFER BETWEEN TWO DIGITAL DEVICES-A SURVEY

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Abstract — *In computer graphical user interfaces, Drag and Drop is a pointing device gesture in which the user selects a virtual object by "grabbing" it and "dragging" it to different location or onto another virtual object. This drag and drop operation is basically the operation of moving or coping files from one location to another. It is one type of data transferring from one location to another. In this paper, we have shown different approaches for transferring data between two digital devices which looks likes the operation of Drag and Drop. There is comparison of all methods are also presented. All the methodologies have been tried to achieve Augmented Reality for transferring data from one screen display to another.*

Keywords-*Drag and Drop; grabbing; dragging; Augmented Reality*

I. INTRODUCTION

The digital world of our PCs and Smartphones play very important role in daily routine. Many operations are performed in these devices. In these operations, operations for transferring data from one PC to another or from one hardware to another like Copying and Paste different files are often made. So here, we have trying to connect our real physical world to the digital world of computers. It can be performed by various approaches.

In computer graphical user interfaces, Drag and Drop is a pointing device gesture in which the user selects a virtual object by "grabbing" it and "dragging" it to different location or onto another virtual object. This drag and drop operation is basically the operation of moving or coping files from one location to another. A drag occurs in three main steps. First, a drag source control starts the drag, usually when the user presses mouse down on the control. The control starts the drag indicating the data wants to drag indicating which type of operation has to be performed i.e. copy, link or move. When the user drags over a possible drop target, it decides whether it will allow the drop and what kind of feedback would be given to the user. With help of drag and drop, we can transfer any kind of data such as document files, images, links etc. It is one type of data transferring from one location to another. There are many different approaches to transfer data between two different display screens which are presented in section II.

Rest of the paper is organized as follow. Section II, is literature review of various approaches for data transferring between two digital devices and the comparison of all approaches. Section III shows the Comparison of all methodologies. Then Section IV gives discussion and concludes the survey.

II. LITERATURE SURVEY

This Literature review explores various approaches for transferring data between two different digital devices through which we can connect real physical world to digital world. These approaches are described as follows. There are many traditional Hardware solutions for transferring data between digital devices such as - Floppy Drive, Universal Serial Bus (USB) sticks, Hard Disk Drives, etc. These all devices take long time and limited capacity and speed. So as a solution for this, the wireless methods like Bluetooth and Infrared, etc. are developed.

The put-that-there [4] concept is drag and drop controlled by the recognition of hand gestures and joystick operation. This concept is given by Richard Bolt in 1980. With the help of this interaction, any file or virtual object can be copied or moved to another location on the same screen. Pick-and-drop [5] emulates the interaction of drag and drop to transfer digital information across multiple computer interfaces using a device similar to Pen stylus. It is invented by Rekimoto in 1997. In this design, each pen has its unique ID. This ID is readable from the computer when a pen is closer enough to its screen. A combination of modifier buttons (attached to the pen as a side switch) is used to represent IDS. Thus by reading PenID and object ID, it is stored in the cloud known as Pen Manager and when the client is initiated for extracting that object, the object ID will received with given PenID. In Drag and Drop interaction using Sixth Sense

Technology [1,12], it is the method for transferring data between two digital devices or between physical surrounding and digital device. The Sixth Sense Technology is the technology which bridges the gap between digital world and physical surrounding about us using Natural Hand Gestures and Computer Vision Algorithm and Augmented Reality [3]. Sixth Sense allows bringing information from Intangible world to tangible world. This technology is invented by Steve Mann in 1990 in MIT Media Lab, he is the father of the Sixth Sense technology. Then it is developed by Pranav Mistry at MIT Media in 2009. The Drag and Drop operation using Sixth Sense Technology is shown in Fig. 1 in which the information displayed on the paper is copied to the Desktop PC using colored marked hand gestures. In this Technology, Pranav Mistry has used five components - Camera, Smartphone, Projector, Mirror and color markers.

SPARSH [7,12] takes an interactive approach to transfer data through the idea conceptually 'copy and store data on the human body', and transfer of information 'within and outside the body' playing devices forefinger. Slurp [8] provides a Tangible User Interface (TUI) for extracting digital information from physical objects, and transfer to the digital domain, with the assumption that in the future, each real object is created with a digital body connected there to. SmartFinger [6] aims to create a "channel" seamless for capturing visual information from the physical environment in the digital domain, and to share data between digital devices using a finger worn camera. It allows a user to copy data from an "information container" in which the information is stored in the cloud under the camera's device ID once another two devices are linked together via SmartFinger.

A touch event initiated by the user in any file located on the touch screen device produces a replica instance in the cloud. The copied data is transmitted to the cloud via TCP and tagged to a specific ID associated with the device. Images and documents can be copied as a single file. SWYP [6,12] was developed to transfer data between two devices enabled touchscreen with a wave slide off the edge of the screen of a display device and another device.

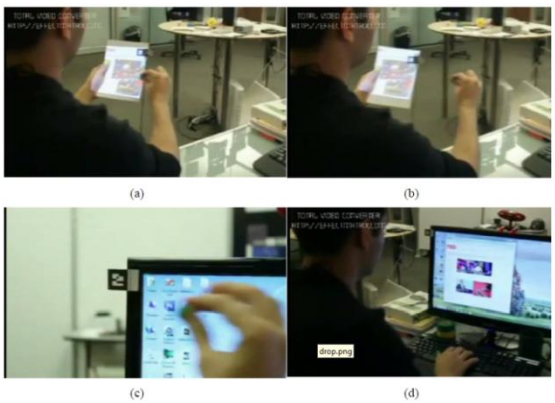

Figure 1.Drag and Drop using Sixth Sense Technology [12]

Magic Finger [6] also extracts texture data in physical surfaces through a worn micro camera finger, and allows the user to perform actions based on the texture of a surface. Bump [6] is an application developed for intelligent to exchange information such as contacts, pictures and applications phones. When two devices are "collided" closely, the application begins exchanging data selected by the network.

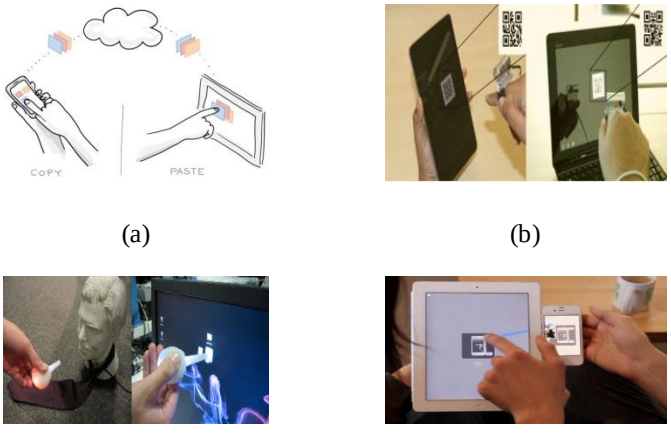

Figure 2.(a) SPARSH prototype [7] (b) SmartFinger [6] operation (c) Slurp [8] operation (d) SWYP [12] operation

III. COMPARISON

Most of the systems mentioned above are designed either to extract data from the physical world [1,3,6,8] or transfer medium between digital devices [4,5,6,7]. Some of these applications use extensive dedicated hardware components, such as IR nodes, RFID [1,5,8] tags, the stylus as accessories [4,5] and intermediate tools for interconnecting digital ports with different protocols. Few methodologies such as Bump and SWYP pairing between digital devices based on network location information and account information such as Google or Facebook. As a result, such methods may be unreliable in a situation in which four or more users at the same place attempting to log peeling between devices. Some systems are designed to work with futuristic scenarios, like any physical object will be created with an attached digital body.

In Richard bolt's Put-that-there concept, it needs very much mechanism for interface. It requires a big room and very complex measurement calculations. In this methodology the Put-that-there operation is done in one same screen. In Rekimoto's Pick-and-Drop concept, first the main requirement is the Pan Stylus and it requires more number of pens and PenIDs for multiple object data transfer. So it becomes very hard for Pen Manager to manage all the IDs and data transfer. In Drag and Drop based on Sixth Sense Technology, data can be copied to digital device is very simpler than other methods. It uses Color markers for gesture recognition and Smartphone, projector, camera for different processing purpose. It requires this type of hardware, but it can be minimize which is the future scope for this technology.

Main advantage of Sixth Sense Technology is that it is based on Natural Hand Gestures which are very easy, simpler and flexible for people to use. There are many other applications of this technology which is very useful in our daily life work or events. In SPARSH prototype, it is limited to the touch sensible devices. So for non-touch sensible devices it gets failure. There are many problems in installation for the software tools for SPARSH prototype. But it is very flexible and make more successful for data transfer compared to other methods.

Thus, in these all methods, all have some advantages and disadvantages. There is very complexity and not sufficient compatible for different systems and use under different conditions. Still no method can give open source application for transferring data from one location to another.

IV. DISCUSSION AND CONCLUSION

As the process of data transfer like copying and pasting data from one location to another is being very necessary and common task in our daily life. Various researchers proposed their approaches in this area by using different physical conditions. From this survey we can know different methodologies for copying data from one digital device to another and also their merits, demerits and problems occurring during the data transfer. In most of approaches, a small hardware is used for data transfer. These all approaches are limited to only for data transfer application but the Drag and drop based on Sixth Sense Technology gives freedom to interact digital world as real world. We can perform many other tasks through Sixth Sense Technology. So it has very wider area of application. There is very complexity and not sufficient compatible for different systems and use under different conditions. Still no method can give open source application for transferring data from one location to another. So there is open area of research to propose an open source application of Drag and Drop operation using Augmented Reality.

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