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# An Interactive Approach to Smart Digital Signage

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***Abstract— In today's busy lifestyle, people are constantly flooded with an extensive variety of advertisements and information. They may not be capable of recollecting all that they have seen. Posters and static signboards were used earlier to display information to the public at airports, railway stations, educational institutions etc. There is a rising demand for digital signage over traditional static displays. This is because dynamic displays can attract the attention of customers much more than static displays. Also we can change the digital content easily and at reduced cost. Nowadays mobile phone apps are ruling the smartphone world. This project is based on the combination of the smartphone and digital signage concepts. It aims to provide offline access to any content that is being displayed on a digital screen currently. The user has to install a mobile app on an android smartphone. When a user is interested in a particular image being displayed, he has to flip the phone. This results in transfer of that particular image and any associated text file (if present). The chief attraction of the project is a fast and simple method to capture the content from a digital display screen. The image and data which appears on the user's mobile phone can be saved for later reference.***

***Keywords— Digital signage, Gesture, Wireless, Flipping, Accelerometer***

## I. INTRODUCTION

Digital signage is emerging as an innovative and efficient method of providing attractive and dynamic and audience centred information to the public at specific locations and at particular times [1]. Smart signage aims to provide an interactive experience to the users. The content can also be changed in real time. Many interaction modalities are being experimented including speech, facial expression, touch and hand gestures [2] [7]. Ideas similar to display registration and flashlight interaction originally tried to ease display monitor - phone interaction [9-10]. Current technical development in the areas of wireless communication, smartphones and electronic display has created scope for designing an interactive signage device. In this project titled "Smart signage: A gesture based technique for information transfer" the content to be shown on the screen is controlled by the server software. This server application executes on a computer. It is designed to display several images, one at a time, in a periodic fashion. It provides one-to-many communication by permitting many users to capture the information onto their smartphones, from the display screen with a simple "flipping" movement. The data transfer takes place via a wireless router which provides Wi-Fi connectivity between the smartphone and the system. Less user response time is the main advantage of this system. The obtained image and text can be stored, zoomed or deleted.

## II. MOTIVATION

Sign boards and posters are essential for circulation of information to a large number of people in semi-public places like colleges and other organizations, public places like airports, malls and restaurants. But the interested audience may not have the time and resources to note down the content. Digital displays are gaining popularity, especially for out-of-home advertising [3]. Although it is effortlessly sustained and updated, digital signage usually does not provide interactive services to the audience. The popularity of smartphones has inspired the implementation of new interactive digital signage systems for advertising purpose. Even though latest studies have recognized the trend of cyber-physical interaction, they are not generally scalable for multiple users, and none of these support interaction with many displays in a single site [3]. The smart signage system is a new, interactive method that can provide an efficient interaction between display device and user, giving an exciting experience to the user. This helps to transfer the information on the monitor type display to the user's phone using a flipping movement.

## III. EXISTING SYSTEMS

Different technologies which are being widely used for information transfer are:

### *A. Bluetooth*

Using Bluetooth, users possess the facility to interact with display monitors without experiencing individual connectivity charges [8]. Bluetooth marketing is an area specific form of advertising which can be integrated to a digital signage network. Its various applications for Point of Sale and digital signage are limitless [4]. Any individual with a Bluetooth enabled phone can receive and send information. Bluetooth technology allows for those in the near vicinity of

 

a transmitter to receive information. It is the "push" ability of Bluetooth marketers, and its inexpensive nature that makes Bluetooth a double edged sword technology.

*1) Limitations:*

(i) The Bluetooth configuration permits a maximum of 7 users. This is a key drawback on scalability.
(ii) For transfer of information through Bluetooth the receiver device must be in close proximity with the sender device.
(iii) It requires establishment of the setup and connection with another device before we transfer data. Bluetooth connections take significantly longer time.

### *B. NFC*

Near field communication (NFC) is a way of less power, wireless communication between devices such as smart phones, tablets or digital signs. It consumes power in low quantity. Retail applications and public places let customers use their mobile gadgets to use NFC tags – permitting them to avail directed marketing, coupons, and other relevant announcements directly [5]. The customer's preferences are accessed from the smart phone to target the customer with a customized message on the digital signage screen.

*1) Limitation*s:

(i) NFC is a set of short range wireless protocols [5], making it useful only if the devices are in close proximity.
(ii) NFC is typically slower than Bluetooth or Wi-Fi connections.

### *C. QR code*

QR code (Quick response code) is a sort of matrix bar-code [6]. QR codes offer an easy and quick method for directing the users to a related website, contact number or other extra information. Matrix bar code needs to be scanned using a mobile phone camera using which information in it can be accessed.

*1) Limitations:*

(i) It cannot be used in public places for transferring information displayed on a screen as the code needs to be scanned by going near it which can cause overcrowding.
(ii) QR code is that software required for scanning is not commonly supported by all mobile phones.
(iii) Its response time is slow.

## IV. METHODOLOGY

It fundamentally comprises of a system which contains a sequence of images together with its associated text. The presentation is displayed on a monitor (a digital screen) which is linked to a computer based device. The content displayed on the screen is controlled by server software executing on a computer. This application which is being executed on the server is coded in java using the eclipse IDE. The user has to install the signage app in their mobiles and run it. The app developed for the smart phone uses Android Studio IDE. Multiple users can transfer the image and data from the display screen onto their mobile phones with a "flipping" movement of their phones. The content is transferred through a Wi-Fi link between the computer and smartphone. The Wi-Fi link is provided by a wireless router or through any existing Wi-Fi link already available in that location.

### *A. Server Program*

The server program can execute on windows or Linux operating system. It uses Java Runtime Environment. Server part is designed using eclipse with swings. When the server program starts, it looks for a folder which consists of images, a text file which represents the number of images and the text file for the images. The text for each image is separated by a delimiter. The server opens a predefined port for communicating with the client. The server keeps on changing the image and text periodically .The timing for the image change can be changed in the code. It keeps listening at the port for data request from a client. Once a data request is obtained from the client, the server converts the corresponding image into string by base-x 64 format which will be transmitted through the port via TCP/IP architecture to the corresponding client. Every time the count reaches the maximum, the displaying of images is repeated from the beginning.

### *B. Smart phone and flipping gesture recognition*

This module needs a smart phone running on android OS. The .apk file of the signage app will be installed on the smart phone. The user needs to turn on the Wi-Fi. Then we must link with the laptop through a router. This is done by running the app on the mobile phone and setting the IP address of the laptop running the server program. Once this is completed, the user does not need to provide the same IP address once again for each image. Different IP addresses must be given once the configuration is changed. Now the user can flip the phone for a specific image which is displayed on the screen. Once the z-axis tilt is detected by the accelerometer, the app sends specific command to server for requesting the present information being displayed on the screen. The server then transmits the encoded image and text to the client. On reception by the mobile phone, the image will be decoded and it will be resized to fit screen. The image and text files are stored separately in a created folder.

## V. CONCLUSIONS

The proposed system can handle one-to-many communication. It lets any number of users to obtain information from a display device by means of an upward flipping movement of their mobile phones. It has long distance

 

communication range because of the Wi-Fi used for data transfer. The quality of the content captured on the mobile is not compromised. It is a more spontaneous way of gathering data with a very less response time of a few seconds.

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## VI. FUTURE WORK

This project has been demonstrated by sending images and data to only one display device which is controlled by the server. This system can be extended to house multiple displays, placed in different orientations all of which are associated to a server. This is done by providing a different id for each of the display devices. The server can be coded to send different information to different display devices in the same location by specifying the required signage identifier.

Any content like video or power point presentation may be played on the screen and transferred to the user's mobile phone.

It can be extended to include all kinds of digital displays.

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