Smart Advertising Platform using Raspberry Pi and Push Notifications

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***Abstract*— This paper is based on an advertising platform. Our proposed idea digitizes the advertisements of products. A php server is running on the raspberry pi which contains the database that includes all the offers uploaded. These offers are uploaded by the individual shop keepers. A dashboard is created which is used by the shop keeper to upload the offers to the database in the raspberry pi.**

A Wi-Fi module connected to the raspberry pi is used to broadcast the offers to the customer's Smartphone. Whenever the customers come into the Wi-Fi range of the shop, the customer's smartphone gets the notification of the offers. An android application is installed in the customer's Smartphone to get offers broadcasted through the Wi-Fi. This application does not use the internet nor is GPS, only the Wi-Fi connection sufficient.

Keywords*— *Raspberry pi, Smartphone, Wi-Fi module, php server, notification.

I. INTRODUCTION

Advertising is a means by which communication with the users of a product or service occurs. Advertising is always present, though people may not be aware of it. In present world, using every possible media advertising get's its message through. This is done via television, print (newspapers, magazines, journals etc), radio, press, internet, events, direct selling, hoardings, posters, mailers, contests, clothes, sounds, visuals sponsorships, and even people (endorsements). However today's advertising platforms are relatively expensive in terms of creative, production and airtime costs making it difficult for targeting your market. A professional has to be hired to design an efficient, well-crafted and effective script.

Our proposed idea helps in making the advertising more efficient and cost effective. This assists in the targeted marketing strategy.

This paper describes how the proposed idea is more effective than traditional advertising methods. The section III describes the requirements needed for the proposed idea and design of the proposed model. It is followed by the implementation of the model and the experimental results of the model.

II. LITERATURE SURVEY

The Raspberry Pi [7] is a series of credit card–sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation with the intent to promote the teaching of basic computer science in schools and developing countries. It is capable of doing everything a desktop does like browsing video streaming etc. It has a Broadcom BCM2836 Arm7 Quad Core Processor powered Single Board Computer running at 900MHz,1GB RAM so you can now run bigger and more powerful applications, Micro SD slot for storing information and loading your operating systems. You can now provide up to 1.2 AMP to the USB port – enabling you to connect more power hungry USB devices directly to the Raspberry PI. (This feature requires a 2Amp micro USB Power Supply) and 10/100 Ethernet Port to quickly connect the Raspberry Pi to the Internet.

Android [2] is a mobile operating system (OS) currently developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as Smartphone and tablets. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input.

Wireless technology [10] has widely spread lately and you can get connected almost anywhere; at home, at work, in libraries, schools, airports, hotels and even in some restaurants. Like mobile phones, a Wi-Fi network makes use of radio waves to transmit information across a network. The computer should include a wireless adapter that will translate data sent into a radio signal. This same signal will be transmitted, via an antenna, to a decoder known as the router. Once decoded, the data will be sent to the Internet through a wired Ethernet connection.

PHP [9] is the most popular scripting language for web development. It is free, open source and server-side (the code is executed on the server).MySQL is a Relational Database Management System (RDBMS) that uses Structured Query Language (SQL).

Apache [6] is the most widely used web server software. Developed and maintained by Apache Software Foundation, Apache is an open source software available for free. It runs on 67% of all web servers in the world. It is fast, reliable, and secure. It can be highly customized to meet the needs of many different environments by using extensions and modules.

III. SYSTEM DESIGN AND DESCRIPTION

An efficient advertising platform helps in effective marketing of the products. It should be cost effective and more responsive than the traditional methods. The design of the proposed model for the effective advertising platform is shown in figure 1.

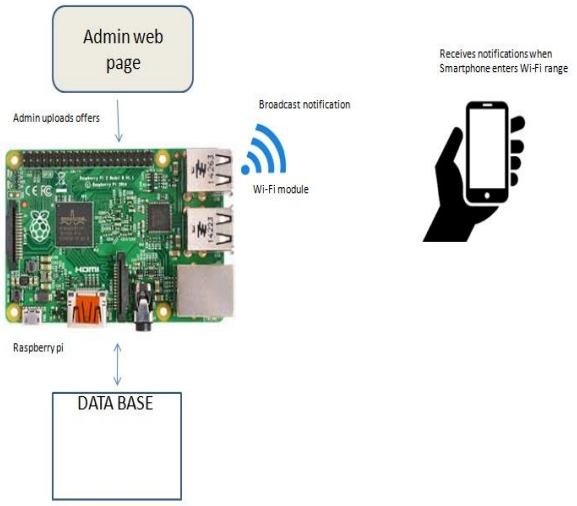

Fig.1 design of the proposed advertising platform.

In the design phase the software requirements for the proposed model is as follows:

The android studio is used for the development of the app for the customer's smartphone. The raspbian OS is uploaded onto the raspberry pi. Php and mysql is used for designing the backend. The database which is used to store the information about offers is placed in the raspberry pi and php is used to upload and retrieve the data from it.HTML, CSS, bootstrap is used for designing the front end of the model. An admin page is used to upload the data.

The raspberry pi is used as a medium for storage and sending of the offer details. A mysql database is created on the raspberry pi to store the offer's list. An admin web page or dashboard is used by the shop keeper to upload the data to the database. A Wi-Fi module is present in the raspberry pi which is used to broadcast the offers to the customer's smatphone. An android app is installed in the customer's smartphone and whenever the smartphone comes into the range of the shop keeper's Wi-Fi, he gets a notification about the offers present.

IV. IMPLEMENTATION

The section IV describes the implementation of the proposed advertising model.

A. Android application part

An android app is created and is to be installed by the customer in his smartphone to get the notification about the offers. The app is designed to get the notification about the offers whenever the customer enters the shop's Wi-Fi range. Volley library [3] is used for asynchronous background threads.

The data (offers) in the raspberry pi is broadcasted through the Wi-Fi module. In the android phone a BroadcastReceiver[8] is used to check the Wi-Fi state. Broadcast Receivers simply respond to broadcast messages from other applications or from the system itself. These messages are sometime called events or intents. For example, applications can also initiate broadcasts to let other applications know that some data has been downloaded to the device and is available for them to use, so this is broadcast receiver who will intercept this communication and will initiate appropriate action.

Whenever a Wi-Fi connection is detected, a service is made to run on the background to pick up the data from the raspberry pi. This data is in the form of JSONs. JSON [4] is a lightweight data-interchange format. JSON uses JavaScript syntax, but the JSON format is text only, just like XML. Text can be read and used as a data format by any programming language.

The data got is populated into Recycler Views [5] in android with custom adapters and getters and setters. Many apps need to display collections of the same type (such as messages, contacts, images, or songs); often, this collection is too large to fit on the screen, so the collection is presented in a small window that can smoothly scroll through all items in the collection. RecyclerView is an Android widget that displays a collection of items in a list or a grid, enabling the user to scroll through the collection.

B. Website interface

The shopkeeper has to upload the offers using the admin page or the dashboard in the raspberry pi. The raspberry pi contains a sql database where all the offers are stored.

The admin page or the dashboard is created using the HTML, CSS and bootstrap. The offers entered here are then uploaded to the database using the post method of the php. A php server is running on the raspberry pi and it uses which contains the database that includes all the offers uploaded.

A Wi-Fi module connected to the raspberry pi is used to broadcast the offers to the customer's smartphones. Whenever the customers come into the Wi-Fi range of the shop the customer's smartphones gets the notification of the offers. An android application is installed in the customers Smartphone's to get offers which is broadcasted through the Wi-Fi. Figure 2 shows the website interface of the proposed model.

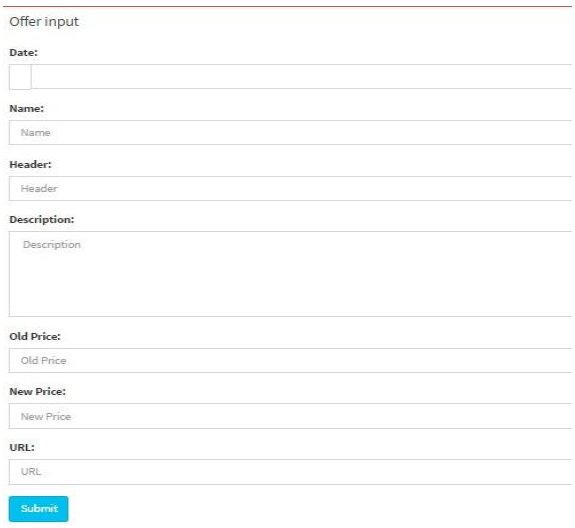

Fig.2 website interface

V. EXPERIMENTAL RESULTS

The section V shows the experimental results achieved by implementing the proposed model. Whenever the customer's smartphone comes into the Wi-Fi range of the shop the customer gets a notification on his smartphone when the app is off. Figure 3 shows the notification got on the customers smartphone.

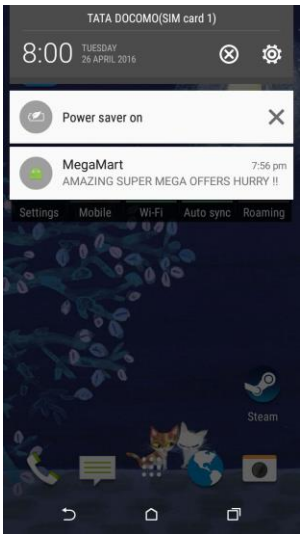

Fig.3 notification about offers

When the notification is received by the customer, he can go into the app to check for the details about the offer. An image of the product can also be broadcasted along with the offers details. Figure 4 shows the content present inside the app when the offers is got from the shop.

Fig.4 example output of offers

VI. CONCLUSION

The proposed advertising model has been designed for immediate notification of offers to the customers through Wi-Fi connection. This model helps in providing a very efficient and effective advertising platform. It overcomes disadvantages of the traditional advertising platform.

One of the biggest concerns of advertising is the cost, this proposed model is very cost effective and also the usage of the neither internet nor GPS is not necessary. Only the Wi-Fi connectivity is sufficient.

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