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A Review: Embedded System for Dynamic Location based Advertisement using Google Maps API

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***Abstract*—**Today, a vast amount of revenue is generated using Advertisement-Basedsystems. Our goal is to maximize the efficiency of these advertisement systems.This can be achieved by making the ad-system vary according to the current location of the vehicle. This ensures we capture the attention of the target audience ina much better way by providing them the advertisements related to their currentlocation. This provides a much better personal experience to the audience. Sucha system can be created using a Embedded Microcontroller or SOC such as the "Orange Pi" to keep the production cost to a minimum with the essential modules such as GSM/GPRS/GPS module and Display Support. The location services can be handle using the Google Maps API.

Keywords*-Dynamic, Location-based, Google Maps API,Embedded System,OrangePi*

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I. INTRODUCTION

Right from the industrial revolution, advertising has played a major role in promoting private and public businesses. Advertising is a form of marketing communication that is used to make people aware of a certain product or entity. In 21st century, advertisement has become ubiquitous but with the same traditional rudimentary ways and techniques. Due to these age old techniques, maximum potential of advertisement is not being achieved.

Our project is a part of the smart city concept meaning the advertisement techniques used are Digital and advanced. Thus, our project will overcome issues like wastage of Physical Space, Reusability and Maintenance.

Our proposed project consists of "Orange Pi" at its core with basic modules such as GSM/GPRS/GPS and a HDMI Display.

Advertiser's data is stored on an offline database in the form of flash storage which can be updated manually on a regular basis. This data is in the form of banner ads, videos or images which is displayed through a Colored LCD.

II. LITERATURE SURVEY

Open Street Map is an Open-source alternative to Google Maps. Use of such Open-source map API may result into a profitable and rather beneficial for applications such as advertising for shops. A shop owner in Bangladesh successfully implemented Open Street Map in his application and achieved positive results. [1]

QR codes and WiFi could be used simultaneously to achieve an efficient advertisement model for the customers as well as vendors. An Android application could be developed to make it easy for the vendors to deploy their advertisements and also the customers to get a more personalized advertisement experience. QR codes provide an additional layer to the experience in a way that the customer can scan the code if he/she is interested in the item. Such an advertisement system has been proven to be non-intrusive and capable of capturing the customer's attention. [2]

As we know location based networking has many critical issues that need to be solved. The issues of communication overhead and reachability need to looked after. To solve these issues,the concept of Angle Based Location Advertisement (ABLA) was developed. ABLA uses angle based change of routes and not the traditional hop count based which increases the communication overhead. It has been proven that if we make use of ABLA, we achieve lower communication overhead with the same reachability which in turn improves the performance of our location based advertisement by achieving low overhead and better trade-off. [3]

The problems of inaccurate locations and information in highly urban areas due to unavailability of line of sight measurement units can be solved. Since our project mainly deals with highly urban areas this is an important factor to consider. We can make use of any current mobile devices instead of additional hardware or client side software. We can make use of Bluetooth technology in these devices to calculate the accurate locations. As we know Bluetooth Technology is highly accurate and available everywhere this technique can be easily implemented. [4]

III. SYSTEM OVERVIEW

A. HARDWARE

Orange Pi:

It is an open-source single board computer which is capable of running Android, Ubuntu, Debian as well as Raspberry Pi's proprietary OS. The board can be used in a cross-compilation environment as well as a standalone device for developing embedded applications.

Technical Specifications:

- CPU – H3 Quad-core Cortex-A7
- GPU – Mali400MP2 GPU @600MHz
- Memory – 512MB DDR3
- Operating Voltage – 5V
- Operating Current – 2A
- GPIO Pins – 40
- Clock Speed – 900MHz

- Flash Memory – 4096MB

Fig: Orange Pi One

GSM/GPRS/GPS Module:

This module is an essential part of this project as it is backbone for operating Google Maps API. It makes the whole location-based dynamic advertisement possible.

The GPS module is responsible for providing the Geo-coordinates to the Google Maps API whereas the GSM/GPRS is responsible for providing the Google Maps API with data connectivity to enable it to communicate with the Google Maps servers.

Fig: GSM/GPRS/GPS Module

LCD Module:

A small 10in LCD module is required to display the advertisements. HDMI support is preferable for easy interfacing with the Orange Pi Board.

Fig: LCD Module

B. SOFTWARE

Java Development Kit:

JDK is an implementation of Java Standard Edition released by Oracle. The entire bundle is aimed at aiding the tasks of Java Developers. In this project we will be using Java as the Software Core.

Eclipse IDE:

Eclipse Integrated Development Environment is made to ease the task of Java Developers by providing rich set of features and a flexible task environment. It is compatible with a number of plugins which makes it a very versatile IDE.

Google Maps API:

Google Maps API was launched by Google in 2005 to allow developers to embed Google Maps into their website or application. It is free of cost for commercial use and paid for business use. The project uses some core functionalities of Google Maps API to implement its Location-based Advertisement.

SQL Database:

SQL Databases are relational databases which will be used to store the offline location database as well as the references to the advertisements.

IV. SYSTEM ARCHITECTURE

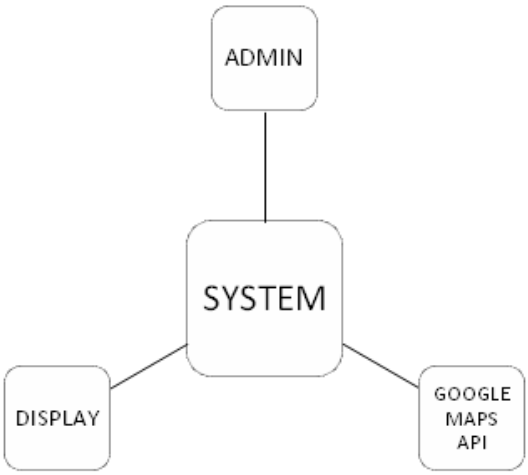

Fig: System Architecture

A. System:

The System here comprises of the Orange Pi board, the GSM/GPRS/GPS module, and the TF Card with the Location and Advertisement database. Lying at the core it is responsible for interfacing all of the other elements. It receives data from the GPS module provides is to the Google Maps API and displays the result on the LCD Panel.

B. Admin:

The admin is responsible for managing all the Databases on the system. This includes regularly updating the Advertisement database as per the Client's need and also updating the software.

C. Google Maps API:

Google maps API is responsible for all the mapping of the geographic co-ordinates to the actual location. This is done through a process known as Reverse *Geocoding*. It receives co-ordinates from the system and transfers it over to Google Maps, which then provides the system with the appropriate mapped locations.

V. CONCLUSION

By this proposed project we observe that the existing means of advertisement are inefficient and inadequate, thus they need to be replaced advanced and modern techniques.

Hence, we infer that the future for advertisement can be improved vastly by making use of:

- Dynamic digital systems
- Location-based advertisement
- Personalized experience

VI. FUTURE SCOPE

This project is fairly limited in its capabilities but it has a lot of potential for future use. A full-fledged system could be created which could be much more versatile and could integrate into the environment seamlessly.

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