

# DigiBoard—A Smart Display Notice Board

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## ABSTRACT

Notice board is an important media for dissemination of information for organizations, Institutes or at any public place like railway station, bus stops or park. But, day to day sending of various notices is a dreary process. This work presents a model which can be helpful at places where information has to be given to a mass of people especially at public places [1].

The proposed work implements a system to provide the facility of smart notice board which overcomes the tedious task of managing manual notice board. This will help the organizations to pass on the notices at a quicker rate and reduce the human errors while sending the notices. This system can also be used in agriculture for farmers to know exactly the weather conditions. Also, this system may be helpful to flash the rate of the crops at various markets. The Smart notice board can be used at rural places so as to keep the farmers aware about the latest happenings.

As a backbone the proposed system uses Beagle bone Black which is a small sized microcomputer. From Google Cloud Messenger (GCM), a cloud messaging service is used to send direct-messages to the Beagle bone Black.[6]. The algorithm for the system is developed as an Android application which is the conventional for programming and is open sourced. The experimentation is done with educational institute. By using the internet connectivity access is given to teacher's computers to send the notices to the digital board. Cloud services helps to send notices on student's smart phones and can be exploited as per the needs.

**Keywords:** DigiBoard, Smart Notice Board, E-Notice, Digital, Notice Board.

## 1. INTRODUCTION

Advanced changes have been brought about by digital technologies to the companies all over the world touching all organizational elements. DigiBoard is a name for a Smart Notice Board.

In the last some of decades, communication technology has developed at a very high speed. The use of "Embedded System in Communication" has given a new way to many interesting applications. Due to the advent of technology, everything around us is becoming smart such as smart phones, smart refrigerators, so why not smart notice boards. At present, manual updating of information has to be done onto notice boards. By adding Android application interface to this system, these limitations will be overcome by the proposed system. Hence we have interfaced a LCD screen with a Beagle bone Black to receive messages and process them. The message on display is easily changed by sending it through the Android application. Wireless notice board is a way of wireless data transfer for quick display of messages in real time. It provides the flexibility to display flash news or announcements in a fastest way because of Android-based system. Android based display system can be used at various public places like institutions, hospitals, railway stations, organizations etc. This system is easy, robust, to use in normal life by anyone at anyplace with less errors and maintenance [2].

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It represents a Smartphone and Web Application based notice board incorporating the widely used embedded device technology to facilitate the communication of displaying message and notices on the digital board via user's smart phone or laptop/pc.

A DigiBoard bonds together everyone in your organization working on different floors/locations of your company/institution

## 2. PROPOSED SYSTEM

Fig. 1 shows the Block diagram of the proposed system. It lude the control unit, GCM and User Unit. Control unit consists of LCD display, Beagle bone Black board and power unit. The Beagle bone Black is used to receive messages and then process them and send it to the LCD. The liquid crystal display is used to display the messages. The power supply unit supplies power to the Beagle bone Black and the display [1]. The user unit actually is the mobile phone with the DigiBoard application installed on it. The figure above gives us a rough overview about the system

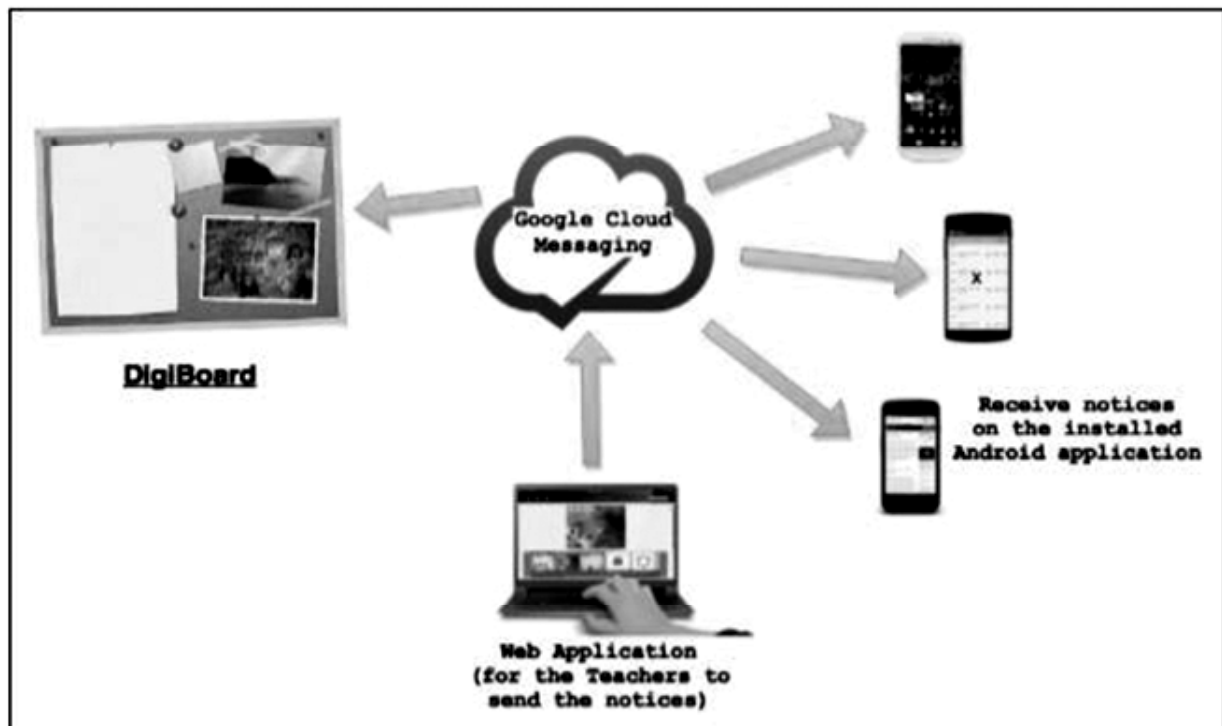


Figure 1: Block diagram of the Proposed System

## 3. SYSTEM COMPONENT

The components used in the system are hardware as well as software components. It is discuss in detail below.

### 3.1. Software Component

Fig. 2 Shows the Software Component of DigiBoard. The major software components of this project will consist of:

#### 3.1.1. Embedded Device Application

This will be the application for the LCD screen. The display will consist of active tiles. The tiles will be of different sizes so as to suit the needs. Offline or online contents will be displayed on the tiles when there are

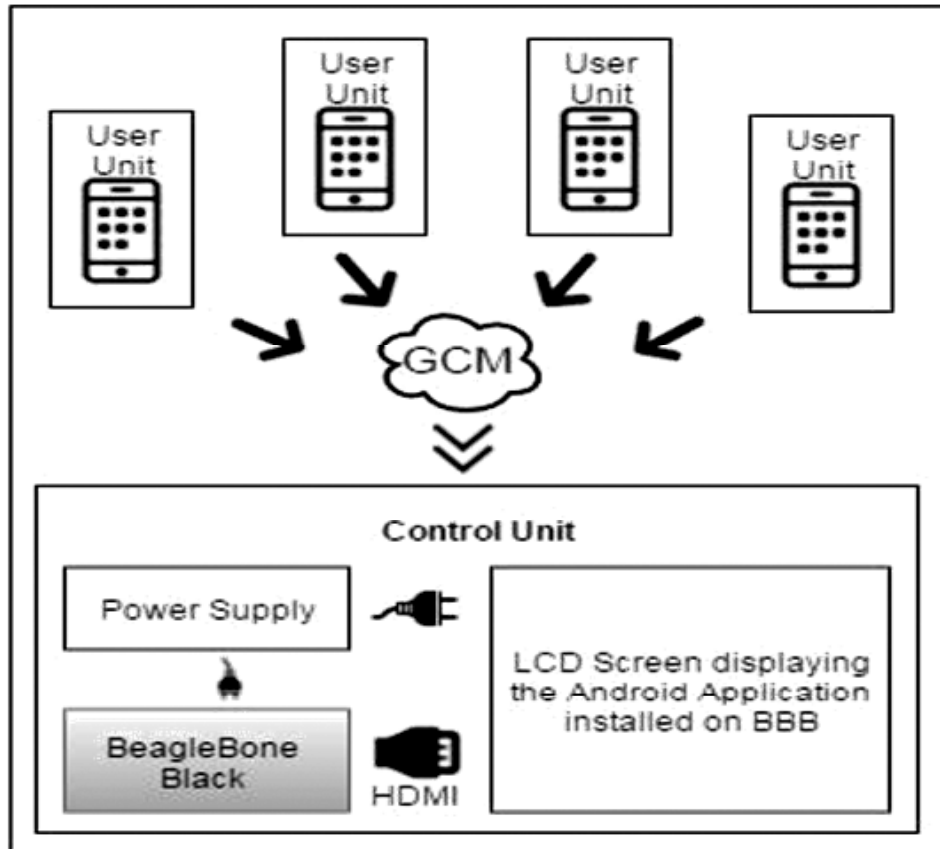


Figure 2: Software Components of the DigiBoard

no available notices. Content will be like inspirational quotes, weather updates, technology or any educational news. The content may vary as per the use of the notice board. As soon as a notice is received the appropriate tile will be replaced with the notice.

### 3.1.2. Android Smartphone Application

This application will be installed on the students' smart phones (considering an educational institution). It will have options like viewing of archived notices (Removed notices). It helps in sending notices to be displayed. Sending the notices to display will require admin approval. Notices will be sent to the smart phone application as soon as they are sent for display on the notice board. Achievements will also be notified on the smart phone application. Important notices will be benefited a lot because of this application.

### 3.1.3. Web Application

The web application will be for the teachers and administrators. All the notices will be sent from the web application. Notices from the smart phone will also be approved only from the web application. The timetables can be linked to the existing timetable management system through this web application (for an educational institution). Inspirational quotes, Rules and Regulations, Holiday messages, and other content can also be managed from here.

### 3.1.4. Google Cloud Messenger / (Equivalent push notifications service)

Push notifications is used to notify a user of events or new notices even when the user is not actively using your application. When an android device receives a push notification, the application's icon and a message appear in the status bar [3].

Google cloud messaging (GCM) is an Android platform Application Programming Interface (API). This is Google provided API used for sending and receiving push notifications to and from an Android application [3]. It works in two parts. In Part A – A custom web application running in an application server. This application server will connect to Google GCM server and it will post a notification. In Part B – An application running in the Beagle bone Black with Intent capable of receiving the push notification from the GCM server [4]. Then the Beagle bone Black application will process the received push notifications thereafter and post the news or content accordingly.

### 3.2. Hardware Component

The major hardware components of this system consist of Beagle bone black and LCD Screen. Fig. 3 Shows the Hardware Component of the system.

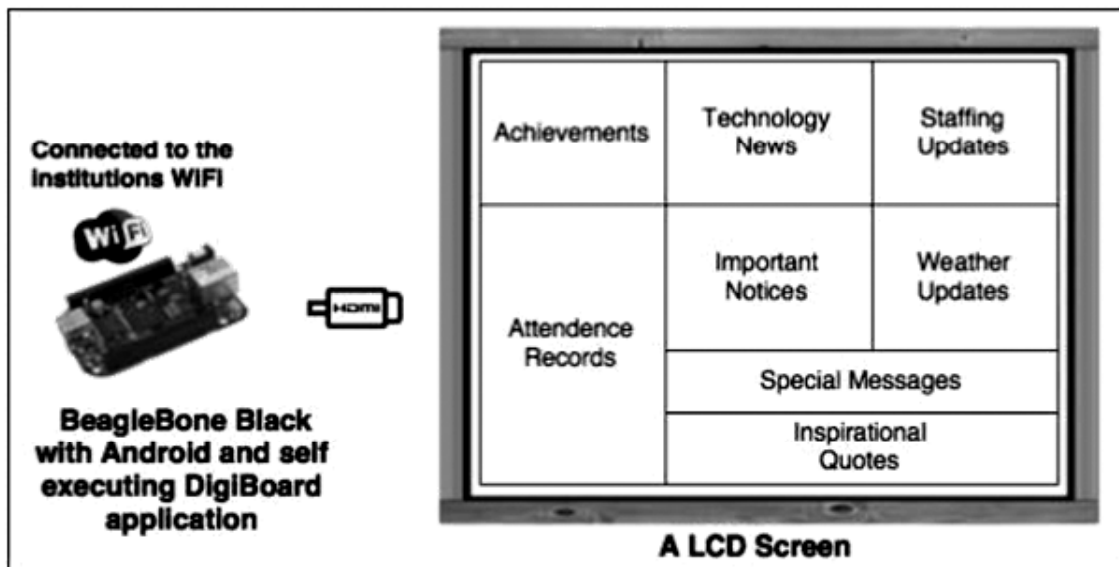


Figure 3: Shows the Hardware Component of the system

#### 3.2.1. The Beagle bone Black Board

The Beagle bone black is a single board computer. It is low power device and main functionality is that it is open source.

The Beagle bone Board measures approximately 75 by 75 mm and has all the functionality of a basic computer [5].

In Beagle Bone Black Built-in storage and memory are provided through a PoP chip that includes 256 MB of NAND flash memory and 256 MB of RAM (128 MB on earlier models).[5]

The beagle bone board uses up to 2 W of power and can be powered from the USB connector, or a separate 5 V power supply can be provided. Because of the low power consumption, no additional cooling or heat sinks are required [5]. Fig. 4. Shows the Beagle bone Black Board.

#### 3.2.2. A LCD Screen

A liquid crystal display (LCD) is a thin, flat display device made up of monochrome pixels arrayed in front of a light source or reflector.

The LCD screen would be the most visible part. It will be a blend of pixel quality enough to view from close and cost effectiveness. The display on the LCD screen would be controlled and managed through the application running on the Beagle bone Black. [6]

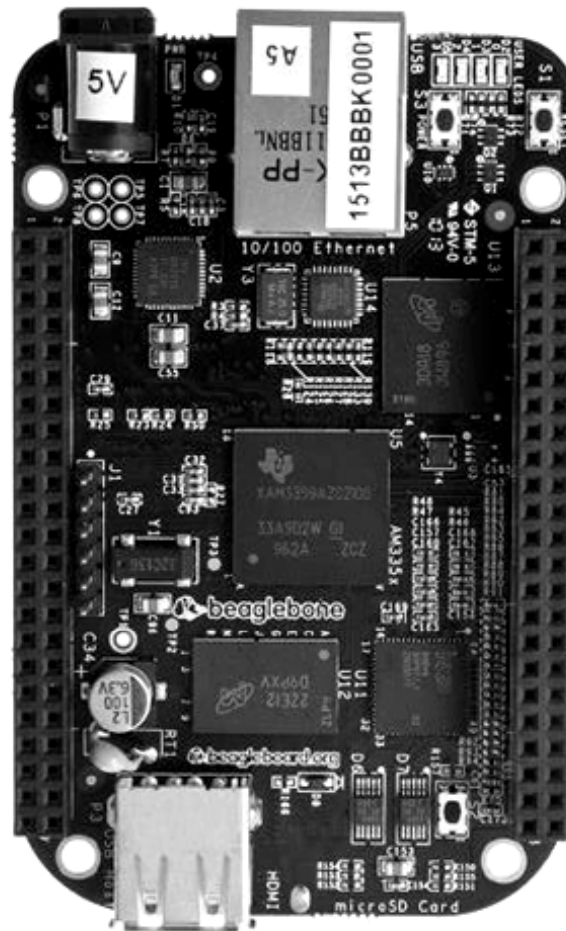


Figure 4: The Beagle bone Black Board

#### 4. SYSTEM WORKING

The Beagle bone Black is loaded with Android as the primary operating system. The DigiBoard applications on the Beagle bone Black will auto load so as to show up on the LCD screen. As soon as the application runs it will check for notices and display them according to the priority. As priority is given to the notices as per the priority notices will be displayed. Fig. 5. Shows the System working.

The notices will be displayed on the active tiles. The empty tiles will display the predefined content stored on the app. When a new notice is received the application will verify the sender of the notice

If the sender is valid the priority of the notice will be checked. If the priority is higher than the currently displayed notices then the lowest priority notice will be replaced. If the priority of the new notice is lower than the previously displayed notices then the notices are queued for display. When a previous notice reaches the deadline the queued notice is put up on that spot. The predefined content stored in the application differs according to the place where it is going to be put up. If the Board is going to be put up at a Gram Panchayat office it will have preloaded information about how to get high yield on the crops or tips for better farming practices.

#### 5. SYSTEM IMPLEMENTATION

This document describes the design methodologies which are used to implement the project starting from sending notice from server application to client application. It gives whole idea about the life cycle of the notification and the data right from sending notice from server application till notice is received by client's application.

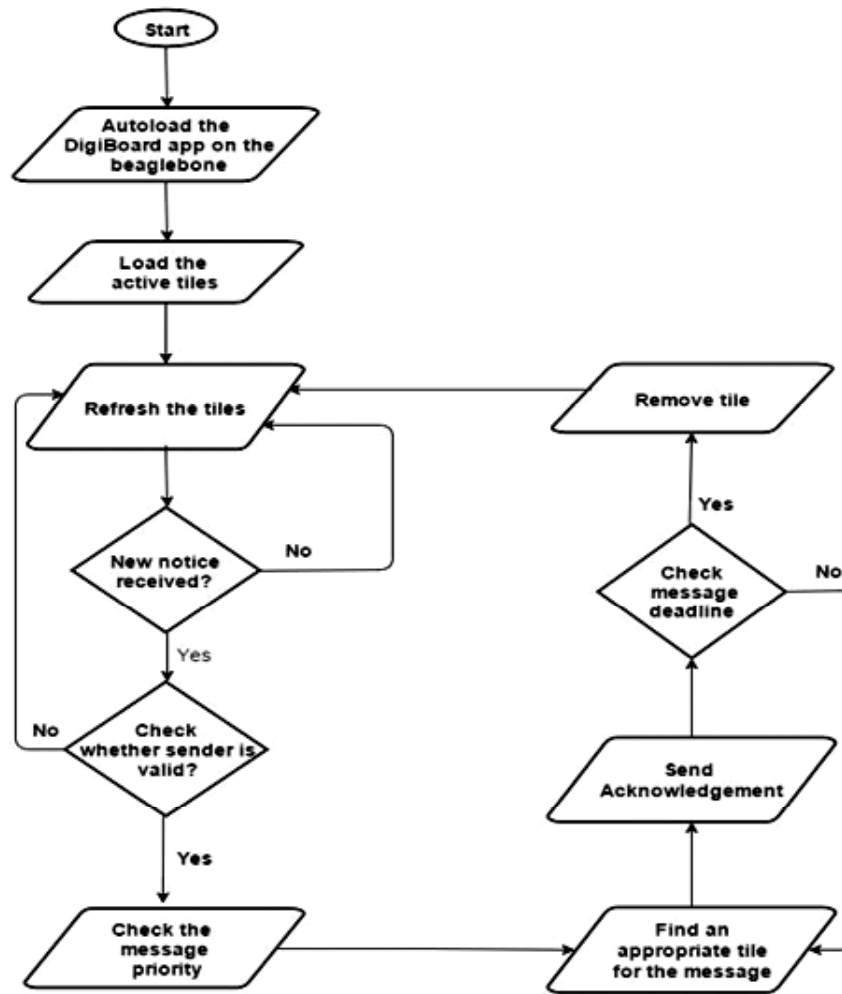


Figure 5: Working of the System.

The technology that is used at front end is Android, JAVA and JSP. Android is an open source operating system. The LED screen which is used for displaying notices is controlled by android operating system loaded on Beagle bone Black. This Beagle bone Black is used for displaying notices on LED screen and computations related to it. The mobile application is also provided to students which run on android OS.

The language used for developing the project is Java. Java is widely used to create Internet applications and other software programs. A JSP translated into Java servlet before being run, and it processes HTTP requests and generates responses like any servlet. However, JSP technology provides a more convenient way to code a servlet. Translation occurs the first time the application is run. A JSP translator is triggered by the .jsp file name extension in a URL.

Registration is the first step. Enter all details and store it in database using Web services. To store the details in database call the web services where the insertion method is defined. The method includes insert query through which the data is being stored in the database. After registration for login enter the username and password. Check if it matches with the one stored in the database. If the match exists then allow system access.

For sending notices from sever to all students Google's GCM technology is used . Google Cloud Messaging (GCM) is a service that handles the sending, routing, and queuing of messages between server applications and mobile client apps. The notice added to the system will be broadcasted to the user's device using the GCM services [4]. For connectivity with the screen and small computations we have used Beagle bone black. The smart phone will be connected to the Beagle bone, notices will be viewed on the screen

according to the priority. The Beagle bone Black is the recent in the Beagle Board family. It is a lower-cost, high-expansion focused development kit using a low cost Sitara™ ARM® Cortex-A8 processor from Texas Instruments [5].

The technology used at back end is MySQL. MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). All the queries which are used in project are managed using MySQL server. All the operations are performed on database using MySQL database management system

## 6. CONCLUSION

Beagle bone Black is a safe bet in this age of technological development. DigiBoard implemented using is Beagle bone Black reliable and robust. This paper presents how a DigiBoard - Smart Display notice board can be developed using the least number of components in a short span of time. This System helps to eliminate the need of huge billboards. The only change with respect to different locations where it has to be put up will be that the preloaded content will change to configure only appropriate and desired words/sentences [2]. This proposed work reduces the cost and is also marketable. The components used are not very complex and easily available in the market. It is our belief that our project can become commercial and can be used in places such as institutions, organizations, banks, railway station etc.

## 7. FUTURE SCOPE

The DigiBoard can be connected to large LED screens to be further used alongside highways like the billboards

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