

# Notice Board Using Android and Arduino Uno with GSM

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**Abstract-** Notice board in colleges is important factor of communication between students and staff of college. But this is not always an efficient way of communication. It needs to be more particular and more easily reachable to students and that too in time. So we are proposing a system in form of android application that will act as a notice board. The application will be for both student as well as staff and teachers. Staff and teachers will have admin rights to the android application. They can update and maintain database. There will be a cloud database, and login facility mandatory for all students. Visitors will get their notifications even without logging in. Hence all notices will be delivered to students in time and there will be record of all notices.

**Keywords— Arduino Uno, Android OS, GSM module LCD Screen.**

## I. INTRODUCTION

In Today's world, Communication is a very basic and essential need of our life and wire-less communication is the only in demand. In colleges, university and even in hospitals there is a need of displaying notifications on notice boards regarding information about college events, result declaration, meetings or even some special announcements. But doing it day to day sometimes becomes hectic and also requires human presence at the spot for the same. Notice board in colleges is important factor of communication between students and staff of college. But this is not always an efficient way of communication. It needs to be more particular and more easily reachable to students and that too in time. So we are proposing a system in form of android application that will act as a notice board. The application will be for both student as well as staff and teachers. Staff and teachers will have admin rights to the android application. They can update and maintain database. There will be a cloud database, and login facility mandatory for all students. Admin shows all students and staff list as well as add notice templates. Visitors will get their notifications even without logging in. Hence all notices will be delivered to students in time and there will be record of all notices.

## II. MOTIVATION

The main motto of this application is to give notifications to students as well as for teachers. This system develop an android application for notification. Student can download or view private or public notice. The necessity of developing this application is to eliminate the manual pen and paper work. Admin shows all students and staff list as well as add notice templates. This software is good and meaningful application for students, teachers and admin as well.

## III. OBJECTIVE

This system develops an android application for notice boards. The application used for students and teachers. Teachers should be able to add or remove notice. All private or public notices will be delivered to students in time. Admin shows all students and staff list as well as add notice templates. This application eliminates manual pen and paper work.

## IV. LITERATURE SURVEY

[1] Implementation of real time factory information system using Arduino and Android. - This paper describes the implementation of a real time factory information system which includes

an Android Application along with microcontroller board to procure real time information of factory processes. The merits of AutoIO automation system over current system is, it replaces the bulkier HMI's with android phone and the interface of hardware is very compact which makes it portable and easily alterable

[2] GSM based Smart home and digital notice board - The project presents a digital notice board and a home automation system using a GSM SIM900 module. The idea behind this project is to provide its users with a simple, fast and reliable way to put up important notices in an LCD where the user can send a message to be displayed in the LCD. The message can be sent through an android application designed in this project, to the GSM SIM900 module which has a SIM card inside it. Similarly, a home automation system has been developed where home appliances like light, fan etc. can be switched on or off using the same android application designed in this project.

[3] Improvement in the fun of the board game by A.R. introduction (In the case of Japanese Board Game "Sugoroku") - By detecting the marker beacon system on the face of the board of Sugoroku game with a PC camera, the 3D images and characters by CG (Computer Graphics) are displayed on the realistic face of the board. By this method, improvement in the reaction velocity of a notice of the required information in the game can be aimed at, and this method can support using information realistic about the playing game. As a result, the Board Game becomes more interesting.

[4] GSM based e-Notice Board: Wireless Communication - The paper explains how a smart notice board can be developed using the least number of components in a short span of time.

[5] Using nfc-enabled phones for remote data acquisition and digital control - Near Field of Communication (NFC) is live example for unconventional way of communication. NFC is born out of Radio Frequency Identification (RFID), but the range is small compared to RFID. It operates at the frequency of 13.56 MHz and proximity of distance to communicate is maximum up to 10cm.

## V. ALGORITHM

K-means clustering is a method of vector quantization, originally from signal processing,

that is popular for cluster analysis in data mining. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster. This results in a partitioning of the data space into Voronoi cells.

The problem is computationally difficult (NP-hard); however, there are efficient heuristic algorithms that are commonly employed and converge quickly to a local optimum. These are usually similar to the expectation-maximization algorithm for mixtures of Gaussian distributions via an iterative refinement approach employed by both algorithms. Additionally, they both use cluster centers to model the data; however, k-means clustering tends to find clusters of comparable spatial extent, while the expectation-maximization mechanism allows clusters to have different shapes.

The algorithm has a loose relationship to the k-nearest neighbor classifier, a popular machine learning technique for classification that is often confused with k-means because of the k in the name. One can apply the 1-nearest neighbor classifier on the cluster centers obtained by k-means to classify new data into the existing clusters. This is known as nearest centroid classifier.

Given a set of observations  $(x_1, x_2, \dots, x_n)$ , where each observation is a d-dimensional real vector, k-means clustering aims to partition the n observations into  $k$  ( $\leq n$ ) sets  $S = \{S_1, S_2, \dots, S_k\}$  so as to minimize the within-cluster sum of squares (WCSS) (i.e. variance). Formally, the objective is to find:

$$\arg \min_S \sum_{i=1}^k \sum_{x \in S_i} \|x - \mu_i\|^2 = \arg \min_S \sum_{i=1}^k |S_i| \text{Var } S_i$$

where  $\mu_i$  is the mean of points in  $S_i$ . This is equivalent to minimizing the pair wise squared deviations of points in the same cluster:

$$\arg \min_S \sum_{i=1}^k \frac{1}{2|S_i|} \sum_{x, y \in S_i} \|x - y\|^2$$

The Equivalence can be deduced from identity

$$\sum_{x \in S_i} \|x - \mu_i\|^2 = \sum_{x \neq y \in S_i} (x - \mu_i)(\mu_i - y)$$

Because the total variance is constant, this is also equivalent to maximizing the squared deviations between points in different clusters (between-cluster sum of squares, BCSS).

Regarding computational complexity, finding the optimal solution to the k-means clustering problem for observations in d dimensions is:

NP-hard in general Euclidean space d even for 2 clusters.

NP-hard for a general number of clusters k even in the plane. If k and d (the dimension) are fixed, the problem can be exactly solved in time  $O(n^{dk+1})$ , where n is the number of entities to be clustered. Thus, a variety of heuristic algorithms such as Lloyd's algorithm given above are generally used.

### VI. ARCHITECTURAL DIAGRAM

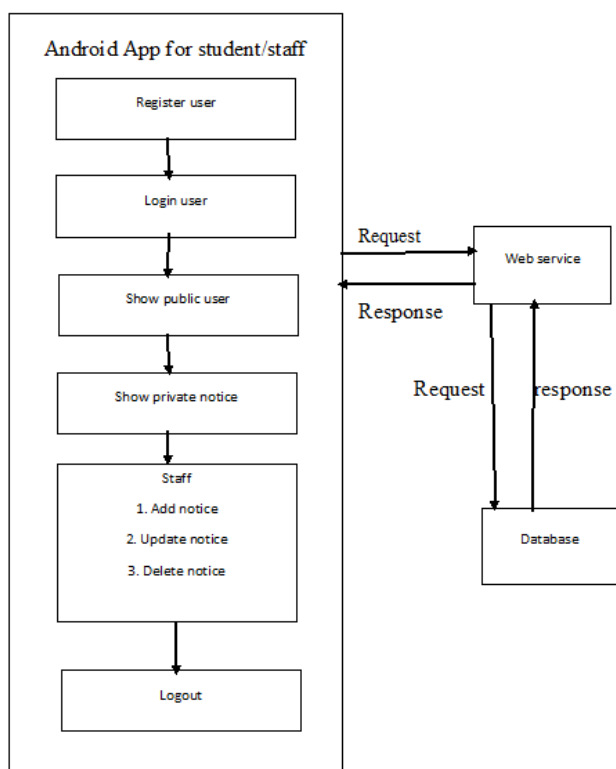


Fig. architecture of android App.

### VII. TECHNOLOGIES TO BE USED

#### A. About JAVA

Java has been tested, refined, extended, and proven by a dedicated community of Java developers, architects and enthusiasts. Java is designed to enable development of portable, high-performance applications for the widest range of computing platforms possible. By making

applications available across heterogeneous environments, businesses can provide more services and boost end-user productivity, communication, and collaboration—and dramatically reduce the cost of ownership of both enterprise and consumer applications.

The original and reference implementation Java compilers, virtual machines, and class libraries were originally released by Sun under proprietary licenses. As of May 2007, in compliance with the specifications of the Java Community Process, Sun relicensed most of its Java technologies under the GNU General Public License. Others have also developed alternative implementations of these Sun technologies, such as the GNU Compiler for Java (byte code compiler), GNU Class path (standard libraries), and Iced Tea-Web (browser plugin for applets).

#### B. About Android

An Android phone is a powerful, high-tech smartphone that runs on Google's Android operating system. Pick an Android mobile phone and you can choose from hundreds of great applications and multitask with ease. You'll also get regular software updates that add great new features to your smartphone. Android is an OS created by Google for use on mobile devices, such as smartphones and tablets. It's an OS that's available on devices made by a variety of manufacturers, giving you more choices of device style and pricing. Also, with the Android OS, you can customize your device in many ways.

#### C. About Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground,

making it easier to put into DFU mode. Revision 3 of the board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.

- Atmega 16U2 replace the 8U2. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward.

The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

#### D. GSM SIM900 Module

A GSM SIM900 module has been interfaced with the 32-bit ARM processor based LPC2148 microcontroller. It is connected to LPC2148 through a USB to RS232 driver. The module contains a SIM card holder, RS232 based serial port

for connection, an antenna for sending/receiving signals to the SIM and an LED as a status for power, signal and incoming call. It supports features like voice, data/fax, GPRS and SMS at both 900 MHz and 1800 MHz. Serial port baud rate is adjustable from 1200 to 115200 BPS (bauds per second). It receives only incoming calls to its SIM from the users through the antenna.

## VIII. OVERALL DESCRIPTION

### A. Product Perspective

The main perspective of this system is to develop an android application for sending notifications to student and staff such as college events, notices etc.

### B. Interface:

#### 1. Hardware Requirements:

8 GB RAM

500 GB HDD

#### 2. Software Requirements:

JDK 7

Android studio 1.5

Eclipse Kepler, workbench 6.0

Tomcat 7

MySQL 5.2

Windows VERSION:7 and above

### C. Product Function:

This system develops an android application for sending notification to students as well as staff about notices and events. In this system there are two applications such as student app and staff app as well as one admin portal.

#### Student App-

Log in as student.

Public Notice - Public notice shown to all student without registration or log in.

Private Notice - Show private notice after student log in only.

Student should be able to download and view notice online and offline also.

#### Staff App-

Logs in as staff.

Public Notice - Public notice shows all staff with register or log in.

Private Notice - Show private notice after staff logs in.

Download - Staff should be able to download and view notice and view notice offline also.

Staff should be able to add and remove student.

Staff should be able to add, update and remove notice.

#### Admin Portal-

Show all student and staff list.

He add notice template.

Making Web services.

#### User Characteristics:

Student login on their application.

They can download or view notice.

## IX. MATHEMATICAL MODEL

Let Assume S be the system which execute Noticeboard Campus Notification System

$S = \{s, e, X, Y, T, F_{main}, NDD, DD, Success, Failure\}$

**S (System)** = is our proposed system which includes following tuple.

**s (initial state at time T )** = GUI of search engine. The GUI provides space to enter a query/input for user.

**X (input to system)** : Input Query. The user has to first enter the query. The query may be ambiguous or not. The query also represents what user wants to search.

**Y (output of system)** : List of URLs with Snippets. User has to enter a query into search engine then search engine generates a result which contains relevant and irrelevant URL's and their snippets.

**T (No. of steps to be performed)** : 6. These are the total number of steps required to process a query and generates results.

**f<sub>main</sub>(main algorithm)** : It contains Process P. Process P contains Input ,Output and subordinates functions. It shows how the query will be processed into different modules and how the results are generated.

**DD (deterministic data)**: It contains Database data. Here we have considered SQLite which contains number of queries. Such queries are user for showing results. Hence, SQLite is our DD.

**NDD (non-deterministic data)**: No. of input queries. In our system, user can enter numbers of queries so that we cannot judge how many queries user enters into single session. Hence, Number of Input queries are our NDD.

**Memory shared**: SQLite. SQLite will store information like list of information about Bus, registration details and numbers of Bus. Since it is the only memory shared in our system, we have included it in the SQLite.

**CPU<sub>count</sub>**: 1. In our system, we require 1 CPU for server.

**Success** = successfully recommended best system as per user's interest

**Failure** = Failed to be recommended.

**Subordinate functions:**

Where

s=Start State

e=End State

X={Set Of Inputs}

= {x1,x2,x3}

Where x1= Log in details

x2=Register details.

x3= Notice data or

attachment file.

Y={Set of Outputs}

= {y1,y2,y3}

Where y1= Getting Public Notification and Private Notification.

y2= Add and update Notice.

y3= Download notice and view notice.

F<sub>main</sub> = {Set of procedure}

= {f1,f2,f3,f4,f5,f6}

Where

f1= Take x1 input

f2= Give y1 output

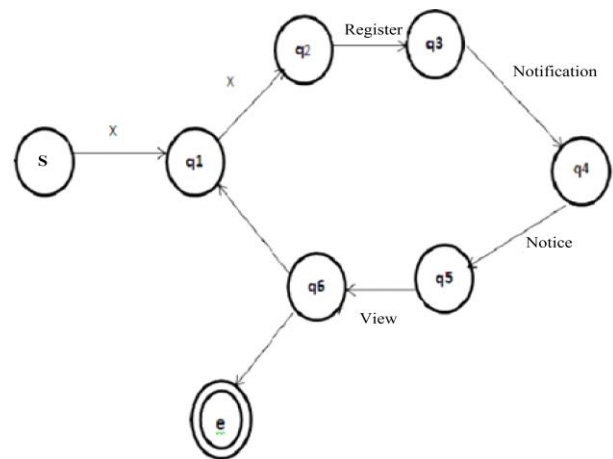
f3= Take x2 input

f4= Give y2 output

f5= Take x3 input

f6= Give y3 output

**State Transition Diagram:**



**Fig: State Transition Diagram**

Where,

s=input state

x=query

q1=Log in details

q2=Getting Public Notification and Private Notification.

q3= Register details.

q4= Add and update Notice.

q5= Notice data or attachment file.

q6= Download notice and view notice.

## **Explanation**

The 'q1' state accept the ambiguous query 'x' from the state 's' which is our initial state

The q2 state is meant for user login the data query x which is accept in state q1. The query stores in state q2 user has getting public notification and private notification and send to state q3.

In q3 state, register details.

'q4' state use add and update notice.

q5 State Admin notice data or attachment file, then perform state q6.

q6 state Download notice and view notice..

## **X. CONCLUSION**

We have developing Smart Notice Board using Arduino Uno to provide college related notices directly on your android device.

To eliminate or reduce the human interaction so as to avoid mistakes in the database, It is now implement notification system for students as well as teachers.

Student can get notice on its own android device and teacher can get their meetings.

In this system admin shows all the student and staff list as well as add templates of notice.

## **REFERENCES**

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