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Promoting an IoT-based electronic notice board in Public Institutions in Nigeria

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Abstract- *In this paper, we introduced an IoT-based electronic notice board to easy the methods of displaying information on the notice board. The methodology involves sending messages from a mobile app to a display unit that has an embedded electronics such the microcontroller, the Wi-Fi module and the Liquid crystal display. The Wi-Fi provides the platform for internet connectivity through a wireless access gateway from where the messages are displayed on the display unit from the mobile app in a remote location after the microcontroller has processed the information. The device is simple and costs effective for the purpose of its objectives.*

Keywords- *embedded, IoT, notice board, microcontroller, wireless, liquid crystal display*

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I. Introduction

An informed society is a civilized society equipped with advanced reasoning and formal ways of communicating with people. A civilized society has information at its disposal. Just like the adage that says knowledge is power, information brings about knowledge which creates innovations and inventions.

Notice board is a platform for conveying important information or messages. It can be used for advert of needed items or required for sales or for the announcement. It is mostly positioned in all institutions or public utility places like bus stops, railway stations, college dormitory, parks, and so on. It comes in various forms but the most common type is the traditional notice boards. The traditional notice boards were the most adopted in most public institutions. The method involves the addition and removal of messages which are always on printed materials such as papers. The limitations of conveying messages with traditional notice boards involve human efforts in their dealings and operations. It takes time for disseminated information to be removed or erased. Aside the traditional notice board, some other ones existing are; RF based, GPRS based, Bluetooth based, and GSM based which has limited coverage area from sender to the board and do not employ real-time application. This research work is an IoT-based, where information would be disseminated in the real-time and instantly. It can be changed and updated at any time automatically with no dissipation of energy while messages are wired remotely.

The research work incorporates embedded electronics, software, and network connectivity that enables information to be disseminated to the targeted audience and also creates awareness through the use of the internet.

II. Literature Review

The review of existing electronic notice board was summarized along with their limitations as presented below. The research work on raspberry pi controlled smart e-Notice board using Arduino [1] uses a Raspberry Pi 2 central server to authenticate its users from anywhere through the internet network. This research work justifies the author's ideas and thus promoting IoT-based e-Notice board. The limitation of this work is that it creates too many credentials for user authentications and thus require a static IP address for its operation. The work of Wireless Electronic Notice Board [2] makes use of ZigBee technology to send messages from a personal computer to an electronic notice board. ZigBee is a dedicated high-level protocol that makes use of low power digital radio based on the IEEE 802.15.4 standard for personal area networks. The coverage area of the network is usually between 300-400m.it uses the same principles with other WPANs like Wi-Fi and Bluetooth except it is cheaper. The limitation of this work is that the security level is low and it can only be used in the small coverage area. The electronic information desk system developed in [3] uses an SMS-based approach to respond to a sent SMS query to the system. The system does not require any human operator hence it acts independently of human effort. The drawback of this system is that it responded with too many information leaving the user to select the right choice for his/her purpose. The security and various methods to prevent attacks were highlighted in [4], [9]. The research dwells more on the communication principles, bandwidth and

the number of characters that could be sent at a time. The research is an eye opener to severe ways of designing an end to end secure communication through the SMS platform. The introduction of a wired type electronics board in [5] presented a board made up of LEDs for outdoor advertisement and highway guide and direction. The drawback of this system is that it cannot be updated from any remote area.

The above-reviewed work on notice board is all platform dependent. Therefore, to promote electronics notice board that will make noticing system much simple, faster & cost effective with web & SMS interface, we proposed an IoT-based electronic notice board in public institutions.

III. Methodology

The design of an IoT-based electronic notice board comprises of five (5) sections namely; the user unit, the control unit, the display unit, the Wi-Fi unit and the power unit. Each unit of the design consists of different components which perform various functions necessary for the overall operation of the system. The block diagram of the IoT-based electronic notice board is illustrated in Fig. 1

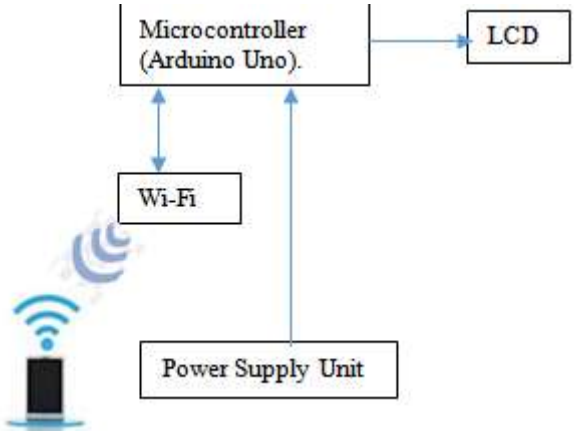

Figure 1 The Block Diagram of an IoT-based Electronic Notice Board

3.1 The User Unit

The user unit comprises of the mobile application created from the andromo.com [6]. The process of creating the mobile application involves five (5) steps listed below;

1. Open the web address www.andromo.com [6] and register your username, password and e-mail address as demanded from the site.
2. Login to edit the public profile by entering the name of the proposed project which appears on the andromo's app control panel.
3. Type-in the name of the project, the project description and the version number as categorized under the approved Google app.
4. Customize the app to suit your project by adding the background colour, font styles, and the heading colours.
5. Save the changes.

Fig. 2, Fig.3 and Fig.4 displays the mobile application used respectively.

Fig. 2 Creating the Web page on andromo website

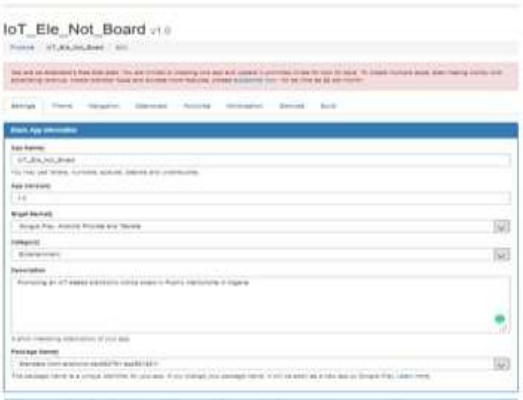

Fig. 3 Configuration of the webpage for purpose of the project

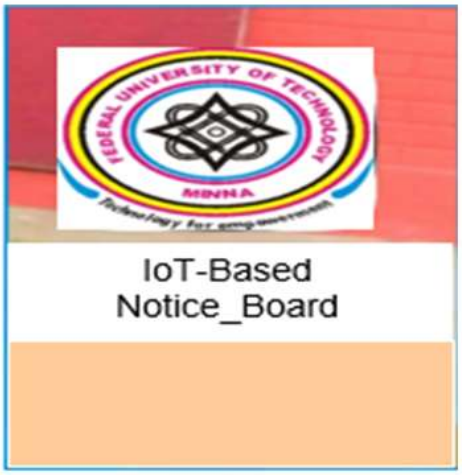

Figure. 4 The IoT-Based Notice_Board Front page

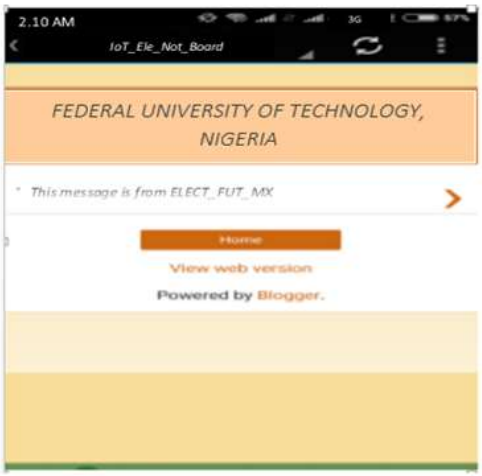

Figure. 5 The IoT-Based Notice_Board webpage

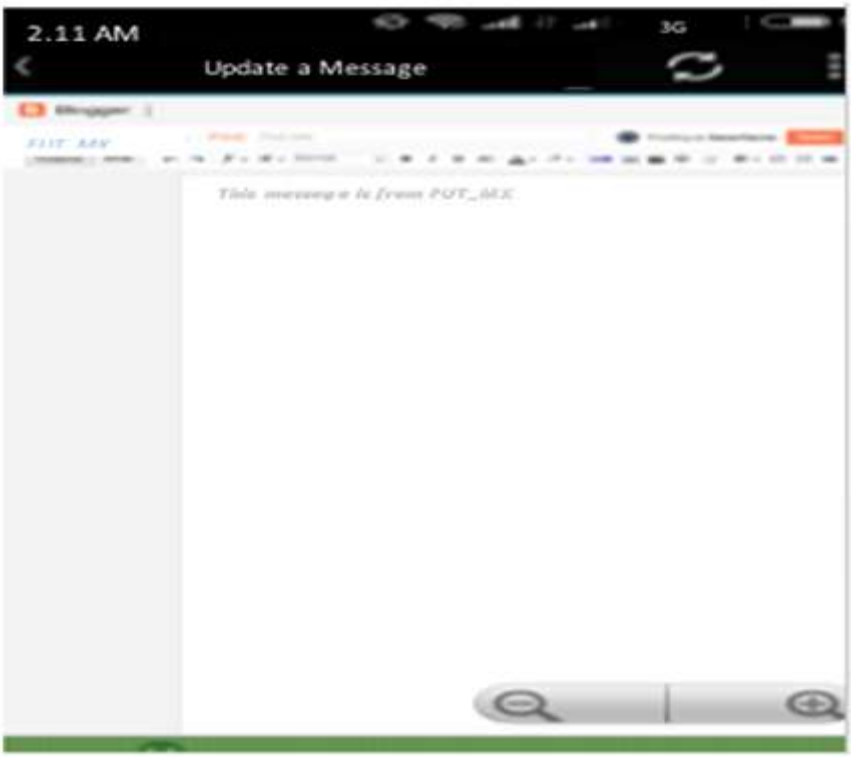

Figure. 6 The IoT-Based Notice_Board Updating webpage

3.2 The Control Unit

The control unit consists of the microcontroller device. This is the most intelligent unit of the system, which organizes, guides and controls the entire behavior of the system. It is an integrated circuit which is capable of running programs. It comprises of a processor core, memory and programmable input/output peripheral. It is the unit where information is being observed and required actions are taken from the data drive unit. The microcontroller (Arduino Uno) output is connected to the LCD [7]. The feature of the microcontroller used for this project is tabulated in Table 1.

Table 1: The Features of Microcontroller Used [7]

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended):	7-12V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pin	6
Clock Speed:	16 MHz
SRAM: &EEPROM	2 KB & 1 KB
DC Current per I/O Pin:	40 mA

3.3 Display Unit

The display unit uses a Liquid Crystal Display (LCD). LCD is composed of several layers which include two polarized panel filters and electrodes. There are various types of LCD, but the one used for this project is LCD 20 x 4. The LCD requires a 5V DC input from the power unit. The LCD is interfaced to the microcontroller, using D4, D5, D6, and D7 which displays the output from the controller unit [8].

3.4 Wi-Fi Unit

It is a self-contained System-on-a-Chip (SoC) with integrated TCP/IP protocol stack that can give any microcontroller access to a Wi-Fi network. This is capable of either hosting an application or offloading Wi-Fi networking functions from another application processor. Wi-Fi module connects the device with the Internet from a setup wireless router and gets data from the mobile app to the controller. Data from the Internet is got by API of the current DOM element in the mobile app. This DOM element is indicated by using XPath in thingspeak.com.

3.5 The Power Unit

The electronic components used in this project are low powered devices which require a little amount of voltage to function. It requires a step-down transformer of 220/12V rating, so as to step down the supplied voltage into the silicon diodes (IN5932) which is used for rectification. A capacitor-input filter is connected in parallel with the output of the rectifier which increases the DC voltage and decreases the ripple voltage component of the output. A voltage regulator (LM7805) is used to further step down the output voltage from the transformer to a constant DC output voltage of 5V and virtually eliminates any remaining ripple voltage

3.6 The working Principle

The IoT-based electronic notice board employs the use of Arduino microcontroller which serves as the core processing unit that supports up to eight simultaneous socket connections. It controls the Wi-Fi module that creates the platform for internet connectivity both for the user to get access to the webpage and for transmitting messages to display on the display unit. When messages are sent from the mobile app via the Wireless media to the microcontroller, the messages are fetched to the microcontroller from the internet through the API of the current DOM element in the webpage. The DOM element uses XPath in thingspeak.com to return the inner text (i.e. messages) which were then displayed at the output of the display unit.

The project uses open source web services to create the IoT-based electronic notice board in order to reduce the cost of implementation. The webpage is so designed that it can be updated from the Google account of the administrator at any time anywhere. The administrator can change and update messages from his mail. The web interface has two sections namely; the updating page and the notice board page. Both pages can be navigated simultaneously to either update messages on the notice board or to view the displayed messages. Fig. 5 and Fig. 6 illustrates the updating webpage and notice board webpage respectively.

IV. Results

The result illustrates the pictorial diagram of the designed IoT-based electronic notice board. The design was tested to evaluate its efficiency and effectiveness which was successful. Fig. 7 illustrates the complete proposed IoT- based electronic notice board. This paper has demonstrated that mobile applications can be an effective tool in executing an IoT- based electronic notice board.

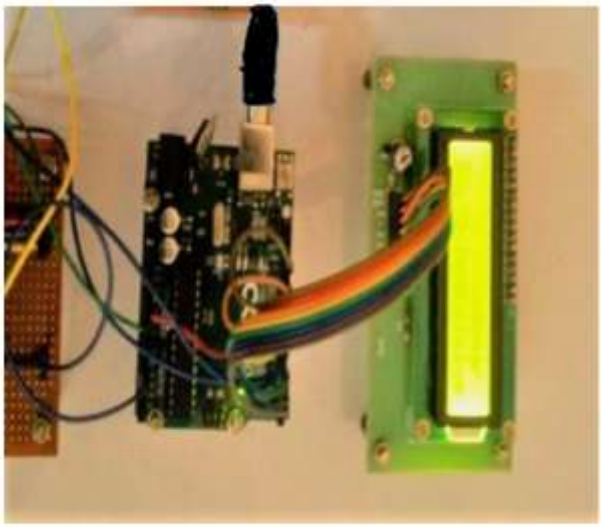

Fig. 7 Pictorial Design of an IoT- based electronic notice board.

V. Conclusion

The project "IoT-based electronic notice board was design to help public institutions such NASDR, the Higher institution of learning and organizationsin disseminating quick information that requiresurgent attention and needed to be circulated in a short period of time. The design was successful, cost-efficient and can be massively produced in a short period of time.

References

[1]. M. Arun, P. Monika and G. Lavanya, "Raspberry Pi Controlled Smart e-Notice Board using Arduino, "IJCAT, 2017.

[2]. G. Ajinkya, K. Tej, L. Manan and K. Deepak, "Wireless Electronic Notice Board," International Journal on Advanced Computer Theory and Engineering, vol. 2, no. 3, pp. 1-4, 2013.

[3]. Azam R. Memon, Bhawani S. Chowdhry, Syed M. S. Shah, Tarique R. Memon and Syed M. Z. Shah, "An Electronic Information Desk System for Information Dissemination in Educational Institutions," in 2nd InternationalConferenceon "Computing for Sustainable Global Development," New Delhi, 2015.

[4]. Yi-Bing Lin, Sok-Ian Sou and Chao-Liang Luo, "Transmission Policies for Multi-Segment Short Messages," IEEE, vol. 65, no. 7, 2016.

[5]. R. P. Sheweta, "Electronic Notice Board," International Journal for Engineering Application and Technology, 2015.

[6]. www.andromo's.com. Access on line 10th may, 2019.

[7]. Arduino, 2018. [Online]. Available: http://storr.arduino.cc/usa/arduino-uno-rev3.

[8]. S. Rubin Bose and J. Jasper Prem, "design and Implementation of digital Notice Board using IoT," IJRIER, 2017

[9]. Dogo E.M., Akogbe A.M., Folorunso T.A, Maliki D. and Akindele A.A. "Development of Feedback Mechanismfor Microcontroller Based SMS Electronic Scrolling Message Display Board," IEEE, vol. 7, no 4, 2014.

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