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SMART TIMETABLE DISPLAY FOR STUDENTS' SUBJECT ALLOCATION IN CLASSROOM USING IOT

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Abstract: This essay describes the development of School bells have played a major role in all of our childhoods. But even with the advent of technology, a lot of things have gone digital, and the school bell is still a manual, antiquated bell. The first break occurs after two periods, and the second break occurs after the next two periods. After the fifth period, school is out. You can select a topic and duration for each period from a list of options in the project. The six days of the week that the user can set the schedule for are Monday through Saturday. The user can also alter the duration of each period. Our college's bell is set to ring continuously for ten seconds at a time in each of its blocks. This is accomplished by using data transmitted via the Internet of Things to notify teachers and students about the concurrent conclusion of a particular session in each block. In addition, a voice module is utilized to read aloud the data shown on the LCD module while a buzzer beeps to indicate an alarm. Three main parts were used in this Arduino college bell circuit: an Arduino Uno board, an IC RTCDS1307, and 16x2 LCD modules. The Arduino is a reading device. To develops this system, an STM32 controller, a Bluetooth module, a school bell buzzer, a 16 x 32-inch LED display, buttons, basic electronics components, and a PCB board are used. The STM 32 controller communicates with the user via the display. Both running and settings modes are available. The user can set the system's current schedule with timings using the Android app.

Keywords: ESP32; Buzzer; LCD; Power Supply; Time Table

I. INTRODUCTION

An automatic bell system that can be customized for each classroom in the school is the project, which is based on an Arduino Nano. This digital circuit, called the Arduino Nano Board Automatic College Timetable, is used to automatically switch on and off a bell without the need for human intervention, following a predetermined schedule.

Generally, bells are used to signal the start or stop of processes wherever we go, be it a school or an organization, if the intention is to inform a large number of people. It is assumed that the school day consists of five scheduled periods for various subjects, with two breaks in between. Two periods later comes the first break, and the following two periods follow the second break. School ends after the fifth period. The fifth period concludes the school day.

A six-day workweek, spanning from Monday through Saturday, can be designated by the user in their schedule. Also, the length of each of the two periods is adjustable by the user. By utilizing mobile technology and a micro controller, the suggested methodology offers a workable solution for displaying timetables and notice boards in classrooms. This device features a 16-by2 LCD screen that continuously shows the date, time, and subject of the current period on the first row, as well as the current day of the week on the second.

Every period or break has a buzzer built into the circuit that begins to hum. A four-switch keypad on the circuit allows you to choose the subject and set the duration of each period. To maintain track of the current date and time, the project makes use of an RTC module. Schools and colleges can send a simple SMS to remind faculty members when classes start based on the real-time clock and switches. They can also use the information displayed on the display boards to send a reminder message.

The project gadget is powered by line current and is controlled by voltage regulator ICs 7805 and 7812, a full-bridge rectifier, and a step-down transformer. Colleges and other educational institutions have traditionally rung the bell by hand, which takes time and is prone to error. Similarly, it takes a lot of work to keep the notice board updated with information. The bell relay is turned on when this duration matches the bell ringing time. The LCD panel shows the current time. This college bell control design is absolutely fantastic.

II. EXISTING SYSTEM

This project describes an autonomous bell system that rings bells in schools or organizations using an Arduino Nano. Without the need for human interaction, the system runs according to a predetermined timetable. The system is designed to fit the conventional school day structure, consisting of five periods each day with two breaks in between. Users are free to choose the length of each phase and create a schedule for each day of the week.

Easy input of schedule details is made possible by an intuitive interface, most commonly utilizing a keypad. On a 16 by 2 LCD screen, the system presents the date, time, and the next scheduled topic in addition to the current day of the week and the current subject. There are buzzers to indicate the start and finish of each period or break, providing auditory signals. The bell ringing is timed to the planned times by an RTC (Real-Time Clock) module, which guarantees accurate timekeeping.

In order to provide faculty members and display boards with timely reminders and changes, the system can also be coupled with mobile technologies to deliver SMS notifications. A regulated power supply configuration powers the project equipment, guaranteeing steady functioning. The device provides a more dependable and efficient option to human techniques by automating the bell ringing process and displaying real-time updates on a digital notice board.

III. LITERATURE REVIEW

One of the most difficult issues that educational institutions always deal with is creating a workable lecture schedule in a large university department. Describe the idea behind smart timetable displays and its significance for a range of settings, including public transit, companies, and schools. The constrained university timetabling problem is addressed in this work using an evolutionary algorithm (EA) based solution. The strategy makes use of the EA method and a chromosomal representation tailored to the task. Provide a summary of earlier research, initiatives, or schedule display- related items. Don't forget to mention the technology they employ, their features, and any known limits.

In a reasonable amount of computer time, workable timetables that are correct have been obtained through the application of heuristics and context-based reasoning. Talk about the current state of smart schedule displays, with an emphasis on those that make use of microcontrollers or other comparable embedded systems. Examine their features, user interfaces, and any cutting-edge innovations. There has been conflicting success when using techniques like CSP, evolutionary algorithms (EAs), and genetic algorithms (GAs).

Systems for smart timetable displays, with an emphasis on those that make use of microcontrollers or other comparable embedded systems. Examine their features, usability, and any novel aspects they provide. We have further solved the problem using the genetic artificial immune network (GAIN), a mimetic hybrid algorithm. The result is then displayed after a comparison with that from GA. This work has reviewed the problem of organizing educational timetables and shown that the evolutionary algorithm is the most

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straightforward solution.

Smart displays have been shown in numerous studies to be beneficial in enhancing accessibility and accuracy of information. Real-time updates from online platforms combined with displays reduce uncertainty about schedule changes, according to research by [Insert reference here]. The advantages of dynamic content and visual cues in holding students' attention and encouraging involvement are also emphasized by [Insert citation here].

The usefulness of these systems is further increased by the incorporation of sensors. Examples of projects that demonstrate how RFID readers can personalize the displayed content based on student identification are [Insert reference here], which guarantees smooth transitions between classes. Similar applications improve visibility and encourage energy economy by adjusting the brightness of the screen through the use of light sensors.

Even while the study that is now available shows promising results, certain areas still need to be investigated further. Robust solutions are needed for security concerns pertaining to data tampering and access. Furthermore, it is still essential to optimize user interfaces for readability and clarity in a variety of learning contexts. Lastly, incorporating interactive elements like opportunities for feedback or confirmation of attendance may help to improve classroom management and student engagement even further. IoT-powered smart timetable displays have great potential to transform classroom administration and communication.

These systems help create an effective, interesting, and well-organized learning environment by providing remote control, personalizing information, and dynamically showing precise schedules. To fully realize the potential of this ground-breaking technology, future research endeavors ought to concentrate on resolving security issues, refining user interfaces, and investigating interactive functionalities. The ability to handle remotely adds even more convenience. As discussed in [Insert reference here], web interfaces and mobile apps enable administrators to remotely and instantaneously alter timetables, expediting the process and saving significant time.

IV. PROPOSED SYSTEM

An intelligent e-notice board and a time-based automated college bell automation system are combined in the proposed system. Automating the management of notice boards and bell ringing in educational facilities is the system's goal. With the Arduino Nano, you wish to build an intelligent timetable display system. Summarize its objectives and the problem it aims to resolve. The microcontroller schedules the bell-ringing procedure to happen at specific periods of the day. The smart timetable display's hardware design is centered on the use of the Arduino Nano and any extra parts, including display modules, sensors, or networking modules. The system's software development method involves programming the Arduino Nano microcontroller. Explain the libraries, logic, and algorithms that were used to put the smart timetable display's capability into practice. You aim to use the Arduino Nano to construct a smart timetable display system. Give a brief description of its goals and the issue it seeks to solve. The bell's ringing at specific times of the day is controlled by the microcontroller. Overall system architecture, encompassing both the software and hardware parts. Describe each system component's function. While the LCD display indicates the current time, the RTC module records the date and time. The Arduino Nano and any extra parts, like display modules, sensors, or networking modules, are the main emphasis of the hardware design for the smart timetable display. Programming the Arduino Nano microcontroller is part of the system's software development process. Give an explanation of the libraries, logic, and algorithms that were used to develop the smart timetable display's functionality. Administrators can remotely update the board via a web application or mobile app because the LED display is connected to the Wi-Fi module. The push button is used to adjust the bell ringing schedule, as well as the current time and date.

V. METHODOLOGY

It is possible to approach evolutionary algorithms similarly to a genetic algorithm thanks to the application's technique. A class of direct, probabilistic search and optimization algorithms known as evolutionary algorithms was derived from the organic evolution paradigm. To safeguard the electronics and give your timetable display a polished, clean appearance, design and construct an enclosure. Think about utilizing 3D-printed plastic, wood, or acrylic materials. Establish the current time by connecting the Arduino Nano's RTC module.

Even with the Arduino shut off, this module will guarantee that the time on your timetable display is accurate. Evolutionary algorithms include Genetic Algorithms (GAs). The Genetic Algorithm is distinct from other methods of search. The trade-off between examining previously found material and discovering new points in the search space is optimally balanced by GAs. Because of their visibility and ease of use, LED matrix displays are a popular option. To communicate with your particular LED matrix display, you might need to create bespoke code. Because GAS algorithms employ operators whose outcomes are determined by probability, they are randomized algorithms. These operations yield results depending on probability and the value of a random number. As per your circuit design, connect the Arduino Nano, LED matrix display, RTC module, and any additional parts. When you're happy with the configuration, solder the connections after using the breadboard for prototyping. Deploy your smart timetable display at its designated position after everything has been put together and is operating as intended.

1.1. Arduino nano

Compact and suitable for a breadboard, the Arduino Nano is a board. It has an ATmega328P microprocessor, eight analog inputs, a USB port, a Mini-B USB socket, and fourteen digital input/output pins, six of which can be utilized as PWM outputs. The Nano is perfect for integrating into prototypes or projects with limited space.

Figure 1 Arduino nano

1.2. Micro controller

An integrated circuit with a CPU core, memory, and programmable input/output peripherals is called a microcontroller. Microcontrollers are little computers. It is appropriate for a range of applications that need control and monitoring capabilities because it is made to carry out certain functions within embedded systems. Electronic devices, appliances, automobile systems, and industrial automation all make extensive use of microcontrollers.

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Figure 2 Microcontroller

1.3. LCD display board

An electronic display that uses liquid crystal technology to create graphics, text, or images is called an LCD (Liquid Crystal Display) display board. In public spaces like train stations, airports, shopping centers, and dining establishments, LCD display boards are frequently utilized for digital signage purposes to show information, announcements, and ads. Information like timetables, directories, and notices are displayed on LCD display boards in workplaces, schools, and other establishments.

Figure 3 LCD display board

1.4. Power supply board

In order to operate the internal components of an electronic device, the PSU (Power Supply Unit) board, also known as the power supply module, transforms incoming electrical power from the mains supply or another power source intothe proper voltage, current, and frequency. To maintain a steady output voltage, which is essential for electronic circuits to operate properly, power supply boards usually control the incoming voltage. Often, they have mechanisms that restrict the amount of current that is given to the gadget in order to shield it from short circuits or overloading.

Figure 4 Power supply board

1.5. ESP32

Two separate controllable Tensilica Xtensa LX6 CPU cores are present in the ESP32, allowing for the reduction of power consumption.It can be used for a variety of wireless applications because it supports Bluetooth 4.2, Bluetooth Low Energy (BLE), and 802.11 b/g/n Wi-Fi. The ESP32 is appropriate for battery-powered devices due to its power-efficient design, which includes many sleep modes and power-saving functions.Piezoelectric (GPIO) pins, SPI (Serial Peripheral Interface), I2C (Inter-Integrated Circuit), UART (Universal Asynchronous

Receiver-Transmitter), DAC (Digital-to-Analog Converter), ADC (Analog-to-Digital Converter), and other peripherals are included in this broad range.

Figure 5 ESP 32

VI. RESULT AND DISCUSSION

Data about class schedules, available rooms, available teachers, and any other pertinent restrictions would need to be fed into the system. The information can be automatically imported from databases or scheduling systems that are currently in use, or it can be manually entered by administrators. To create optimal timetables that take into account a range of limitations and goals, the system would utilize algorithms.

To obtain the ideal or nearly ideal solution, these algorithms may employ strategies such as constraint satisfaction, simulated annealing, or evolutionary algorithms. An interface that is easy to use would display the timetables that have been prepared. Users should be able to access and browse the timetable display with ease, including teachers, administrators, and students.

Real-time updates should be supported by the system, enabling the timetable to be updated instantly in response to modifications in timetables, room availability, or other restrictions. The functionality and usability of the timetable display can be improved by integration with other systems, such as messaging platforms, attendance monitoring systems, and student information systems.

Prioritizing criteria is important while creating a schedule. reducing confrontations, making the most of space, or striking a balance between teachers' duties. The system guarantees accessibility for individuals with disabilities or assistive technology users. expenses related to setting up and keeping up such a system, as well as any prospective gains in terms of reduced waiting times, increased productivity, and general organizational effectiveness.

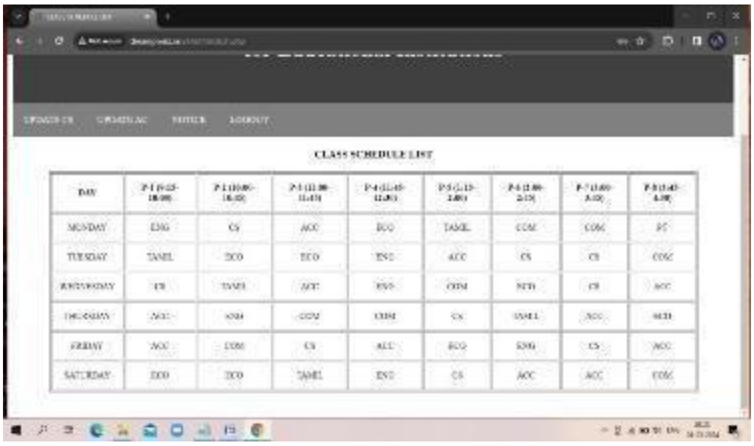

Figure 6 Timetable

Figure 7 Period display

Figure 8 Alternative period

Figure 9 Notice board

VII. CONCLUSION AND FUTURE SCOPE

The issue of scheduling lectures in a college has been successfully resolved by the creation of an automated schedule system. The technology offers a graphical user interface for simple comprehension and input when integrated into a Rich Desktop Application. Real-time updates, interactive features, and customized scheduling are all available on the Arduinopowered smart schedule display. The system enables users to maintain organization and manage their schedules by integrating Arduino with wireless connectivity, sensors, and LED displays. Experimenting with hardware and programming concepts is another educational opportunity offered by the system. Faculty members can examine their schedules on the system and make sure they are available at designated times.

In addition, it has voice control, remote management, and updating capabilities, and integration with popular calendar apps. Users can add more features like temperature sensors, humidity sensors, or RFID readers because the hardware is scalable and modular. This all inclusive timetable management solution aids in resolving issues with both the old and new systems.

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