IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 15, May 2023

Digital Nameplate with Visitor Sensing

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Abstract: *The aim of this project is to create a controller-based model that counts the number of people visiting a specific location. A digital nameplate system is employed, offering features such as displaying the family or office name, scrolling through family member names, showing "We are Out" messages, and welcoming guests with a customized message. The system utilizes an Node MCUESP8266, an ultrasonic sensor, LED display board, buzzer, buttons for operation, and other basic electronic components. When a guest approaches the sensor within one meter, the microcontroller detects the trigger and displays the pre-saved welcome message. The system also allows for setting an away message when the family or office is closed.*

Keywords: Digitalization, modern technology, scrolling display

I. INTRODUCTION

The objective of this project is to create a controller-based model for visitor counting at a specific location using a digital nameplate system. This innovative approach overcomes the limitations of traditional nameplates. The system comprises a microcontroller, ultrasonic sensor, LED display board, buzzer, buttons, and basic electronic components. The microcontroller stores the input message, which can include the family or office name, as well as family member names or a company tagline. This message is displayed on a scrolling LED nameplate outside the location. An integrated ultrasonic sensor detects the presence of individuals within one meter. Once a person is detected, the microcontroller triggers a pre-defined welcome message, providing an automated greeting to the guest. Furthermore, the system allows for setting an away message when the family or office is closed.

Nameplates have become increasingly popular for houses and offices, as people seek creative and unique designs for their properties. However, traditional nameplates have limitations in terms of size and the amount of text they can display. To address this, we have developed digital nameplates that elevate the concept to a whole new level. These digital nameplates not only showcase the family or office name but also greet and welcome guests upon their arrival. The digital nameplate offers a range of features, including the ability to display the family or office name digitally, scroll through all family member names, show messages indicating the absence and expected return of occupants, and automatically detect and welcome guests with a personalized message. This innovation brings a dynamic and interactive element to nameplates, enhancing the overall experience for both residents and visitors..

II. LITERATURE SURVEY

1)"Design and Construction of a Bidirectional Digital Visitor Counter"

Author : Winfred Adjardjah 1 George Essien 2 Hilary Ackar-Arthur 2

This study focuses on the design and construction of a digital bidirectional visitor counter (DBVC). The DBVC is a reliable circuit that accurately counts the number of people entering and exiting a room, while also providing an alarm when the capacity limit of the auditorium or hall is exceeded. The system utilizes a microcontroller, sensors, and an LCD display to achieve its functionality. The microcontroller detects the entry or exit actions based on signals received from infrared receivers. By obstructing either sensor 1 (outside the building) before sensor 2 (inside the building) or vice versa, the system determines whether a person is entering or exiting. The microcontroller processes these signals and displays the total number of people inside the room on a 16x2 LCD screen. This digital bidirectional visitor counter offers a practical solution for accurately monitoring and managing occupancy in various environments.

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2)"Digital Nameplate"
Author: Kunal Doshi
I created a special project to digitize office desk nameplates, offering the following features:
Scrolling LED matrix display for showing person's information.
Easy content modification through SD card or provided PC software.
User-selectable font sizes (5x8, 5x5, 3x5).
Dual functionality as a clock, displaying time and date.
Time can be updated using up/down buttons.
Entertaining animations for idle moments.
Considerations for similar projects:
Adjust Matrix Display Library programmatically for your display size.
Minimize flickering by updating only specific parts of the display instead of clearing the entire screen.
Use an Arduino clock with millis() to update the display while syncing with the Real-Time Clock (RTC) at regular intervals.
Improve legibility by angling the LED matrix display or using a wedge.
Libraries used: Matrix Display Library (Miles Burton), SD Card library (Ladyada), Modified RTC library (Ladyada), Standard Arduino Library: EEPROM, fonts, and Wire.

3) "Electronic Nameplates (E Ink): Your Guide to the Modern Conferencing Staple"
Author: Chole Walford
Electronic or E Ink nameplates are digital versions of traditional engraved or printed nameplates. They revolutionize conferences and meetings by offering easy identification, sustainability, and flexibility. E Ink nameplates allow you to add logos, different text sizes, and make instant corrections to spelling errors or seating arrangements. Unlike flimsy paper nameplates, they can be reused and save time and labor involved in changing nameplates between meetings. Overall, electronic nameplates provide a more convenient and eco-friendly solution compared to their paper counterparts.

III. DESIGN

To design a system for a digital number plate with digital sensing using NodeMCU, an ultrasonic sensor, wireless message display, and an alert to the admin when a person is detected, the following components and workflow can be considered:

Hardware Components:
1. NodeMCU: An ESP8266-based development board that provides processing power and Wi-Fi connectivity.
2. Digital Display: A wireless display module capable of receiving messages from NodeMCU and showing the desired information.
3. Ultrasonic Sensor: An ultrasonic sensor for proximity detection to determine if a person is present.

Software Components:
1. NodeMCU Firmware: Flash the NodeMCU firmware onto the board.
2. Microcontroller Programming: Write firmware code using a suitable programming language (e.g., Lua or Arduino IDE) to handle the system's functionality.
3. Network Protocols: Implement the necessary network protocols (e.g., HTTP or MQTT) to establish communication between NodeMCU, the display, and the admin's alert system.
4. Data Processing: Develop code to process the sensor readings, trigger appropriate actions, and format the data for display and alert messages.

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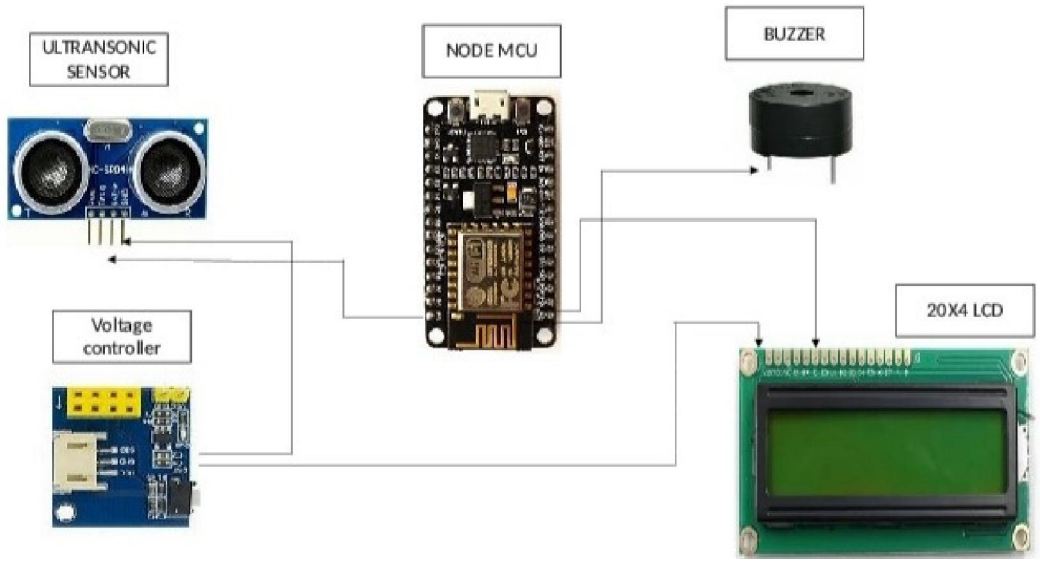
System Workflow:

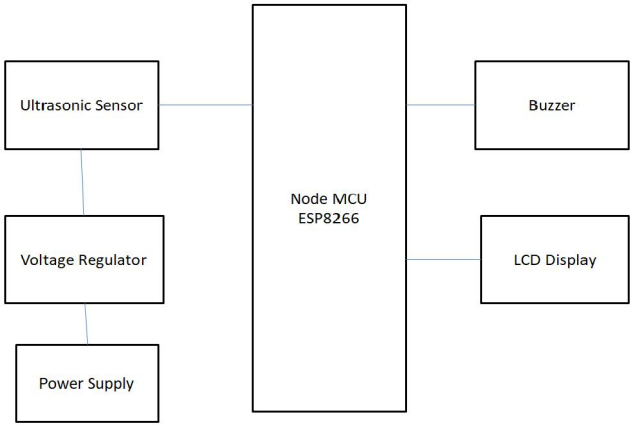
1. Initialization: Upon booting up, the NodeMCU establishes a Wi-Fi connection and initializes the digital display and ultrasonic sensor.
2. Proximity Detection: The ultrasonic sensor measures the distance to detect the presence of a person. If a person is detected within a predefined range, the system proceeds to the next step.
3. Display Update: NodeMCU sends a wireless message to the digital display module, updating it with the desired information, such as the digital number plate or a customized message.
4. Admin Alert: Simultaneously, NodeMCU triggers an alert message to the admin, indicating that a guest has arrived. This can be achieved by sending a notification via email, SMS, or using a messaging service like Telegram or MQTT.
5. Repeat: The system continues to monitor the proximity using the ultrasonic sensor, updating the display as required, and triggering admin alerts whenever a person is detected.

It's important to customize and expand upon this basic workflow according to your specific requirements and the capabilities of the components you're using. Additionally, ensure that the wireless message display module supports the chosen communication method with NodeMCU (e.g., Wi-Fi or Bluetooth).

IV. CIRCUIT DIAGRAM



V. BLOCK DIAGRAM



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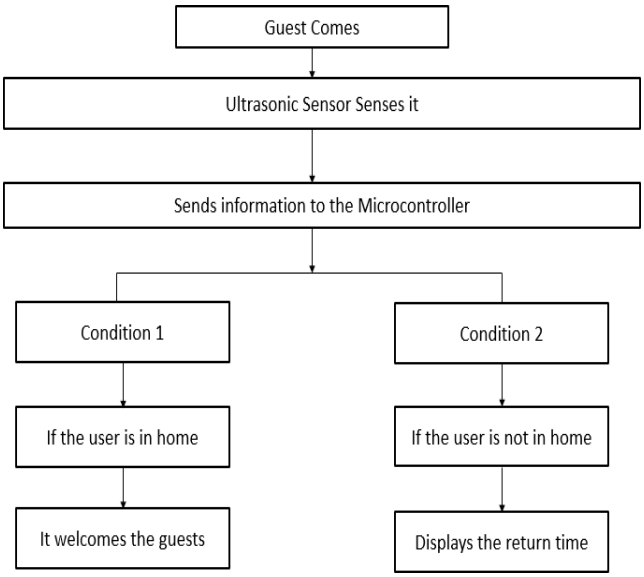
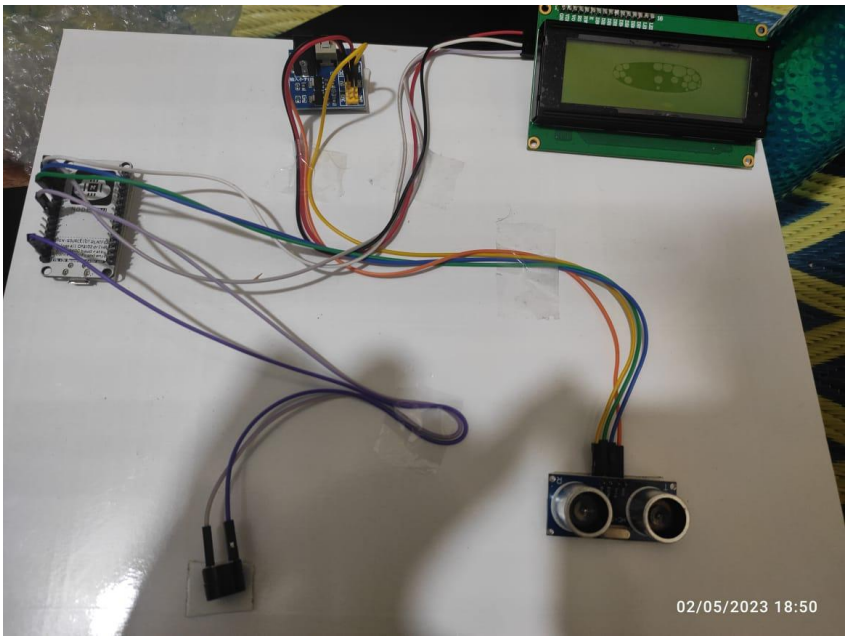
In this block diagram the Node MCU ESP8266 is at the core of the system.. It interfaces with various components to get the desired output. At first the Ultrasonic Sensor senses the visitor when it comes into the specified range it sends that info to the Node MCU. Then the Buzzer rings. After that the LCD Display displays the Welcome message if the owner is at home either if the owner isn't in home then it displays the return time.The voltage regulator is used to control the high voltage coming from the supply. The ultrasonic sensor is major input device and Buzzer & LCD display are output devices.

VI. FLOW CHART



VII. HARDWARE



VIII. CONCLUSION

This system is built with the Node MCU esp8266, an ultrasonic sensor, an LCDdisplay board, a buzzer, as well as some basic electronics components and voltage regulator. The input message to be displayed on the LCD board is stored in

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the controller.The message could include the name of the family or the name of the office. The ultrasonicwaves are reflected from the user and received by the sensor as soon as a guest arrives andstands in front of it.

IX. ACKNOWLEDGMENT

We would like to express our sincere gratitude and appreciation to all those who have contributed to the successful completion of this project.

First and foremost, we extend our deepest thanks to our project supervisor **Prof.S.A.Wakure** for their guidance, support, and valuable insights throughout the project. Their expertise and mentorship were instrumental in shaping our work.

We would like to thank the **Department of Electronics and Telecommunication Engineering, JSPM'S Jayawantrao Sawant College of Engineering, Pune**for providing the necessary resources and facilities to carry out this research. Their continued support and encouragement were essential in enabling the project's progress

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