

POSITIONING AND TRACKING OF A PERSON USING EMBEDDED CONTROLLER IN A DEFINED AREA

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Abstract - Tracking of a person in large institution is an arduous task for the management. Management can't employ separate force to trace and locate the respective person inside such large Institution/Organization. This technique involves the use of GPS to locate and trace the person in a defined area and updates the location in an IoT database. Additionally this system has the capability where the admin can monitor the location in a local mobile app/cloud.

Key Words: GPS, IoT (Internet of Things).

1. INTRODUCTION

Previous methods of tracking a person with NFC and RFID involve a very low range and some limitations. Even the conventional method of using a camera to monitor a person involves a huge work force. And this conventional method requires a continuous human monitoring and a great data management. In this proposed system the person's identity number is sent through the app to the cloud via Node MCU (ESP8266). In response to the request send by the admin the respective person's location co-ordinates get updated in the form of latitude and longitudes to the LCD screen. In additional to this, the location can be viewed in the form of graphical map.

2. BLOCK DIAGRAM

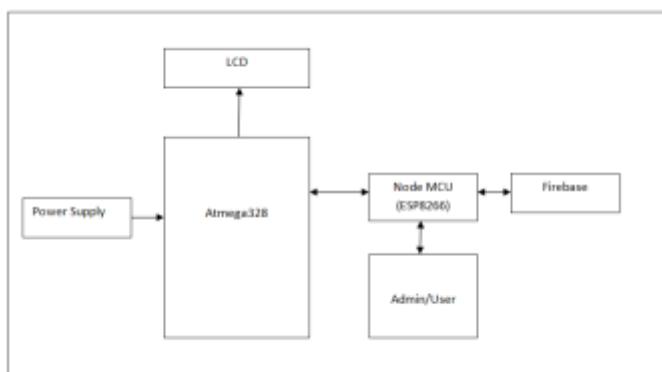


Fig -1: Admin side.

In the admin side an Node MCU (ESP8266) is interfaced with the cloud using a WiFi controller. On the other hand, the Atmega 328P is also interfaced with the Node MCU to get the values displayed via LCD in the form of Latitude and Longitude. The system is powered with a power

supply of 12v which can be regulated with a voltage regulator for the required use.



Fig -2: Individual person side.

The target to be tracked is provided with a GPS module in this case the targets mobile GPS is used to acquire location. The location is constantly updated to the Firebase (cloud).where the location can be seen in the form of graphical map using Maps API (Application Program Interface).

2.1 PROJECT WORK FLOW

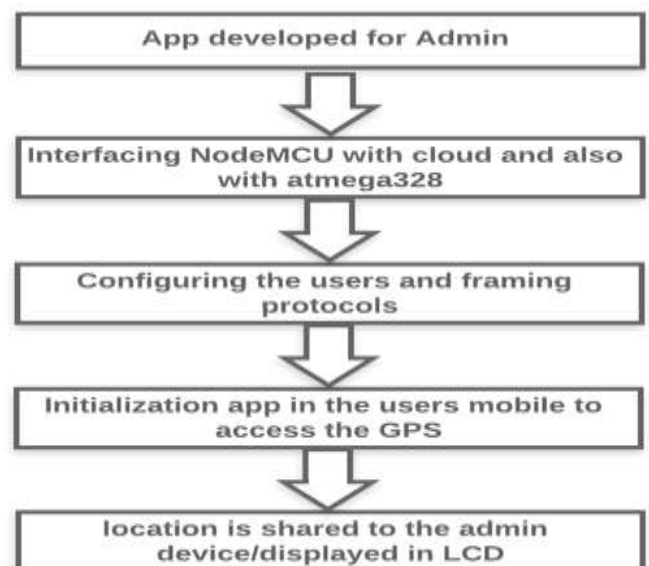


Fig -3: Project work flow.

3. COMPONETS DESCRIPTION

3.1 NODE MCU (ESP 8266)

Node MCU is a cheap open source IoT platform. Node MCU first included firmware which runs on ESP8266 WiFi SoC from Espressif systems and hardware was dependent on ESP-12 Module. Afterward the technical support for the

ESP-32 32bit MCU was included. NodeMCU is an open source firmware for which open source prototyping board structures are accessible. The name "NodeMCU" joins "node" and "MCU". The expression "NodeMCU" carefully alludes to the firmware. The firmware utilizes the Lua scripting language. The firmware depends on the eLua project, and based on the Espressif Non-operating system SDK for ESP8266. It utilizes many open source projects, for example, lua-cjson and SPIFFS. Because of asset requirements, clients need to choose the modules pertinent for their projects. Support for the 32-bit ESP32 has likewise been included.



Fig -4: Node MCU.

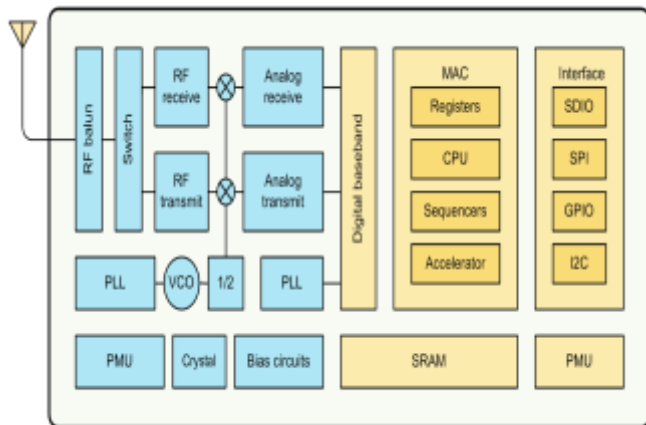


Fig -5: Node MCU block diagram.

3.2 Atmega 328P Microcontroller

The ATmega328P is a single-chip microcontroller produced by Atmel in the megaAVR family (later acquired by Atmel in 2016 by Microchip Technology). It has an 8-bit RISC processor core adapted from Harvard architecture. The Atmel 8-bit AVR RISC-based microcontroller integrates 32 KB ISP flash memory with read-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general-purpose I / O boards, 32 general-purpose working registers, 3 versatile mode timer / counters, internal and external interrupts, USART serial programmable, byte-oriented 2-wire serial interface, SPI serial port, 6-channel

10-bit A / D. As of 2013, The ATmega328 is widely used in many projects and autonomous systems as of 2013, requiring a simple, low-powered, low-cost microcontroller. Perhaps the most common implementation of this chip is on the famous Arduino development platform, namely the Arduino Uno and Arduino Nano models. Reliability validation indicates that the expected rate of data retention loss is much less than 1 PPM over 20 years at 85 °C or 100 years at 25 °C.



Fig -6: Atmega 328P Microcontroller.

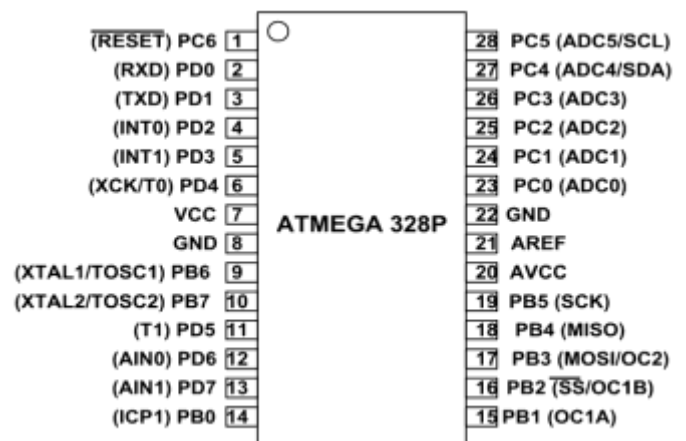


Fig -7: Atmega 328P Pin diagram.

3.3 LCD

LCD screen (Liquid Crystal Display) is an electronic display element and can see a wide range of applications. A 16x2 LCD display is a very simple module, and is commonly used in different devices and circuits. These modules are preferred to seven segments, and other LEDs in multi section. The reasons being:

- LCDs are cheap
- Easily programmable

Have no limitation of displaying special characters. A 16x2 LCD means that 16 characters can be shown per line, and there are 2 such lines. Every character in this LCD is represented in a matrix of 5x7 pixels. This LCD comprises two registers: Command and Data. The command register

stores command instructions given to the LCD. The LCD performs predefined functions when the command is given such as

- starting it
- Clearing its screen,
- Assigning the cursor ,

The data is the character's ASCII value which will be displayed on the LCD.

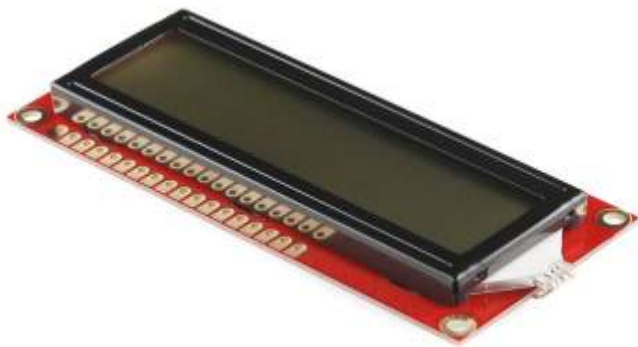


Fig -8: LCD

4. SYSTEM OVERVIEW

Our project allows the administrator to keep track of persons who are in the campus. Initially an App is developed for the admin to trace the person. Another app is developed for the persons of the organization to be tracked. This app enables the GPS of the person's mobile phone which sends the location co-ordinates to the Cloud (Firebase). The app in the admin side requests the location data from the cloud via the Atmega 328P and Node MCU. The cloud in return responds to the request send by the admin, and then shares the location of the person to the admin app through Node MCU and Atmega 328P. The admin app is secured with a password.

Firebase is known as a forum for web applications. It lets developers create applications of high quality. It stores data in the format of JavaScript Object Notation (JSON) that does not use query to insert, edit, remove or add data. It is the backend of a framework that is used to store data as a database. This also offers a user management system whereby developers can allow user authentication with Firebase email and password login. It allows fast and secure transfer of files for Firebase apps irrespective of the nature of the network. Google Cloud Storage supports it, and is a cost-effective storage service. It can be used by the developer to store images, audio, video or any other content created by the user.

5. CONCLUSION

The latest technology revealed in this article demonstrates the possibility of knowing the last visited location of the person. The work is planned under all situations to provide an effective management of the person tracking system for easy communication. It is useful to use this form of application to see where the individual spends time when out on the job. The research can be carried out in the future by interactive exhibits at tourist sites, i.e. museums, caves, etc. The principle of monitoring can be applied further in monitoring patients with amnesia at hospital premises.

6. REFERENCES

- [1] Silke Feldmann, Kyandoghere Kyamakya, Ana Zapater, Zihuo Lue" An indoor Bluetooth-based positioning system: concept, Implementation and experimental evaluation"2003.
- [2] Beom-Ju Shin, Kwang-Won Lee, Sun-Ho Choi, Joo-Yeon Kim, Woo Jin Lee, and Hyung Seok Kim,"IndoorWiFi Positioning System for Android-based Smartphone"978- 1-4244-9807-9, Nov 2010.
- [3] Cliff Randell Henk Muller; Low Cost Indoor Positioning System, report, Department of Computer Science, University of Bristol, UK.
- [4] Daniel Pan. 2016. Firebase Tutorial. October, 2016.
- [5] Bill Stonehem, Google Android Firebase: Learning the Basics Paperback, 2016 dated 18/3/17.
- [6] Jos Luis Carrera et al. "A Real-time Indoor Tracking System in Smart-phones". In: Proceedings of the 19th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (2016),pp. 292-301.
- [7] ESP8266.<https://www.espressif.com/en/products/hardware/esp8266ex/overview>. Accessed June 8, 2018.
- [8] H. Liu et al. "Survey of Wireless Indoor Positioning Techniques and Systems". In: IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews) 37.6 (Nov. 2007), pp. 1067-1080. ISSN: 1094-6977.
- [9] S. Saha et al. "Location determination of a mobile device using IEEE 802.11b access point signals". In: 2003 IEEE Wireless Communications and Networking, 2003.
- [10] Arduinojson. <https://arduinojson.org/>. Accessed August 5, 2018.

- [11] Y. Zhang, M. G. Amin, and S. Kaushik. Localization and tracking of passive RFID tags based on direction estimation. International Journal of Antennas and Propagation, 2007.

- [12] Verma, P. & Bhatia, J.H. (2013). „Design and development of GPS-GSM Based Tracking System with Google Map Based Monitoring“, International Journal of computer science, Engineering and Applications (IJCSEA) vol.3, no.3