



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 13, April 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

9940 572 462

6381 907 438

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# AI with Deep Reinforcement Learning Based Staff Localization Detection System through Smart Phone

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**ABSTRACT:** The new technological approaches in the last several years bring new possibilities for localization. Nowadays, the indoor localization starts to take a significant part in staff efficiency evaluation, industrial management and many other areas. In this paper, Deep reinforcement learning-based staff localization detection system through smart phone is proposed and it consists of Smart tag, chip scanner, W89052E digital controller, HC-05 WLAN device, and Smart phone. The smart tag consists of internal microchip which contains unique 8-digit code. The 8-digit code consider as staff identity which stored in AI (Artificial Intelligence) data based and designed by code developer or useradmin. The information about the staff and scanner location or placement details is stored in AI data base. The chip scanner is used to read the unique code from smart tag through wireless mode. The digital controller receives that code from scanner and verifies the code with the AI data base. The matched information transmitted to smart phone in the form of text through HC -05 wireless local area network units. The DRL based software application is designed and stored in smart phone which is used to convert the text data into voice data. The voice data is announcing the staff localization.

**KEYWORDS:** Deep learning, Deep Reinforcement learning, Staff localization detection, navigation system, tracking system.

## I. INTRODUCTION

In places where employees work a lot, for example in colleges, schools, offices, factories, etc., state-of-the-art surveillance cameras are used to track the location of employees or their current location. Cameras and other maintenance equipment are expensive and require a separate control room. Most of the places do not have these types of facilities. So that here we introduce a new technological advancement for finding the localization of the staff movement through smart phone by using Artificial intelligence with Deep Learning process.

Most of the industries, educational sectors play an important role in the National Development Program; there is growing concern to the safety of the staffs during the working process in plant. The system consisted of Monitoring center, network topology for real-time data transmission and indoor positioning system. Monitoring center was software on system for acquisition and display of location data. Indoor positioning system was deployed in chemical plant, and its function included personnel location estimation. The data transmission network was used to connect Monitoring center and indoor positioning system. Because of the indoor complexity environments and the lack of target location site estimation based on RSSI, this paper adopted SVM classifier to improve the localization accuracy in Wireless Sensor Networks.

The objective of the paper is to design a wireless staff location services using face recognition system. This work proposed, RF scheme which can overcome the disadvantage of existing system and provide a wireless communication between the staff location and the monitoring center. This work is developed using face recognition system, smart ID and RF modem technology since it is easy and secure to use. The face recognition system and smart ID technology is used to locate the staff inside the college campus and the RF modem is used for the short-range communication within the college campus. The smart ID readers are placed at every building. As the staff and provides it to the PC. Smart tag is read by the reader and matches the face with already stored information.

The matched information transmitted to smart phone in the form of text through HC -05 wireless local area network units. The deep learning - reinforcement based software application is designed and stored in smart phone which is used to convert the text data into voice data. The voice data is announcing the staff localization. proposed DRL-based



Stafflocalization detection system using smart phone. Simulation of the proposed system using Proteus software is presented and the simulation results are discussed in section 5. Finally, the concluding remarks are presented in section .

## II. RELATED WORKS

Dynamic multi target assignment based on deep reinforcement learning is proposed in [1]. In this system, the dynamic multi-target assignment decision modeling method combining combat simulation and deep reinforcement learning was discussed, and an intelligent decision-making training framework for multi-target assignment was designed based on deep reinforcement learning. In conjunction with the typical combat cases, the warhead combat process was also divided into the penetration phase and the multi-target assignment phase, the model framework and reward function against the multi-target assignment of the missile were devised, and the SAC algorithm was employed to conduct application research on intelligent decision modeling for multi- target assignment.

Information technology analysis on solid protection system of industrial control network security in intelligent factory was proposed by Yali tian jiangsujari et.al [2]. This system focuses on the typical business scenario of intelligent factory, it includes the manufacturing process, carries out hierarchical security protection, forms a full coverage industrial control security protection network, completes multi-means industrial control security direct protection, at the same time, it utilizes big data analysis, dynamically analyzes the network security situation, completes security early warning, realizes indirect protection, and finally builds a self-sensing and self-adjusting industrial network security protection system It provides a reliable reference for the development of intelligent manufacturing industry.

Martin jürgens et.al proposed Felix noltebluetooth mesh networks for indoor localization [3]. Indoor Localization Systems (ILS) are increasingly applied in various use cases, such as tracking the position and movement of staff or equipment within buildings. Creating and applying these systems requires decisions about measuring and transmitting signals, the algorithm transforming signals into position estimations as well as the representation displayed to the user. One approach gaining significance recently in this context are Mesh Networks. A Mesh Network enables single nodes to exchange information with other nodes directly and dynamically, increases the error-tolerance, and facilitates the setup by reducing installation overhead. Silvanocortesi et.al designed and implemented an rssi-based bluetooth low energy indoor localization system [4]. Indoor Positioning System (IPS) is a crucial technology that enables medical staff and hospital managements to accurately locate and track persons or assets inside the medical buildings. Among other technologies, Bluetooth Low Energy (BLE) can be exploited for achieving an energy-efficient and low-cost solution. This work presents the design and implementation of an received signal strength indicator (RSSI)-based indoor localization system. The paper shows the implementation of a low complex weighted k-Nearest Neighbors algorithm that processes raw RSSI data from connection-less iBeacon's.

Cole Bradley et al. performed Security analysis of an IoT system used for indoor localization in healthcar facilities [5]. In today's world, the rapid advancement of technology allows us to find new solutions to old problems in critical areas, namely patient and staff tracking in healthcare facilities. The medical staff within these facilities are in an environment where they depend on immediately knowing the location of a patient or other medical staff. McAllister et al. [7] proposed a solution named locate Health Center Assets Through an IoT Environment, which uses existing technology to track all patients and medical staff in near real time.

## III. EXISTING SYSTEM

In the existing system, the dynamic multi-target assignment decision modeling method combining combat simulation and deep reinforcement learning was discussed, and an intelligent decision-making training framework for multi-target assignment was designed based on deep reinforcement learning. In conjunction with the typical combat cases, the warhead combat process was also divided into the penetration phase and the multi-target assignment phase, the model framework and reward function against the multi-target assignment of the missile were devised, and the SAC algorithm was employed to conduct application research on intelligent decision modeling for multi- target assignment. Preliminary test results suggest that the intelligent decision-making model based on deep reinforcement learning provides better combat effects than the traditional decision model based on knowledge engineering.

### Problem identification

- Deep Learning – Reinforcement algorithm derived for multi target tracking system.
- Due to multi target tracking we need more parallel processing system and huge memory unit.

### IV. PROPOSED SYSTEM

The proposed system consists of Smart tag, chip scanner, W89052E digital controller, HC-05 WLAN device, Smart phone and +5V DC regulated power supply unit. The smart tag consists of internal microchip which contains unique 8-digit code. The 8-digit code consider as staff identity which stored in AI (Artificial Intelligence) data based and designed by code developer or user admin. The information about the staff and scanner location or placement details is stored in AI data base. The chip scanner is used to read the unique code from smart tag through wireless mode. The digital controller receives that code from scanner and verifies the code with the AI data base. The matched information transmitted to smart phone in the 12 form of text through HC -05 wireless local area network units. The deep learning - reinforcement based software application is designed and stored in smart phone which is used to convert the text data into voice data. The voice data is announcing the staff localization.

#### 4.1 Functional blocks

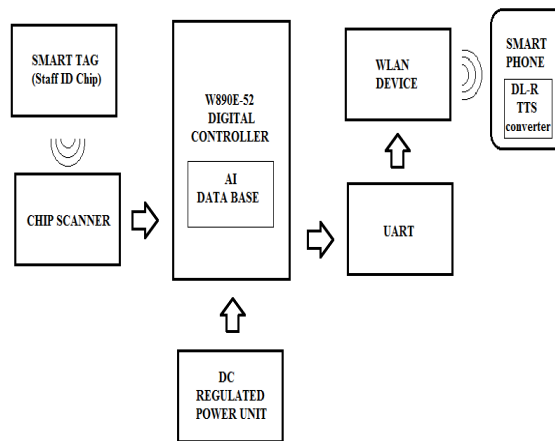


Fig. 1 Functional Block Diagram of the System

In this system consists of smart tag, tag reader or scanner, HC-05 BLUETOOTH, Nuvoton-52 digital controller, android GUI application software, 2X16 LCD display unit and +5V DC regulated power supply unit.

#### 4.1.1 Circuit Diagram

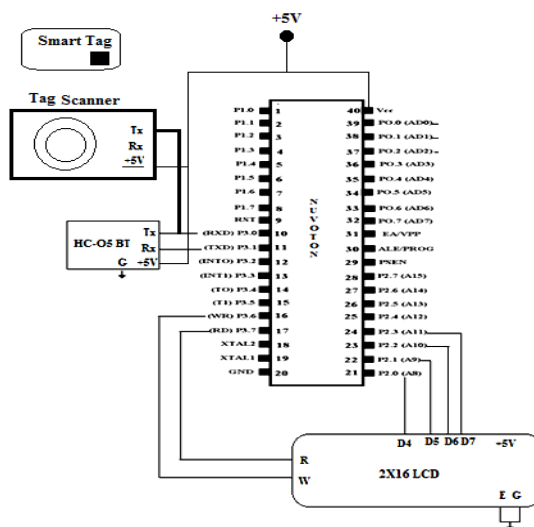


Fig: 2 Circuit Diagram of the Proposed System



All the employees ID card is made up of smart tag. Inside the card has microchip module with loop antenna. The microchip module transmits the RF encrypted data continuously through wireless medium in the frequency range of 16MHz. The tag scanner is used to detect the data and also convert the encrypted data into digital code. The output of the scanner is applied to the input of the controller. The predesigned deep learning reinforcement algorithm is stored into controller. This algorithm is used to identify the real text data from digital code. The real text data denotes the location point of the scanner placement as well as staff localization point. These data can be displayed on liquid crystal display as well as voice on smart phone. The HC-05 bluetooth device is used to communicate the text data from controller to smart phone. The Text to Speech GUI App designed and installed in smart phone which is used to telecast the voice message about the employee localization.

#### 4.1.2 Power supply unit

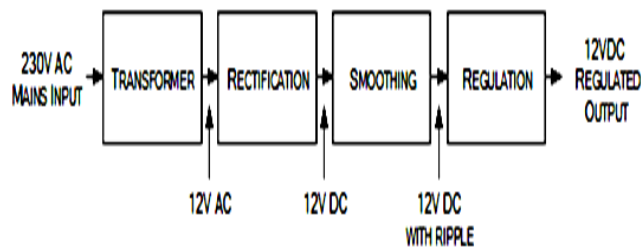


Fig: 3 Block Diagram of Power Supply Unit

### 4.2 HARWARE DETAILS

#### 4.2.1 Nuvoton Microcontroller

Generally, Microcontrollers have a CPU, Memory, Addressing Circuits, Interrupt handling circuits an internal UART, Ports, timers. The microcontroller models vary in data sizes from 4 to 32 bits. Four-bit units are produced in huge volumes for very simple applications. 8-bit access is more versatile than others 16–32-bit words are used in high-speed application in signal processing

#### 4.2.2 Basic Circuit Connection

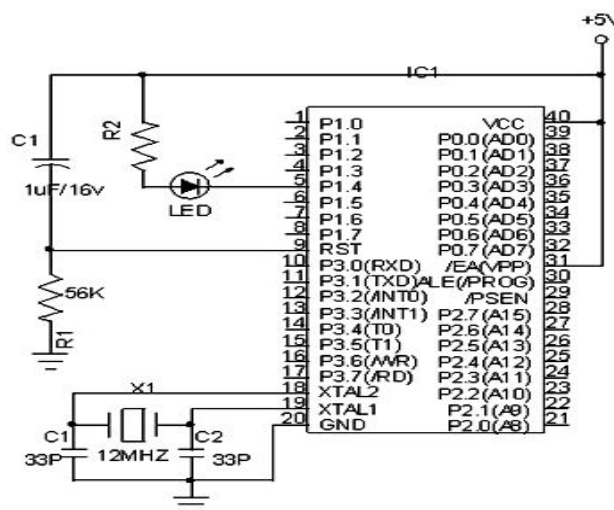


Fig: 4 Basic Circuit Connections

### V. EMBEDDED 'C'

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

### VI. SIMULATION RESULTS

The proposed DRL-based Staff localization system is simulated using Proteus software and the simulation results are presented in Figures 5,6,7, and 8.

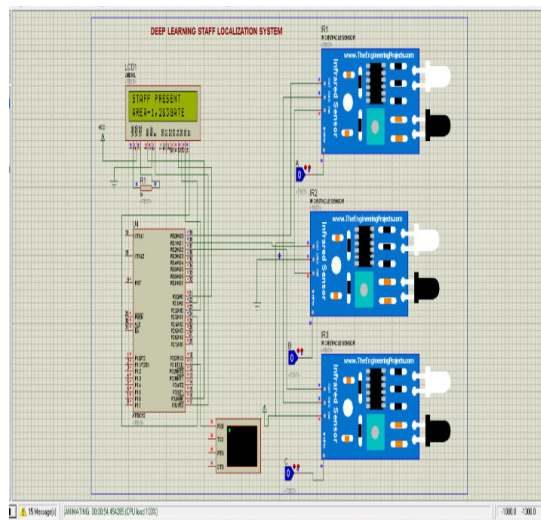
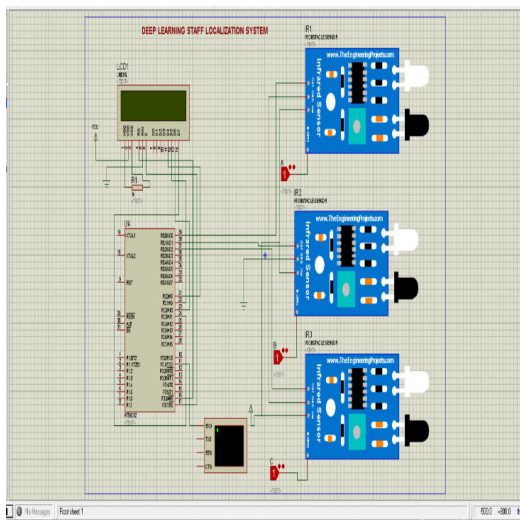


Fig 5 Simulation Result of Proposed System Fig 6 Simulation Result of Proposed System

(OPosition Staff Present in Area-1,2&3 Gate)

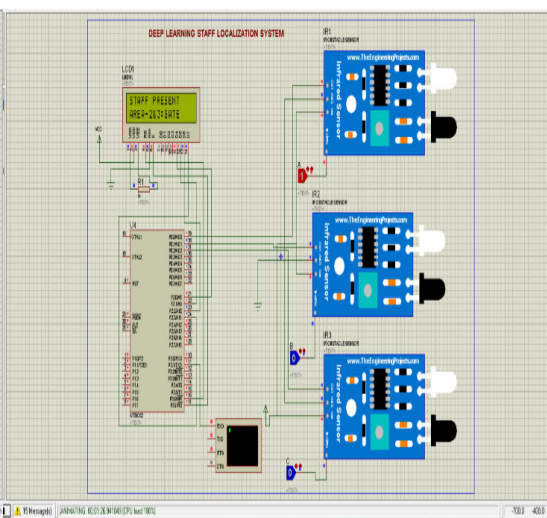
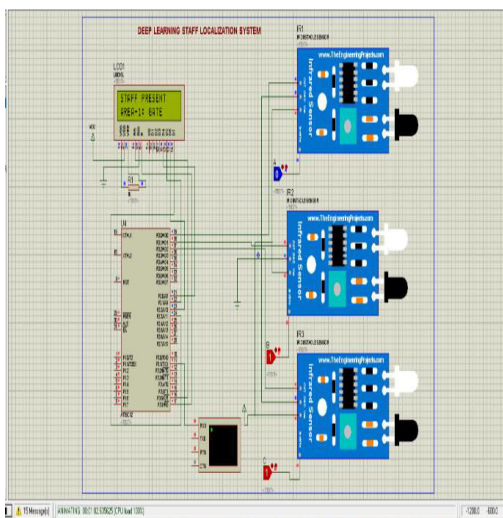


Fig. 7 Simulation Result of Proposed System Fig. 8 Simulation Result of Proposed System  
(Position Staff Present in Area-1:Gate)(Position Staff Present in Area-2&3:Gate)



## VII. CONCLUSION

The system is very useful to find the movement or location of the staff or employees. It predicts accurately and telecast through hand held device like smart phone. The implementation of the system is very low-cost expenses and easy to design. In places where employees work a lot, for example in colleges, schools, offices, factories, etc., state-of-the-art surveillance cameras are used to track the location of employees or their current location. Cameras and other maintenance equipment are expensive and require a separate control room. Most of the places do not have these types of facilities. So that here we introduce a new technological advancement for finding the localization of the staff movement through smart phone by using Artificial intelligence with Deep Learning process.

## REFERENCES

- [1]. Yifeiwu, yonglin lei, zhizhu, xiaochen yang, and qun, “Dynamic Multi target Assignment Based on Deep Reinforcement Learning, vol. 10, IEEE 2022
- [2]. Yali Tian Jiansu Jari Information Technology, Gang Li Jiansu Jari, “Information Technology Analysis on solid protection system of industrial control network security in intelligent factory, 2021 IEEE Asia-Pacific Conference on Image Processing, Electronics and Computers (IPEC)
- [3]. Martin Jürgens\*, Dennis Meiß\*, “Dominik Möllers\*, “Felix Nolte Bluetooth Mesh Networks for Indoor Localization, 2375-0324/19/\$31.00 ©2019 IEEE
- [4]. SilvanoCortesi; Marc Dreher; Michele Magno, “Design and Implementation of an RSSI-Based Bluetooth Low Energy Indoor Localization System”, 10.1109/WiMob52687.2021.9606272 IEEE 2021
- [5]. Cole Bradley; Samy El-Tawab; M. Hossain, “HeydariSecurity analysis of an IoT system used for indoor localization inhealthcare facilities, 10.1109/SIEDS.2018.8374726 IEEE 2018
- [6]. R. Fujdiak; P. Mlynek; J. Misurec; J. Slacik; J. Brychta, “Efficiency evaluation for different kind of localization methods for android devices”, 10.23919/ICINS.2017.7995615 IEEE 2017.
- [7] T. Dylan McAllister; Samy El-Tawab; M. Hossain Heydari, “Localization of Health Center Assets Through an IoT Environment (LoCATE),” 2017 Systems and Information Engineering Design Symposium (SIEDS) Charlottesville, VA, USA, April 2017.



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