Enhanced Fingerprint and Trajectory Prediction for IoT Localization in Smart Buildings

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ABSTRACT: This paper "ENHANCED FINGERPRINT AND TRAJECTORY PREDICTION FOR IOT LOCALIZATION IN SMART BUILDINGS" is to design a trajectory prediction for IOT localization in smart buildings with fingerprint module.

This paper is to adopt fingerprint matching scheme as the basic method for IOT localization in smart buildings. Location service is one of the primary services in smart automated systems of Internet of Things (IOT). For various location-based services, accurate localization has become a key issue. An IOT localization system for smart buildings has been attracting increasing attention. Based on fingerprint module we are developing a prediction for IOT localization in smart buildings. The fingerprint module scans the image in different sections and processed for obtaining user's position through Wi-Fi.

In the proposed LNM scheme, the history data of the pedestrian's locations are analyzed to further lower the unpredictable signal fluctuations in a smart building environment, meanwhile enabling calibration-free positioning for various devices [1]. The performance evaluation conducted in a realistic environment shows that the presented method demonstrates superior localization performance compared with well-known existing schemes, especially when the problems of device heterogeneity and Wi-Fi signals fluctuation exist.

Keywords: *novel localization (LNM), NR-RSS, Finger print, IoT.*

INTRODUCTION:

The aim of the paper "ENHANCED FINGERPRINT AND TRAJECTORY PREDICTION FOR IOT LOCALIZATION IN SMART BUILDINGS" is to design a trajectory prediction for IOT localization in smart buildings with fingerprint module.

The project is designed for the problem of developing Internet of Things (IOT) Localization systems for smart buildings but it also applies to other IOT applications that have location-based service ability. Existing approaches to design such systems generally utilize the received signal strength (RSS) from Wi-Fi to build fingerprint for obtaining user's position. It suggests a novel technique, named novel localization method (LNM) that uses neighbour relative (NR) signal fingerprint and Markov chain for localization in smart buildings. NR-RSS is used as the finger print data to build radio map instead of absolute RSS.

Meanwhile, Markov-chain model is applied to conduct the mobile devices in such a way that the controller is interfaced to PC using serial communication technique. Serial communication is often used either to control or to receive data from an embedded microprocessor. In serial communication the data is sent as one bit at a time. Serial communication is a form of I/O in which the bits of a byte being transferred appear one after the other in a timed sequence on a single wire. Serial communication is commonly used in applications such as industrial automation systems, scientific analysis and certain consumer products.

BLOCK DIAGRAM:

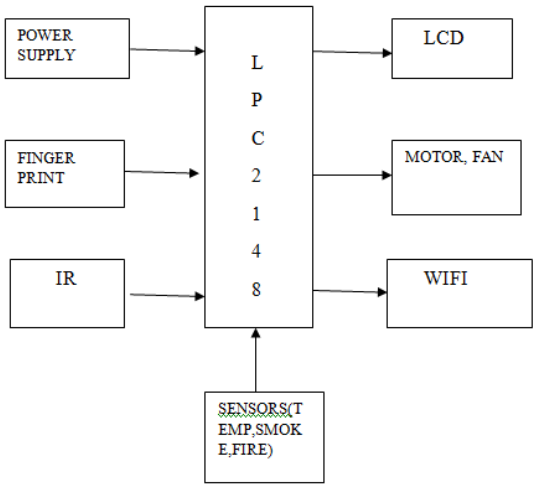

Fig:1 Block Diagram

Working:

Here the serial communication is established between the PC and the controller by a line driver IC max232 which acts as a voltage converter. And the loads will also be interfaced to the controller through relays. Depending on the input received from the PC, the controller will perform the predefined task of turning ON/OFF the loads. Here the front end application will also be developed on C# .NET platform for the visual effects so that the application can be easily accessed. And an LCD will also be interfaced to the controller to display the status of loads.

This paper uses regulated 5V, 500mA power supply. Unregulated 12V DC is used for relay.7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

FLOW CHART

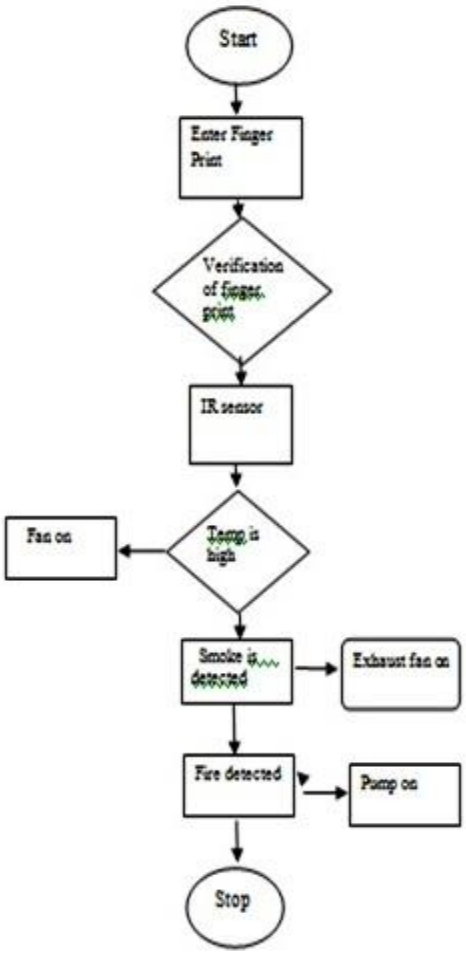

Fig:2 Flow chart of work flow.

The proposed block diagram consists of microcontroller ARM based LPC2148,LCD which are specialized using with microcontrollers having in built CAN Controller and has ability to connect multiple nodes without any kind of interference and with zero error probability. KY-M6 Fingerprint module adopts optic fingerprint sensor, which consists of high-performance DSP and Flash. Module is able to conduct fingerprint image processing, template generation, template matching, fingerprint searching, template storage, etc. Compared with similar products from other suppliers, KY-M6 proudly boasts of following features:

1. Proprietary Intellectual Property
2. Wide Application Range of Fingerprints with Different Quality
3. Immense Improved Algorithm
4. Flexible Application
5. Easy to Use and Expand
6. Low Power Consumption
7. Different Security Levels.

Fig 3 Fingerprint Sensor Module

The circuit is designed in such a way that the controller is interfaced to PC using serial communication technique. Serial communication is often used either to control or to receive data from an embedded microprocessor. Here the serial communication is established between the PC and the controller by a line driver IC max232 which acts as a voltage converter. And the loads will also be interfaced to the controller through relays. Depending on the input received from the PC, the controller will perform the predefined task of turning ON/OFF the loads. Here the front end application will also be developed on C# .NET platform for the visual effects so that the application can be easily accessed. And an LCD will also be interfaced to the controller to display the status of loads.

EXECUTION RESULTS

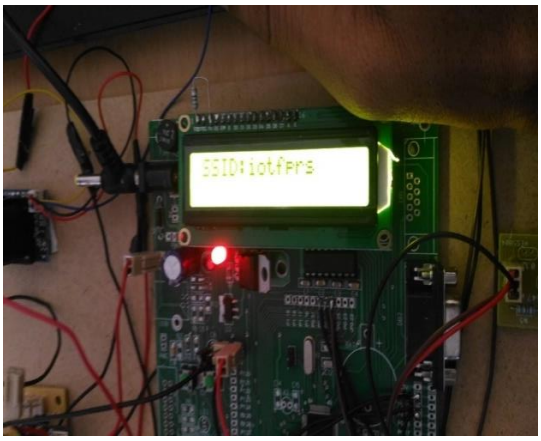

Fig:4 Photo of executed Result

CONCLUSION

The implementation of paper Enhanced Finger print and Trajectory Prediction for IoT Localization in Smart Buildings is successful.

We evaluated a novel method, named LNM, which uses NR signal fingerprint and Markov chain for localizing in smart building environment. The proposed fingerprint radio map building and localization techniques are based on the neighbour relationship. Our techniques provide robust and stable localization accuracy against device heterogeneity and environmental dynamics, which ensures the efficiency of localization. Experiments using heterogeneous smart phones have confirmed that LNM is feasible and reliable. LNM can achieve high localization accuracy. The paper Enhanced Fingerprint and Trajectory Prediction for IoT Localization in Smart Buildings useful in all applications where Trajectory prediction of pedestrians is required i.e., in industries, house hold purposes etc., We can also operate the electrical appliances by using Raspberry pie, Arduino and Internet of Things (IoT) technologies.

For future work, we will evaluate other mobile devices such as aero terrestrial drones (e.g., WiFiBot and Parrot) in complex buildings, as such smart objects will be used in the future smart buildings for supporting many activities (cleaning,emergency, disabled people support, and so on).

ADVANTAGES

- It provides robust and stable localization accuracy against environmental dynamics and device heterogeneity**.**
- It produces highly accurate data.

The major challenge of this paper need to explode in these areas:

- RSS value of an AP may vary with the environment and time.
- Due to the heterogeneity of devices, RSS measurement data may obviously vary even when the actual signal strength remains the same.

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