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IOT Based Product Tracking System

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Abstract:

In the fast moving world, the growth of technology is rapid and provides all necessary and effective solutions for the requirements. One of the most important areas of concern is security. Therefore, a product tracking system was developed along with a mobile application which provides data regarding the product movement, that is as the product being tracked moves out a particular area the application provides the location of the object. The IOT based product tracking system is a term that is used to wirelessly detect the products. The study helps to solve an issue of the Global positioning system which requires line of sight to determine the product in an indoor environment or inside a building. In this scenario, an IOT based product tracking system is developed to increase the safety of electronic devices and any valuable items through the technology of wifi along with kodular app inventor. The proposed implementation of IOT based product tracking to detect the product of users in indoor environment is based on two modes of Wi-Fi which are access point mode and station mode

The prototype implemented in this paper illustrates a simple path to detect the product's location within an organisation based on its available Wi-Fi network in its infrastructure . By using signal strength and histories of access points used by a stationary node we determine an approximate location in the services area. In our work an app was developed for location services to enable queries and manage the path and location.

Keywords — **IOT, Wifi access point mode, stationary mode**

I.   INTRODUCTION

IOT has become a part of our life in this evolving trend. Internet of Things (IOT) comprises many (mobile) devices which are used in daily lives. .This location-based service includes indoor product tracking. Moreover, analyses of personnel and product tracking and collecting movement data. With the increasing prevalence of global positioning system (GPS) applications, satellite

signals have had a significant impact on outdoor positioning systems because of higher accuracy. However, in indoor environments, indoor location and navigation remain unsolved problems. Because of such factors as multipath effects and Wi-Fi signal interference, satellite signals become unreliable for positioning indoors. Consequently, GPS-based indoor positioning techniques still face major

obstacles, including the unavailability or degradation of GPS signals, line of sight, real-world indoor environments, and low-grade devices.

The proposed IOT based product tracking system was developed to track objects motion using Wifi as a medium. The system consists of access point and stationary points through which the real time data will be stored in a database for instance google sheets then the data is used to develop an application, which can used to monitor the product movement.

The system was able to differentiate between two rooms based on the scanner that was placed in the respective rooms. A product tracking system improves the quality of equipment and inventory management. These systems track products and equipment using wireless networks providing real time data.

II. RELATED WORK

Internet of things (IOT) which is one of the hot topics in this fast moving world, the trend of IOT has taken its way in all the fields for instance healthcare such as wearables, education , inventory management etc. Number of device availing internet is increasing day by day and they are connected by either wire or wireless will provide a powerful information at our fingertips [1]. IOT comprises things which are connected by means of the internet, things are the representation of physical devices, assets, products , systems, people or processes that have properties and business logic .The things are equipped with sensors and or actuators so that they can recognize their surroundings they are termed as Nodes. Nodes are intelligent to measure and communicate parameters related to things. IOT contains a gateway which sits at the intersection of nodes and cloud. It aggregates and processes the information from multiple nodes and facilitates the data flow to the cloud . Gateway is capable of connecting to the node via specific protocols they perform tasks such as storing and parsing the information From the nodes,sending information over to cloud servers for processing ,helping in real time control over the devices in the field .To communicate between the nodes and gateways a wireless network is used for interconnecting devices

centred on an individual person's work space. In which connections are wireless some of the networking standards are Bluetooth ,zigbee, Wi-Fi which are for IOT applications , that have less range requirements like connecting peripherals wirelessly to a mobile device or home automation system transferring files or data transfer between various devices under vicinity. They have signal ranges in the neighbourhood of 100m indoor and 300m outdoor.

IOT platforms are a framework for data aggregation, which is a platform that connect devices to the cloud, to provide with the service and application , They are complex heterogeneous aggregation of components. It is designed to build and run the application of the connected world, manages device performance, analytics and create workflow.

Long range Communication protocols in IOT networks are thread and wifi Thread is originally from Nest Labs and is an IPv6 based protocol for Home Automation . Wifi is an edge computing protocol with a iEEE standard of 802.11, wifi contains different types of wireless technologies with varying ranges such as Proximity, WPAN (10-100m), WLAN (100-1000m), WNAN (5-10km), WWAN (100km).according to Wifi standards the wifi security are divided as follows wired equivalent Primary (WEP), Pre-RSN(Robust security network), Wifi-protected access(WPAN),

Wifi Protected access v2(WPA2)-post RSN, Wifi Protected access V3- WPA3 -208/19. There are three major "modes" a wifi-device can use such as wireless clients(station),Access points(master),ad-Hoc node (mesh).

Devices such as computers, tablets, and phones are common Clients on a network. When you are accessing a wireless hotspot, or the router in your home or office, your device is the client. This client mode is also known as "station mode" .Most wireless networks are made using Access Points - devices that host and control the wireless connection for laptops, tablets, or smartphones When a router is set up as an AP, it is said to be in "Master" or "Infrastructure" mode.An AP is sometimes a stand-alone device that bridges between a wireless and wired (Ethernet) network, or is part of a router. APs can cover a range of areas with a wireless signal, depending on the power of the device and the type of antenna. Some

wireless devices (laptops, smart phones, or wireless routers) support a mode called Ad-Hoc. This allows those devices to connect together directly, without an Access Point in-between controlling the connection. This forms a different type of network - in Ad-Hoc mode, all devices are responsible for sending and receiving messages to the other devices - without anything else in between, Ad-Hoc devices are used to create a Mesh network, so when they are in this mode, they are called "Mesh Nodes".

III.   METHODOLOGY

To implement an IOT based product tracking system we use Wi-Fi as radio-frequency technology for wireless communication that can be leveraged to detect and track the location of people, devices and assets, and can be easily activated for indoor positioning with existing Wi-Fi access points (APs) and hotspots[2].
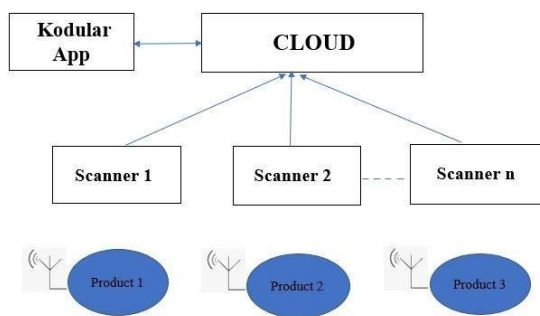

Fig. 1 Block Diagram

The features of this project is going to be the RSSI (received signal strength indication) of the known Wi-Fi networks.Wi-Fi indoor positioning solutions use existing Wi-Fi access points to tracking tags throughout indoor spaces. It collects the dBm (Decibel Milliwatts) value of the access point and converts into percentage by the following Eqn.1:

$$percentage = 2 * (dBm + 100) \qquad (1)$$

A.   Software Implementation

Location data is collected by the access points, or sent from APs to client devices, and is ingested by locating products. Wi-Fi positioning with access

points relies on the existing Wi-Fi infrastructures installed throughout indoor spaces to locate devices. This allows organisations to leverage their existing infrastructure to enable location-aware applications, with no additional hardware required. Building APs can detect transmissions from surrounding Wi-Fi.

Using the RSSI (received signal strength indicator) and MAC-address, the system can define exactly the current location of the user's device this location data is then sent to a server and central IPS and used to calculate a device's position. Devices, both on and off network.

The stationary device or the scanner device is setup inside a room that and then detects the access point present in that area and that is connected to the same AP that receive its signal as the product is scanned and collect data of scans available network around it but take only the device with initialised SSID on the product, these data is sent to a cloud server that is used as a database from which the data is filtered and displayed using kodular app[3].
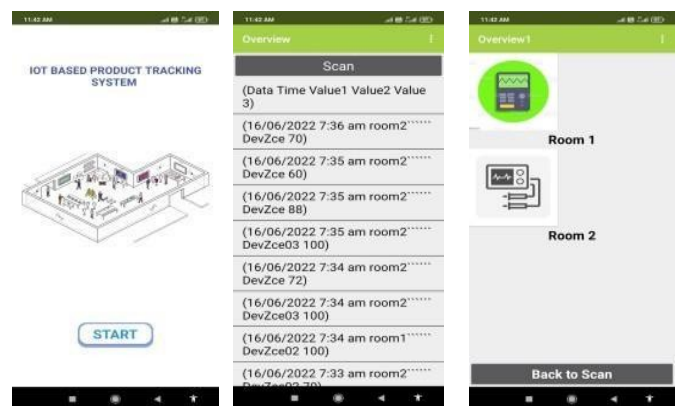

Fig. 2. IOT BASED PRODUCT TRACKING APP

As shown in Fig.2.The Kodular app is a platform for creating and designing apps where the program code is coded in a block format.An app was developed for fast and secure access of the product location.In this Kodular app the data filtered is separated to a different screen based on the scanner (i.e. room 1 or room 2) which scans the product and shows the real time data that is the time, date and name of the product (i.e. product 1or product 2 or product 3) is displayed which is in the room.

B.   Hardware Implementation

As shown in the Fig.1 there is scanner in each room the scanner consists of wifi enabled microcontroller i.e.esp8266 nodemcu which is connected to power supply.

On the product which we are going to track we placed an ESP 12e chip which we gave 3.7v power supply. This chip is programmed in such a way that the scanner only identifies the products. The fig.3 shows a prototype model of product tracking system.

Fig. 3 Prototype of Product Tracking Model

IV.   CONCLUSION

In this paper, we have presented a low cost and an efficient product tracking method. The product tracking system was developed to track different devices in different areas using wifi signal strength (RSSI). This system can be used in places where the gps signals are weak or cannot be reached for instance, inside a classroom or closed places in the absence of windows and we use this existing Wi-Fi infrastructure that is already installed within an organization [4].

V.   REFERENCES

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