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NFC Indoor Nook

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Abstract— Interaction in the Near Field With a range of less than 4 cm, NFC Technology enables wireless communication between common electronic devices in a secure, easy-to-use, and intuitive way. By touching their smartphones to other comparable objects that also have NFC applications, users of devices with NFC applications can quickly and simply use applications and data. The market for maps and map-related software is inundated with outdoor maps and services. The recent growth of the telecommunications network and mobile devices has raised the demand for indoor maps and indoor services, which in this work we refer to as indoor location-based services (indoor LBS). Technology and well-designed maps are needed to implement thorough interior navigation systems, especially for mobile devices. The wireless network must be able to handle these devices in a peer-to-peer fashion.

Keywords— Near Field Communication, Indoor Location-based Services, Nook

I. Introduction

NFC, also known as near-field communication, is a type of technology that will soon be required for every gadget. It combines RFID (Radio Frequency Identification) technology with mobile devices to enable communication between them simply by touching or bringing them very close to one another. NFC is utilized for more complex and secure transactions like contactless access or payment, whereas RFID is primarily used for applications like signaling or identifying products or people without a line of sight. NFC is the result of collaboration between Sony Corporation and NXP Semiconductors (formerly Philips Semiconductors). Near. field communication technology is already present in many smartphones, but due to a lack of public awareness, it is not being utilized all that much. However, because NFC is compatible in some form with practically every existing technology, it will soon be found everywhere in the world as the popularity and demand for android applications grows. In this essay, we will examine the various ways that NFC can communicate and function, as well as its benefits and potential drawbacks in comparison to other technologies, as well as its uses and potential improvements that the technology may require in the future.

II. Current Nfc-Based Sensing Technology

Facial expressions analysis/recognition is very active NFC-based sensors with a technological readiness level (TRL) of 7 or above that are currently commercially accessible. Examples include the wearable glucose monitoring system, FreeStyle Libre by Abbott, and the intraocular pressure sensor, Eyemate by IOP GmbH. Kraft Heinz Company has commercially tested NFC-based sensors for tamper-proofing and marketing in the food business. The academic community is looking more and more into NFC-based sensing technologies, with a particular emphasis on applications in food safety and healthcare. The most advanced technology in the field of health care is NFC-based wearable disposable sensors that resemble tattoos and use a thin, flexible polymer substrate (PDMS) that is bonded to the skin to deliver non-invasive, mostly biophysical readings. The exploration of non-invasive biochemical biofluid sensing is additionally hindered by poor durability, noise, and expensive production. For the purpose of identifying viruses like hepatomegaly, an electrochemical immunosensor based on NFC technology has also been created.

III. Nfc Modes Of Operation

Peer-to-Peer, Reader/Writer, and Card Emulation are the three operational modes of NFC. Since each NFC working mode has a different communication method and as a result affects the field of operation and usage areas differently, the NFC Forum was established in order to standardize and disseminate information about NFC.

Figure 1: Modes of Operation (Sources: NFC-Forum)

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IV. Indoor Navigation System

Localization and indoor positioning are two issues with indoor LBS(Location Based Service). Since GPS signals cannot pass through solid objects like buildings, we need to use other technologies for interior localization, which have overdeveloped in recent years. We require a graph for routing inside the buildings as well as the user's updated position for indoor navigation. In contrast to outdoor placement where the user uses a 2D or 3D map, textual directions, and spoken instructions, the user has more communication options when using the system indoors, including a map, textual instructions, spoken instructions, augmented reality, signs, and rotating campus. In our work, we provide a greater emphasis on route communication for campus maps on mobile websites and indoor positioning systems in campus areas.

V. Implementation Of NFC

A. Robustness

NFC-based sensors' integrity may be jeopardised by medical sensors' propensity for deformation. To make traces for NFC tags, metals like GalnSn and EGaln alloys can be placed into soft polymer microchannels with a minimum bending radius of 0.15mm9. These traces can then be stretched, compressed, and folded. For low-margin, high-volume applications, such food quality sensors, the cost of disposable NFC-based sensors needs to be close to zero. Flexible synthetic (PET) or natural (cellulose) substrates with metal traces can be produced at low cost as a component of packaging, but sensing components and electronics continue to be the most expensive component. Additionally, films that are a component of the package can be employed to overlay sensors with protection. Most NFC-based sensors depend on microcontroller-based multi-component designs, but a large gap remains between available and required technologies due to the high initial investments needed for the development of ASICs.

B. Environmental Considerations

Nowadays, NFC-based sensors are environmentally friendly, non-toxic, biodegradable, and sustainable materials, such that cellulose paper, copper and silicon or ceramics, and others. When non-biodegradable materials must be used, designs that maximize overall recyclability should be selected. Delamination of sensors should be considered in cases where non-recyclable sensors are attached to recyclable packaging and NFC is a good replacement of it.

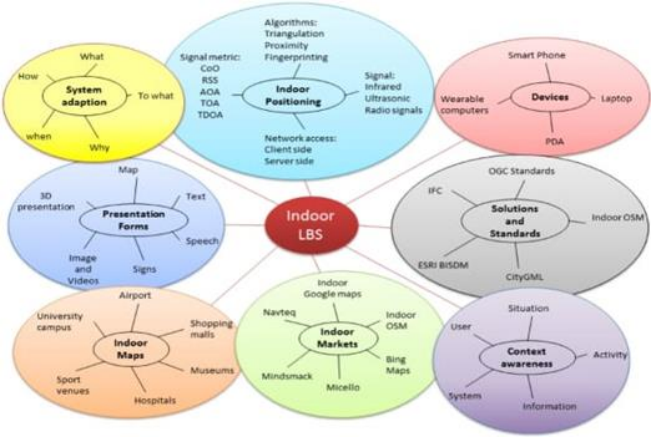

Figure 2: Indoor Location Based System Research Data

VI. Future Scope And Road Ahead

Sensing Indoor navigation systems are intended to guide users in enclosed spaces like gymnasiums, hospitals, or classrooms [6] and to assist in object tracking using wireless ideas, optical tracking, and ultrasonic techniques. Sensors, Infrared (IR), Ultra Wide Band (UWB), Wireless Local Area Networks (WLANs), Wi-Fi, Bluetooth, Radio Frequency Identification (RFID), Assisted GPS (A-GPS), and other technologies have all been developed for use in interior environments up to this point. Actually, the demanding requirements for the majority of indoor navigation applications cannot be met by current navigation technologies Positioning systems research has recently gained popularity in academia and industry, and there are now a number of research and commercial products in this area. Due to the inaccessibility of GPS in indoor settings, as described in the Introduction section, indoor navigation systems have recently become a particularly popular research topic. A variety of technologies have been tested, and new concepts for indoor navigation have been created in the literature with the intention of overcoming this performance issue.

1) Request from the user the destination data

2) Determine the shortest route between the user's present location and the desired location while taking their navigation preferences into consideration

3) Give the user real-time instructions so they can follow the best way possible.

4) When a Location Tag is tapped on a smartphone, update the user's location.

5) After touching a new tag with the smartphone, recalculate the shortest route between the current location and the desired location.

6) Using DR technology, determine the user's general

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location by calculating their steps and assuming which way they are travelling.

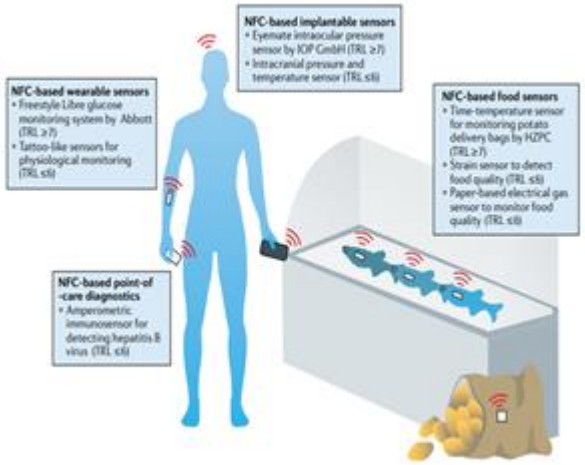

Figure 3: Near-field communication-based sensors in health care and food quality monitoring

VII. Future Scope And Road Ahead

Sensing based on NFC is still in its early stages. In the future of the "connected" technological revolution, NFC's capacity to enable completely new sensing concepts will probably be crucial. However, issues with materials and production still need to be resolved in order to translate lab prototypes into marketable goods. It's interesting how the COVID-19 epidemic emphasises the necessity of contactless interactions outside of payment systems (from no-touch shopping to wireless diagnostic diagnostics), which will likely hasten the development of NFC-based sensing technologies. Additionally, as NFC places a strong emphasis on data security, NFC-based sensors may be combined with high-security technologies like blockchain to construct reliable, automated, and networked sensing systems. The integrity, accessibility, and efficiency of the food and healthcare systems would all be improved by this combination.

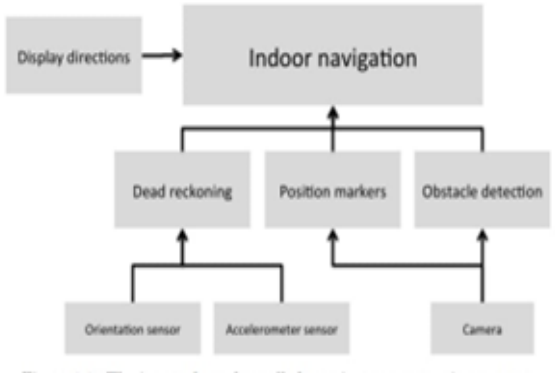

Figure 4: The image shows how all the main components integrate to make the final indoor navigation system.

VIII. Conclusion And Future Scope

The near field communication (NFC) technology is already starting to influence how electronic devices will function in the future. It operates on the same principles as RFID technology, which establishes communication between closely spaced, 13.5MHz electrical devices using magnetic field induction as a medium. NFC has advantages and disadvantages of its own, but as the number of Android applications grows, it will be necessary. Users will first worry about the security of their personal information kept on NFC devices; therefore, it is a must for smart phone applications, and consumers need to be made aware of how it operates.

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