

Indoor Mapping and Navigation

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Abstract— Now a day's indoor mapping and navigation is an important issue and day by day its necessity is increasing. In recent times the concept of indoor mapping has gained great popularity. In this project, we present an indoor mapping and navigation system. The proposed indoor mapping and navigation system consists of a circuit made up of arduino UNO and tweeters as transmitters and our mobile phones as receivers. The different arduino UNO circuits will generate different frequencies corresponding to different rooms and because the mobile phone is so ubiquitous these days, it is the perfect receiver and users can use our application to recognize the 'required' room/shop. The android application has three basic modules which form the basis for receiving the frequency and displaying it. Towards the end, the project discusses the working of the prototype of the system that proves the correctness of the proposed method.

Keywords: Indoor Mapping and Navigation

I. INTRODUCTION

The main aim of this project is to generate an indoor map by using transducers as transmitters and a mobile phone's microphone as a receiver. As we are using frequencies of above 19kHz which fall under the inaudible range, it will not annoy people in the vicinity and will serve the purpose of giving us the checkpoint. Mobile phones have an in-built microphone receiver which will help us to detect the frequency of the sound generated and map that particular frequency with a checkpoint, for ex: a particular lab or classroom. The advent of google maps has made our lives a lot easier but navigating our way through large buildings, universities, supermarkets, airports is still not possible using these applications. Hence, this project aims to make indoor navigation the norm by making it very easy for people to find their way in such places. An indoor positioning system (IPS) is a system used to locate objects or people inside a building using lights, radio waves, magnetic fields, acoustic signals, or other sensory information. There are several commercial systems on the market, but there is no standard for an IPS system. Indoor positioning systems use different technologies, including distance measurement to nearby anchor nodes (nodes with known fixed positions, e.g. Wi-Fi / Li-Fi access points or Bluetooth beacons), magnetic positioning, dead reckoning. They either actively locate mobile devices and tags or provide ambient location or environmental context for devices to get sensed.

II. METHODOLOGY AND IMPLEMENTATION

The transmitter will emit waveforms which have frequencies above 18kHz using the circuit in the figure. As the mobile phone can detect frequencies above 18kHz unerringly, the different transducer circuits will be tuned to produce frequencies of 18, 19, 20 kHz and so on. Each of the mono audio amplifier circuit will produce a sinusoidal waveform of a particular frequency. Mobile phone receives the frequency using in-built Microphone. It will check the database and

display the room/lab/classroom which is mapped to the corresponding frequency. The Arduino circuit required to generate different frequencies has been successfully simulated using National Instruments MultiSim software. Initially, an online tone generator was used to produce these frequencies and were received faithfully using an application on the mobile phone. It has also been successfully implemented using the required hardware and it has been seen that the frequency detector application can detect these set of frequencies accurately and reliably.

III. ADVANTAGES

A. Safety

External power adapters can free product designers from worrying about some safety issues. Much of this style of equipment uses only voltages low enough not to be a safety hazard internally, although the power supply must out of necessity use dangerous mains voltage. If an external power supply is used (usually via a power connector, often of coaxial type), the equipment need not be designed with concern for hazardous voltages inside the enclosure. This is particularly relevant for equipment with lightweight cases which may break and expose internal electrical parts.

B. Heat Reduction

Heat reduces reliability and longevity of electronic components, and can cause sensitive circuits to become inaccurate or malfunction. A separate power supply removes a source of heat from the apparatus. DC in an external adapter, at a safe distance from noise-sensitive circuitry.

C. Weight and Size Reduction

Removing power components and the mains connection plug from equipment powered by rechargeable batteries reduces the weight and size which must be carried. supplies can be replaced quickly by a user without the need to have the powered device repaired.

IV. APPLICATION

- 1) Provides a better experience for shoppers makes it easier, faster and more convenient for shoppers to find stores and products that are of interest to them.
- 2) Builds sales and increases shopper satisfaction Reduces the number of shoppers who leave a mall without making a purchase because they are unable, frustrated or lack the time to find the stores and products they are seeking.
- 3) Enhances mall loyalty Provides an enhanced shopping experience as compared to kiosks, information desks and text for- location services. These positive benefits enhance a shopping mall's brand equity.
- 4) Increases rental revenue an enhanced shopping experience brings in shoppers. Additional shoppers attract more retail tenants and allow malls to command higher rents.

- 5) Serves as the foundation for geo-targeted mobile ads and analytics

V. CONCLUSION

This prototype aims to solve the problem of indoor mapping and navigation by using different frequencies at different checkpoints and receiving them on a mobile phone and mapping it to a particular room. It's a proof of concept that the frequency above hearing range can be used into something useful. After doing study on indoor mapping and navigation project it is found that indoor mapping and navigation system can be introduced in our country and it will be beneficiary in the context of our country. The main benefits are better user experience and consequently time saving. It is eco-friendly and consumes less power. There is less maintenance cost for this system so it helps the property developer in cost saving. It reduces the hassle of searching for a classroom in a university or a shop in a shopping mall. It will benefit the property developer to increase their revenue which will add to the government tax revenue. So in a way it is also helping the government by increasing tax revenue. It will also encourage innovative engineering in our country which will help make advancements in increasing usage of technology. Therefore, we should introduce indoor mapping and navigation and enjoy the benefits.

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