**18ECP78 - Project Synopsis**

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| **Wireless Acoustic Data & Image Transmission Over Handheld Transceiver** | |
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**Introduction**

The digital divide between urban and rural areas is now attracting active research. There are a host of reasons for this divide and this paper presents the work in progress about one proposed solution to a major technical problem causing this. It has been noted that the high frequency WiFi and similar signals are not well suited for the wilderness type of environment with dense foliage. Additionally, such terrains also impose stringent restriction on computational and electric power as well as in cost. This calls forth the need for a new type of signal that can work efficiently in such environments and a low cost, low bandwidth, low frequency signal that can possibly work is identified in the form of Sound. This paper presents a new network architecture that is designed to work with the low frequency, ubiquitous signals such as sound. The architecture can work in peer-to-peer ad-hoc networks mode, infrastructure mode, broadcast mode (for remote telemetry) etc. using wideband multi-channel transmission. However, since the proposed architecture uses low frequency signal, it is expected to deliver low throughput as well. Using an ubiquitous signal such as sound makes the entire process very cost effective as it eliminates the need of expensive transceivers. There is an ever growing technological divide between the urban and rural technological framework. We see the urban front growing in leaps and bounds, fueled by the large economic resources and wide user base, resulting in improvements in speed, reliability and cost. The rural environment does not have these financial resources, and with some added technological limitations that makes it almost impossible to adopt the urban technologies leaves this front struggling to establish basic minimal connectivity. This divide is not conductive for total economic and social development and progress of the world at large and therefore research in this front is of paramount importance. The terrain and sparse user base of the jungle type of environment makes it extremely ineffective to set up wired infrastructure for network connectivity and hence the better option in terms of cost effectiveness and reach is using wireless. However, the dense growth of bushes drastically reduces the range of high frequency RF signals used by WiFi, 3G etc. These are also high energy signals, greatly depreciating the usability as the terrains pose serious limitations to the rages of these signals. It is therefore desirous to have a low energy, low frequency, ubiquitous signal. Sound is a good candidate for such requirements, given its ubiquitous presence, low energy and low frequency, allowing it to traverse very well over obstacles. However, the ubiquity of sound also leaves us open to handle a lot of “noise” as well. The previous studies have analyzed and proven that sound can be used as a carrier signal for wireless data communication, studied the noise profiles in various environment to gather idea on efficient signal-to-noise ratios and to aid identification of appropriate channels for communication, and a survey to identify sound perception of various frequencies by humans so that the channel used for data transmission causes minimal intrusion to the environment of use. This paper furthers with the architecture for a model designed for the purpose. The ensuing sections of the paper is organized as related works, the proposed signal (sound), the design, its philosophy and application and conclusion and future Works. Advances in communication technology have made it easier and faster to share and/or transfer information. High volumes of data can be communicated through data transmission systems such as a local or wide area network (for example, the Internet), a terrestrial communication system or a satellite communication system. These systems require complicated hardware and/or software and are designed for high data rates and/or long transmission ranges. For transfers of data at close proximity or short distances, such as between a personal computer and personal data assistants (PDAs), the systems above may be an inconvenient communication medium for users because of the complexity, delay and often the cost involved in accessing the systems.

Accordingly, other communication systems have been developed using communication medium such as radio frequency (RF) or Infrared (IR) to transmit data. However, these systems require specialized communication hardware and/or interfaces, which can often be expensive and/or impractical to implement. Non-wireless connections can also be used to transfer data. However, to use non-wireless types of connections, users must physically have as well as carry wires or cables and make the physical connections for communication. This can be burdensome and inconvenient to users. Therefore, there is need for a less complex, yet user-friendly, inexpensive and/or efficient way to share and/or transfer information

**Literature Survey**

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| Sl. No. | Author | Title | Year | Inference |
| 1. | Dr Daniel Jones | Chirping Communication – Sending Data Over Sound | October 8, 2017 | Designing a sound based networking infrastructure, to provide an alternative to wireless RF comms protocol |
| 2 | Dr. Hamada Esmaiel  ,Junfeng Wang, Naveed Ur Rehman and Zeyad A. H. Qasem | Underwater Image Transmission Using Spatial Modulation Unequal Error Protection for Internet of Underwater Things | October 2, 2019 | Providing an algorithm for encoded image classification and performing the next generation of the underwater acoustic communication techniques that would be focused on improving transmission data rate to support real-time underwater multimedia applications |
| 3 | Kuruvilla Mathew, Biju Issac and Tan Chong | Ubiquitous Text Transfer Using Sound a Zero-Infrastructure Alternative for Simple Text Communication | 2014 | The paper discusses the successful transfer of text data between smart devices using sound as the signal, making use of the built in speaker and microphones as the ubiquitous hardware. The experiment created two Smartphone apps. a sender and a receiver, encoded the data using frequency encoding of ASCII value of each character with a frequency space between each subsequent value. |

**Challenges**

* + Difficult to transmit sound over large distances.
  + Degradation and dampening of sound with terrain change.
  + Only 64x64 px image can be converted to sound, any higher or lower it creates interference with intended application.
  + Conversion of image and video data is taking 10 -30min.

**Motivation**

* + Communication systems have been developed using communication medium such as radio frequency (RF) or Infrared (IR) to transmit data. However, these systems require specialized communication hardware and/or interfaces, which can often be expensive and/or impractical to implement.
  + It has been noted that the high frequency WiFi and similar signals are not well suited for the wilderness type of environment with dense foliaCursive handwriting makes the separation and recognition of characters challenging.
  + Underwater communication is still a big challenge due to the oceanic environment physical characteristics.
  + The project has an immense potential in military applications from data communication(text, audio , image, video) without internet to industrial production setups to sensing of foreign aliens.

**Objectives of the Project**

* + To convert the images to sound and vice versa.
  + To encode, encrypt and emit the data (text, audio, image, video) over handheld transrecievers

**Methodology**

Diagram

Description automatically generated

**Possible Outcomes**

* Images, text and audio are transmitted on sound waves in wireless comms architecture.
* Images are converted to sound and make them non detectable to sensors.
* Network sniffing and packet tracing is not detected in the case of sound waves , to ensure a secure transmission of data .

**References**

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* Madhavapeddy, A.; Sharp, R.; Scott, D.; Tse, A.; , Audio networking: the forgotten wireless technology, Pervasive Computing, IEEE

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| **Acceptance by the Guide :**  This project is accepted and will be carried out under my supervision.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Guide Name :  Signature: |