UBIQUITOUS TEXT TRANSFER USING SOUND

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INTRODUCTION

- Ubiquitous Computing
  - Unobtrusive
  - Small
- Ubiquitous Signal for Networking
  - Sound?
- Experimentation and results
- Conclusion and future work

THE UBIQUITOUS WAY

- Unobtrusive technology that hides into everyday life
- “Dust”, “Skin” and “Clay”
  - Dust: Micro sized particle computing devices
  - Skin: Fabric computing that weave into wearable formats
  - Clay: 3 D solid hold able solid objects
- Emphasis on
  - smaller
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- Very small form factor
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- Possibilities
  - Applicable in limited infrastructure environments
  - Broadcast message service in crowds (malls/ events)
  - Low power signal => low power requirements
  - Possibly improved penetration and acceptance

THE IDEA

- Use audible sound to accomplish text transfer
- Encode the text as beeps
  - encoded as frequencies
- Support ASCII character set
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$$f = (a + sh) * g \quad (1)$$

f: frequency in Hz,
a: value in ascii,
sh: Freq Shift
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  - Formula for ASCII to frequency values
    - Apply frequency shift ‘sh’ to select sonic range
    - Apply frequency gap ‘g’ between each consecutive ASCII value

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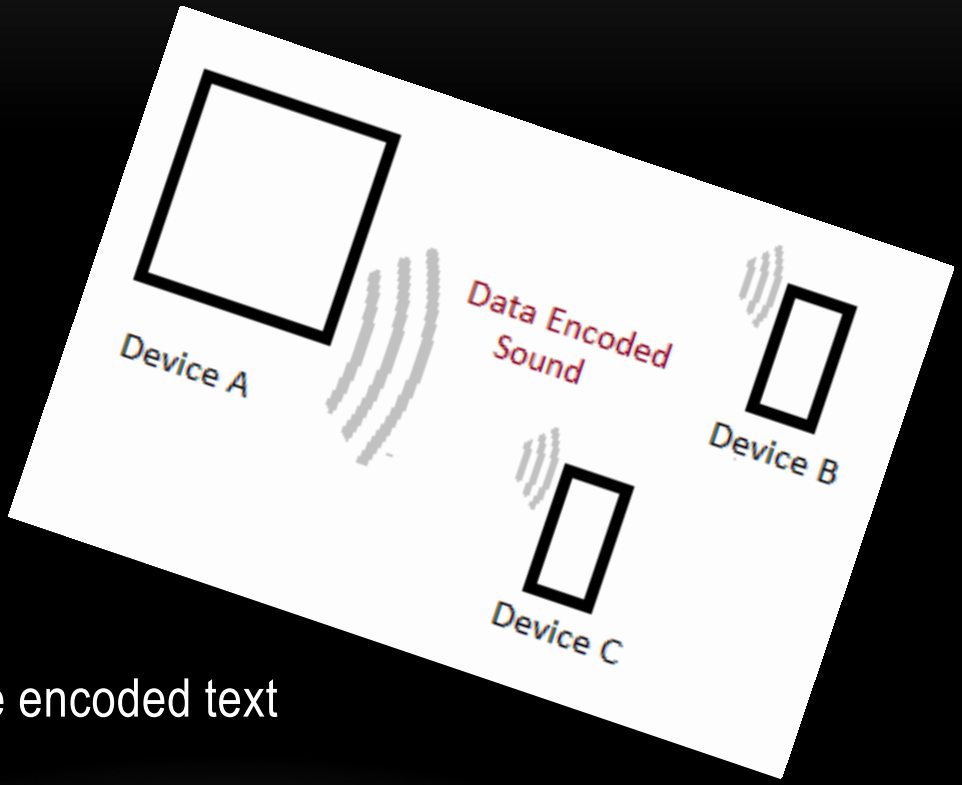
THE EXPERIMENT – COMPONENTS

- Device A
  - Transmitter
- Device B, C etc.
  - Receiver (s)
- Data signal
  - Sound waves – the encoded text



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- Receiver app
  - Record sound using built in mic
  - FFT to identify frequency
  - Decode frequency to text

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THE EXPERIMENT – PARAMETERS

- Frequency Shift
  - To shift the start frequency by adding a value to the converted code
- Gap
  - Gap between two code values.
    - Larger gap proved to get a better result
- Spectrum Range
  - From Start frequency value to ascii code count times gap
  - Eg: A = 65, B=66, C=77 (ASCII)
    Becomes (65 + 100) * 10 = 1650 Hz, (66+100)*10=1660 Hz etc.
  - Range
  - ascii 0 to 127 $\Rightarrow$ (0+100)*10 = 1000 Hz to (127+100)*10 = 2270 Hz

THE EXPERIMENT – RESULTS

- Table: Experiment result
- Random testing using various frequency gaps

TABLE 1: TEST CHARACTER TRANSMISSION RESULTS

	Success Rate with steps of				
Sl No :	*Test Condition*	*3 Hz*	*5 Hz*	*7 Hz*	*10 Hz*
1.	'A', 'E', 'J', 'O', 'T', 'Z'	18%	88%	100%	100%
2.	'0', '5', '9'	33%	100%	100%	100%
3.	'A' to 'Z'	-	98%	100%	100%
4.	'0' to '9'	-	96%	100%	100%
5.	Random characters	-	82%	98%	100%

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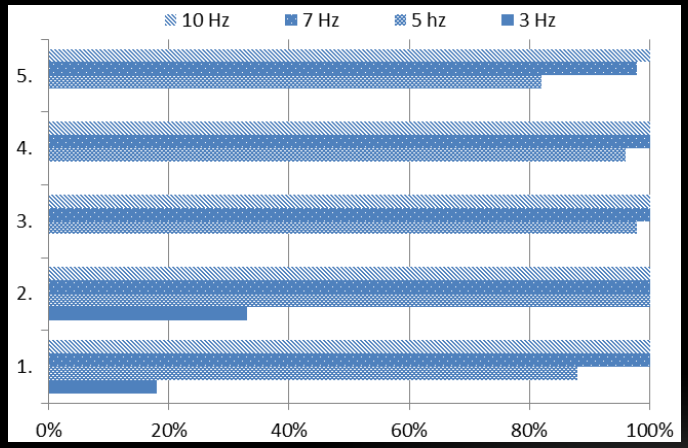

- Chart: comparison of results
- Linear increase of success rate as frequency gap increases

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REFERENCES AND ACKNOWLEDGEMENTS

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