Bluetooth Enabled Panic Button for Potential Rape Victims

Participated in & did the coursework [Y/N]?

GUEVARRA, Alnair M. (11524855)   Y
HERNANDEZ, Roy Stephen A. (11530731)   Y

LAGMAN, Maria Josefa M. (11531029)   Y
MOLINA, Adam M.(11539607)   Y

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1 CONSPECTUS

1.1 What are the objectives of the coursework?

1) To assess any Digital Communications Technology (DCT) to be used in marginalized sector.

2) To modify the DCT appropriate to the selected marginalized sector.

3) To appraise the economic, societal, and environmental implications of the modified DCT.

1.2 How does the coursework fit with the course and previously done coursework?

By:

1) Involving the modification of a communication platform between potential rape victims and emergency contacts

2) Using digital communications theory to enhance performance of data transmission for the protection of app users.

1.3 How were the objectives achieved?

By:

1) Targeting the marginalized sector of the DCT which are potential rape victims.

2) Modifying the multiple access method used by bluetooth from FH-CDMA to TDMA

1.4 What are the key results and generalizations?

The key results are:

1) To help the master (rape victim) in a Piconet maintain more than one connection simultaneously.

Coursework Starting Date: July 13, 2018
Submission Date: August 18, 2018

2 CONCEPTS AND PRINCIPLES

2.1 What are the necessary and relevant concepts and principles for understanding the coursework and for supporting the correct results?

1) Mastery of how Bluetooth works and its specifications

2) Knowledge about different techniques used in Multiplexing methods

3) Clear understanding of Frequency Hopping Spread Spectrum (FHSS)

4) Basic concepts about bluetooth connections

2.2 How does any new component, not covered in previous coursework, function?

By:

1) Overlaying Time Division Multiplexing (TDM) on bluetooth connections.

2) Incorporating frequency hopping with TDM for simultaneous data transmission

3) Synchronizing a master device with the other two devices through the use of frequency hopping.

2.3 What figures, equations, and/or tables could support your answers in Sec. 2.1 and Sec.2.2?

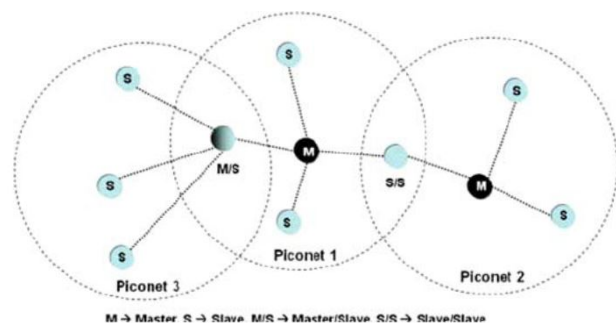1) The figure below shows an example of a wireless connection between a single or multiple devices using bluetooth

M → Master S → Slave M/S → Master/Slave S/S → Slave/Slave

Figure 1. Piconet

2) The figure below shows a block diagram implementation for frequency hopping code.
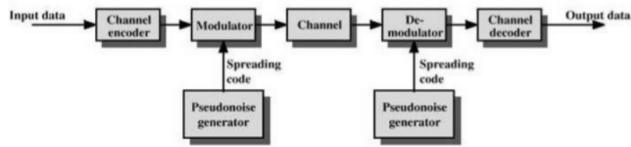
FHSS Block Diagram

Figure 2. Block Diagram of FHSS

2.4 Did you cite more than two publications in your answers in Sec. 2.1. and 2.2

Yes

2.5 Did you cite any online source in your answers in Sec.2.1 and Sec.2.2?

Yes.

3 METHODOLOGY

3.1 How does your implementation in Sec. 3.5 achieve the objectives?

By:

1) Simulating the performance difference between CDMA and TDMA

3.2 Why does your implementation in Sec. 3.5 achieve the objectives?

Because:

1) The application of TDMA simplifies the point to multiple-point connections

2) Multiple-point connections can help the rape victim reach out to a lot of contacts simultaneously

3.3 How does your evaluation in Sec. 3.6 achieve the objectives?

By:

1) Up to two lines per item.

2) Up to two lines per item.

3.4 Why does your evaluation in Sec. 3.6 achieve the objectives?

Because:

1) Up to two lines per item.

2) Up to two lines per item.

3.5 Implementation

Rule of thumb: Implementation is how you made your work; (keywords: implemented, created, made, soldered, programmed, etc.).

3.5.1 What were the materials used?

If the presentation would be better and necessary, tabulate your answers here instead of enumeration.

1) Bluetooth Module

2) Arduino

3) Push Button

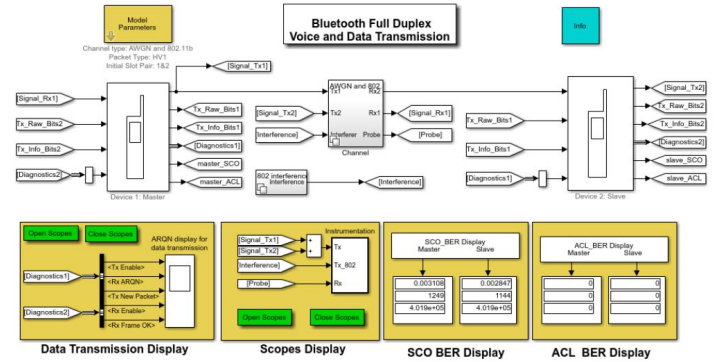*3.5.2 What is the summary of the processes used to make the coursework?*

Figure 3. An example of bluetooth module in SIMULINK to be used for DCT

1) Overlaying of bluetooth protocol to hardware device.

2) Master device shares different hopping code for each slave devices.

3) Each slave devices are independent of each other.

3.6 Evaluation

Rule of thumb: Evaluation is how you tested your work for correctness; (keywords: measured, tested, compared, simulated, etc.).

Table 1
Pseudocode for the calculation of $y = x^n$

Input(s):		
n	:	nth power; $n \in \mathbb{Z}^+$
x	:	base value; $x \in \mathbb{R}^+$
Output(s):		
y	:	result; $y \in \mathbb{R}^+$

Require: $n \geq 0 \vee x \neq 0$
Ensure: $y = x^n$
1: $y \Leftarrow 1$
2: **if** $n < 0$ **then**
3:     $X \Leftarrow 1/x$
4:     $N \Leftarrow -n$
5: **else**
6:     $X \Leftarrow x$
7:     $N \Leftarrow n$
8: **end if**
9: **while** $N \neq 0$ **do**
10:     **if** N is even **then**
11:         $X \Leftarrow X \times X$
12:         $N \Leftarrow N/2$
13:     **else** $\{N$ is odd$\}$
14:         $y \Leftarrow y \times X$
15:         $N \Leftarrow N - 1$
16:     **end if**
17: **end while**

3.6.1 What were your procedures for evaluating the correct outcome of your coursework?

1) Up to two lines per item.

2) Up to two lines per item.

3.6.2 What quantities were gathered and how have you obtained them for testing the veracity of your results?

1) Up to two lines per item.

2) Up to two lines per item.

4 RESULTS AND DISCUSSIONS

4.1 How do the results achieve the objectives?

By:

1) Showing that TDMA was more efficient compared to CDMA. With this, the modified DCT would highly benefit the marginalized sector.

2) Proving that TDM and FDM overlays protocol are beneficial to helping the device to be able to connect to more than one data connection to other devices simultaneously

3) Knowing that using bluetooth modules with modified DCT is better than using other modules such as GSM/GPRS because the marginalized sectors are able to get more benefits with less expenses.

4.2 Why do the results achieve the objectives?

Because:

1) The results achieve the objectives by means of economical because the marginalized sector will consume less on the device due to the cheaper module that will be used;

2) Bluetooth is environmental because it does not release any ionizing radiation, hence being harmless as compared to other radiations that is used by other modules;

3) In addition, the project device overall is societal because of its objective to prevent harm that may be inflicted by rape victims.

4.3 Are all you results correct in accordance to what you described in Sec. 3.6 evaluation process? Why?

Yes, because:

1) the researchers were able to overlay TDM with FHSS and showed a simulation of it.

2) A full duplex system between a master and slave device was made using SIMULINK
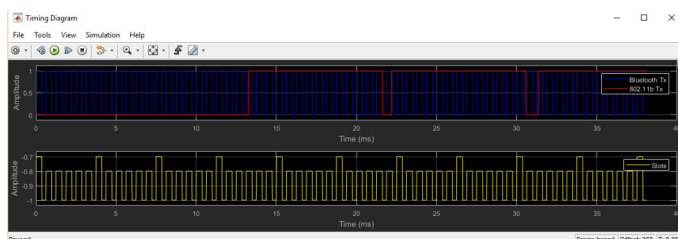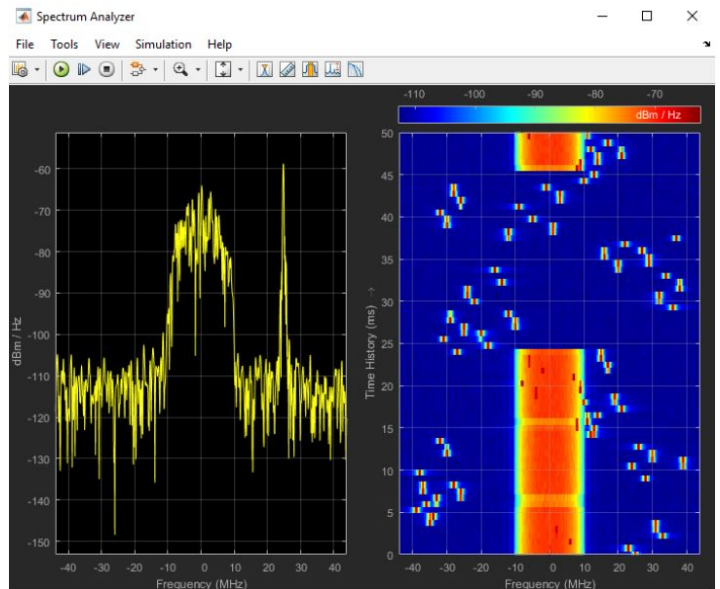
4.4 What

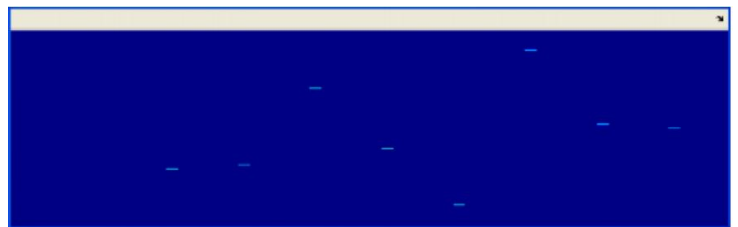Figure 4. Timing Diagram

Figure 5. Spectrum Analyzer

Figure 6. Hopping Spectrogram output for connection 1
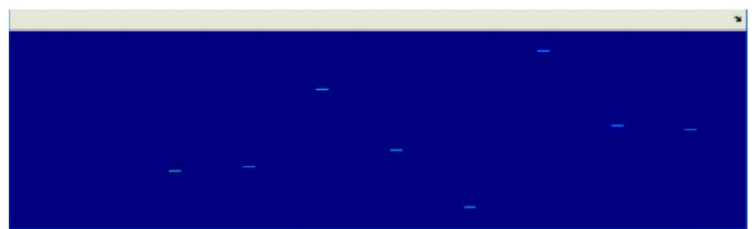
1) dfdfdf

2) dfdf

3) dfd

Figure 7. Hopping Spectrogram output for connection 2

4) dfd

4.5 Did you cite more than two publications in your answers above (yes/no)?

Yes.

5 CONCLUSIONS

5.1 What are the main points that should be known, remembered, and learned about the coursework?

1) Up to two lines per item.

2) Up to two lines per item.

5.2 What are the gists of the inferences drawn from your results?

1) Up to two lines per item.

2) Up to two lines per item.

5.3 Briefly, what are your comments on (1) your results, and (2) future coursework if any?

1) Up to two lines per item.

2) Up to two lines per item.

REFERENCES

[1] A. Einstein, "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]," *Annalen der Physik*, vol. 322, no. 10, pp. 891–921, 1905.

GRADING RUBRIC FOR THE PROJECT

CRITERIA	EXEMPLARY 4 (Exceeds Expectations) (all checked boxes → exemplary)	SATISFAC-TORY 3 (Meets Expectations)	DEVELO-PING 2 (Below Expectations)	BEGIN-NING 1 (Not Acceptable)	RATING
Concrete understanding	☐ 1. Are key points that should be known, remembered, and learned about the coursework correct? ☐ 2. Is the gist of the inferences drawn from the results accurate? ☐ 3. Are the necessary and relevant concepts and principles for understanding the coursework and for supporting the correct results accurate and structured with logical reasoning? ☐ 4. Does the coursework show that it is (or are the answers) on target with sound rationale, backed by strong comprehension, and defended well?	More than half of the exemplary checklist has been met	Half of the exemplary checklist has been met	Less than half of exemplary checklist has been met	_____
Articulateness in communications	☐ 1. Does the coursework show that it has not committed plagiarism? ☐ 2. Is the presentation of information logically structured, mutually exclusive, and/or collectively exhaustive (should it be necessary)? ☐ 3. Are data, figures, tables, equations, abbreviations, and notations properly labelled and neatly presented? ☐ 4. Is the report (written and/or oral) made according to suitable and/or technical standards and set format? ☐ 5. Are literature or source references properly cited? ☐ 6. Is there absence of verbosity?	More than half of the exemplary checklist has been met	Half of the exemplary checklist has been met	Less than half of exemplary checklist has been met	_____

Competence in applying principles	☐ 1. Are methods for achieving the coursework objectives properly selected?
	☐ 2. Is the implementation of the methods successful?
	☐ 3. Is the evaluation for testing the correctness of the results appropriate?
	☐ 4. Are the required output and deliverables met according to the set requirements?
	   ☐ 1. Do the results show evidences of all the project objectives being attained?
	   ☐ 2. Does the documentation discuss how the topic developed historically from the past until now?
	   ☐ 3. Does the documentation discuss how the topic developed technically from the past until now?
	   ☐ 4. Did the proponent(s) define their project entirety into a manageable structure?
	   ☐ 5. Did the proponent(s) sequence their project activities correctly?
	   ☐ 6. Did the proponent(s) estimated the project duration properly?
	   ☐ 7. Did the proponent(s) develop their schedule well?
	   ☐ 8. Did the proponent(s) perform schedule control?
	☐ 5. Are encountered problems, like source of errors, clearly identified and addressed by sharp and logical investigative and observational skills?
	☐ 6. Does the submitted coursework match academic honesty standards?
		More than half of the exemplary checklist has been met	Half of the exemplary checklist has been met	Less than half of exemplary checklist has been met	_____

Remarks:				**Grade:**	= _____ / 12 = _____ %