1. Technical Report

Typically the following components will be present in the TR:

• Title Page (include the following):

◊ Your name, current OACETT designation (if any), and membership number

◊ Title should be brief, ten words or less.

◊ Date of submission• Declaration of Joint Authorship2/5/2018

# Proposal for the development of Project: LIT

Prepared by Ryan Antolin, Aldo Ndreu  
*Computer Engineering Technology Students*https://github.com/AldoNdreu/SensorEffectorProject

**Executive Summary**

As a student in the Computer Engineering Technology program, I will be integrating the knowledge and skills I have learned from our program into this Internet of Things themed capstone project. This proposal requests the approval to build the hardware portion that will connect to a database as well as to a mobile device application. The internet connected hardware will include a custom PCB with the following sensors and actuators Speaker Bonnet & FM Tuner Evaluation Board - Si4703. The database will store FM radio stations, and possibly favorited stations.

Database Used: Firebase. The mobile device functionality will include Setting or selecting different FM radio stations, Favorite different FM radio stations, Displays song or station currently playing and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department SparkFun Electronics (For Parts), Elmwood Electronics (For Parts), Prototype Lab (For Extra Help). In the winter semester I plan to form a group with the following students, who are also building similar hardware this term and working on the mobile application with me FM Tuner Evaluation Board (Aldo Ndreu), Speaker Bonnet (Ryan Antolin). The hardware will be completed in CENG 317 Hardware Production Techniques independently and the application will be completed in CENG 319 Software Project. These will be integrated together in the subsequent term in CENG 355 Computer Systems Project as a member of a 2 or 3 student group.

**Background**

The problem solved by this project is This project which we will be creating will be able to connect to a speaker via FM Radio. How this will work is by taking a mobile device and connecting to the database in order for the FM Radio stations to play through the speaker bonnet.. A bit of background about this topic is One of the products being used will be the FM evaluation board tuner chip. This device does more then tuning into FM stations, it can also detect both data service and radio broadcast data service. It can also be used to display station id and song to the user as well as have great filtering and carrying detection. This board will be able to pick up multiple radio stations and makes a great tool in order for it to be implemented with a Raspberry Pi. By using a speaker bonnet that acts as the output for this sensor, that is the primary source in which the sound will be coming from. It will amplify the audio so it can play in areas that you usually cannot hear with your mobile speakers..

Existing products on the market include [1]. I have searched for prior art via Humber’s IEEE subscription selecting “My Subscribed Content”[2] and have found and read [3] which provides insight into similar efforts.

In the Computer Engineering Technology program we have learned about the following topics from the respective relevant courses:

* Java Docs from CENG 212 Programming Techniques In Java,
* Construction of circuits from CENG 215 Digital And Interfacing Systems,
* Rapid application development and Gantt charts from CENG 216 Intro to Software Engineering,
* Micro computing from CENG 252 Embedded Systems,
* SQL from CENG 254 Database With Java,
* Web access of databases from CENG 256 Internet Scripting; and,
* Wireless protocols such as 802.11 from TECH152 Telecom Networks.

This knowledge and skill set will enable me to build the subsystems and integrate them together as my capstone project.

**Methodology**

This proposal is assigned in the first week of class and is due at the beginning of class in the second week of the fall semester. My coursework will focus on the first two of the 3 phases of this project:  
 Phase 1 Hardware build.  
 Phase 2 System integration.  
 Phase 3 Demonstration to future employers.

*Phase 1 Hardware build*

The hardware build will be completed in the fall term. It will fit within the CENG Project maximum dimensions of 12 13/16" x 6" x 2 7/8" (32.5cm x 15.25cm x 7.25cm) which represents the space below the tray in the parts kit. The highest AC voltage that will be used is 16Vrms from a wall adaptor from which +/- 15V or as high as 45 VDC can be obtained. Maximum power consumption will be 20 Watts.

*Phase 2 System integration*

The system integration will be completed in the fall term.

*Phase 3 Demonstration to future employers*

This project will showcase the knowledge and skills that I have learned to potential employers.

The brief description below provides rough effort and non-labour estimates respectively for each phase. A Gantt chart will be added by week 3 to provide more project schedule details and a more complete budget will be added by week 4. It is important to start tasks as soon as possible to be able to meet deadlines.

CanaKit Raspberry Pi 3 Complete Starter Kit - 32 GB Edition - The platform in which we will be doing this project on.

SPARKFUN FM TUNER EVALUATION BOARD - SI4703 - Enables users to tune into FM radio stations.

JUMPER WIRES - CONNECTED 6" (M/F, 20 PACK) - Used for connection between breadboard where sensor is attached to Raspberry Pi 3.

Adafruit I2S 3W Stereo Speaker Bonnet for Raspberry Pi - Mini Kit - Speaker used for amplyifing audio from the Raspberry Pi 3.

**Concluding remarks**

This proposal presents a plan for providing an IoT solution for Our end solution and goal for this project is to use an amplified speaker and output the radio signal stations from the FM Radio sensor.. This is an opportunity to integrate the knowledge and skills developed in our program to create a collaborative IoT capstone project demonstrating my ability to learn how to support projects such as the initiative described by [3]. I request approval of this project.

**References**

[1] Bluetooth in wireless communication. (n.d.). Retrieved September 18, 2017, from http://ieeexplore.ieee.org/document/1007414

[2] SparkFun FM Tuner Evaluation Board - Si4703. (n.d.). Retrieved from https://www.sparkfun.com/products/12938

[3] Institute of Electrical and Electronics Engineers. (2015, August 28). IEEE Xplore Digital Library [Online]. Available: https://ieeexplore.ieee.org/search/advsearch.jsp

[4] Lumpkins, W. (n.d.). The MobiAria Wireless Bluetooth Speaker. Retrieved September 18, 2017, from http://ieeexplore.ieee.org/document/6685931

[5] Bodson, D. (n.d.). Digital Audio Around the World. Retrieved from http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5641649

[6] Pauli, M. (2017, May 5). Miniaturized Millimeter-Wave Radar Sensor for High-Accuracy Applications. Retrieved from http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7885501

• Abstract (also known as a Summary or Executive Summary or Foreword)

◊ An accurate condensation of the TR. State the main idea or thesis by answering

questions such as:

 What is the TR about?

 Why is it significant?

 What should I do about it?

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• List of Illustrations or Diagrams (if any)

# Introduction (Including the problem statement)

◊ What is the technical problem?

◊ Why was the work described in the TR undertaken?

◊ What is included and/or omitted? What is the scope of the report and what procedures

are used?

◊ What is your objective?

◊ What unique problems were encountered in doing or interpreting the work?

◊ Are there unique approaches in the study?

Body (Content) (discussion of the problem with diagrams, illustrations, tables, calculations,

observations, etc.) with section headings

# Conclusion(s)

◊ A conclusion interprets the data found in the Body. It is reasoned judgment and not

opinions. Consider the variables. Relate cause and effect. Analyze, evaluate, make

comparisons and contrasts. Base the conclusion on fact.

• Recommendation(s) (if any)

◊ Recommendations are not required for all studies. They suggest a course of action and

would generally be provided when there are additional areas for study, or if the reason for

the TR was to determine the best action going forward.

• Bibliography (Technical References)

• Appendices (including detailed calculations, tables, drawings, specifications, technical literature,

acknowledgements, etc.)