

# CS486C – Senior Capstone Design in Computer Science

## Project Description

<b>Project Title:</b> <i>Mobile Device Android App Controlling Radio Modem</i>	
<b>Sponsor Information:</b>  <b>GENERAL DYNAMICS</b> Mission Systems	Dr. Glen Abousleman, Senior Distinguished Member of the Technical Staff Tactical Algorithms Laboratory General Dynamics Mission Systems <a href="mailto:Glen.Abousleman@gd-ms.com">Glen.Abousleman@gd-ms.com</a> 480-441-2193  William Fahrenkrog, Software Engineer General Dynamics Mission Systems <a href="mailto:William.Fahrenkrog@gd-ms.com">William.Fahrenkrog@gd-ms.com</a> 480-441-2804

### Project Overview:

*This project develops and demonstrates an Android App that runs on a Smartphone or Tablet for controlling a Radio modem for tactical applications. The motivation for this project is to implement functions that make it easier and faster for the Smartphone User to send or receive situational awareness information. For example, the User could take a photograph and initiate sharing it to the radio app to be sent by the radio. Received files from the radio could also be downloaded to the smart phone and viewed on the smartphone or tablet. The App makes for a better User experience, integrating with Mobile Device functions such as Camera, Text, etc. to share information directly to the Radio Modem. With the App, users would also be able to select a Radio Waveform, provision that waveform (select frequencies, keys, codes, etc.), as well as using the Radio to transfer files, or conduct streaming video or audio operations. Since the App runs on Android, it would operate on devices that the User is already using for cellular communications.*



Project: Develop an Android App to Control and Exchange Information with a Software Defined Radio

*The Radio Modem includes a Remote Control Interface that the App operates with. The App translates User actions into command and data messages between the Android mobile device and the Radio Modem. The existing Interface Control Document and Host C Language source code would be provided by GDMS.*

*The App would be implemented in Android Studio or an equivalent development environment. For the project's development and demonstration, the Radio Modem is emulated with an existing Radio Simulator to be provided by GDMS.*

*The App will need to have the following features:*

- *The app needs to have the look and feel of an email application. Our existing mobile web application should be used as a model for this effort.*
- *Command and control of the radio will use the existing remote control interface for the radio.*
- *The app needs to present sharing a file to the Radio app as an option for the User when using other applications such as a camera or photo application.*
- *The app needs to be able to "Receive file requests" from other android applications. MVP would be integrating it with Android's default in camera/photo application.*
- *Sharing a photo would open the radio application with the photo attached in an outgoing email where a user can then complete the email text.*
- *The app should provide status to the User that the file is*
  - *Queued for transmission*
  - *Has been transmitted*
  - *Has been successfully received*
  - *Incurred transmission errors*
    - *Send failure/timeout*
    - *Sent but no acknowledgement*
    - *Received but received file has errors*
- *The app should allow the queuing of up to 10 emails with files attached, with a maximum file size of 20MByte per file.*
- *The app should also have a control function allowing a user to choose from a list of "Presets" for the radio to use. Presets configure the radio for a specific operation.*

*Students will learn the following:*

- *Students will apply and practice software development in an Android/Mobile Device environment*
- *Students will learn details about the control and use of a tactical Radio Modem*
- *Students will get experience with Human Machine Interface design in a Mobile Device environment*

*General Dynamics is one of the largest defense contracting firms in the country. We tackle technical issues in many areas from sea, land, cyber, and space. Our current emphasis in the radio space is providing custom, secure communications capabilities to special users throughout the world.*

**Knowledge, skills, and expertise required for this project:**

Background information required to successfully execute the project includes:

- *Software Engineering*
- *Background with Mobile Device Apps*
- *Familiar with C Language*
- *Familiar with Mobile App Languages such as Java or Java Script*

**Equipment Requirements:**

Equipment to be provided by GDMS is as follows:

- *Android mobile devices (phones). One per team member developing software*
- *Licenses (as required) for Mobile App Development Environment*
- *Computer/Laptop*
- *Wi-Fi capability for Computer/Laptop*
- *Radio Modem Remote Control Interface Document (GDMS provided)*
- *Radio Modem Remote Control C Language API Source Code (GDMS provided)*
- *Radio Modem Ubuntu simulator Virtual Machine (GDMS provided)*
- *Screen shots of existing Mobile Web Screens (GDMS provided)*

## **Software and other Deliverables**

Project deliverables are phased through the two-semester sequence and include:

- *Demonstration of the Android Mobile App using a Mobile Device and the Radio Simulator*
- *A Demonstration Report documenting what worked, end Product Change Requests, recommendations for future efforts, etc.*
- *Source code and associated scripts, make files, etc. allowing GDMS to build the App with the necessary tools*
- *Design documentation for the Android App*
- *Design Review material*

## **Other Requirements:**

- *US Citizenship*