11.0 Results and Discussions

11.1 General Project Outcomes

By no means is the MAIDS system perfect and further improvements are required. However, the project managed to accomplish the outcomes described below.

11.1.1 Surveillance Capabilities

Motion and sound sensor devices within MAIDS cause the initiation of a local audible/visible alarms and notification events.

11.1.2 Multi-channel Alerts

Transmission of alarm alerts to home/business owner, police department or central monitoring station via email (with picture), Android Push Notifications, SMS Messaging and phone calls.

11.1.3 Sound Sensing Unit

A sound sensing device that has the ability to detect continuous attack noises in the audio frequency range up to 10 kHz.

11.1.4 Motion Sensing Unit

A motion sensing device that has the ability to detect distinguish between object movement and human movement, cover a motion cone of 110°, distance of up to 7 meters within operating temperature from -20° to +80° Celsius and low power consumption of 65 mA.

11.1.5 Signal Processing Circuitry

Provides separate signal processing circuitry for independent sensing microphone and PIR motion sensor.

11.1.6 Intrusion Alarm System

Intended for use in intrusion alarm systems to provide premise-protection (home/business) of spaces and other secure areas

11.1.7 Visual Capabilities

The camera takes a photographic record of the event and intruder when the alarm is activated providing a caption containing time of entry, place of entry and address of home/business. Photographic/video record is included in email message to the owner and can help law enforcement track down potential criminals or trespassers.

11.1.8 EMI Resistance

A sound sensing device that will not enter the alarm state when subjected to moderate levels of radiated electromagnetic fields and conducted interference.

11.1.9 Reliability of the device

MAIDS performed reliably in 50 out of 54 trial runs.

11.1.10 Control Unit

Raspberry Pi 4, Python Code and Sound/Motion sensing devices that provides the electronic circuitry to process the signal from the sensor and initiate an alarm signal when attack noises are detected.

11.1.11 Secure Mode (All-Safe Mode)

Sound/Motion sensing system where all sensors and control unit are active and ready to respond to attack sounds and motions.

11.1.12 Strategic Placement of Components

Electronic alarm sensors strategically placed so that they can monitor conditions that require security alerts.

11.1.13 Enclosure Protection

Designed MAIDS case to protect equipment from damage.

11.1.14 Web-based Intrusion Database Log

Designed and implemented a web-based intrusion database log developed with PHP and MySQL.

11.2 Project Issues/Challenges

A few issues and challenges were encountered during the design and implementation of the MAIDS project which gave way to possible future improvements.

11.2.1 Project Issues

1. Sensitivity Adjustments: Adjusting the sensitivity of the motion sensor can be tricky with the sensor's potentiometer.
2. False Alarms: Improper installation of the device (common traffic area/improper heights) can lead to a false detection caused by the movement of objects such as pets, blinds, and curtains within the range of a motion detector. The implementation of AI in MAIDS, as discussed below, can reduce false alarms considerably.
3. Overlapping Traces: PCB board design has to take into consideration short-circuits created between overlapping traces. Therefore, overlapping traces should be placed in different layers.
4. Sensor Threshold: Adjusting the sensor's threshold of allowed movement so that small movements in the room from events such as blind movement do not constantly set the alarm system off.

11.2.2 Project Challenges

1. **Environmental Impact:** New standards and regulations require electronics designers and manufacturers to consider the environmental impact of a product's entire life cycle. MAIDS tried to consider every aspect, from the manufacturing process, chemicals and tools used, to consumer energy use and disposal of the product.
2. **Stringent Quality Control Methods: For MAIDS, i**t is important to produce good quality products. Consumers want electronic products that operate the way they should. Therefore, MAIDS implemented strict quality control measures to ensure the consistent quality of all the products produced.
3. Lack of skills: A lack of appropriate skills and an understanding of embedded technology can become an important issue in the design process. MAIDS strived to understand the embedded technology used (Raspberry Pi 4) and the associated GPIO pins, as well as, learn and apply the skills (i.e. CAD design, 3-D printing, soldering, etc.) required by the project.
4. On-time Delivery of Project: There is an inherent pressure to deliver projects quickly. Therefore, lead times become a primordial concern.

11.3 Project Lessons

11.3.1 Design Lessons

In order to minimize the design risk, MAIDS minimized the design complexity. Using electronic modules, as MAIDS has, for instance, was the common way to reduce the design complexity and risk.

11.3.2 Soldering Lessons

The following are lessons learnt during the soldering process that are important to follow.

1. Set the tip temperature to the temperature appropriate to the solder alloy being used.
2. Use lead-free solder; healthier for the people working on the project and for the environment.
3. Place component and fix two opposing corner pins.
4. Clean the solder-well tip on a sponge.
5. Do not over tin the tip with solder
6. Remove flux residue if necessary.

11.3.3 Breadboard Building Process Lessons

The following are lessons learnt during the breadboard building process that are important to follow.

1. Breadboard circuits should only be used for designing and testing circuits outside of cases and housings, before you move on to a soldered version.
2. Tools are not needed most of the time, however, it is helpful to have a pair off tweezers or needle-nose pliers to handle some smaller components.
3. Component insertion into the breadboard must be done by pushing the component leads into the breadboard holes straight down and trimming them if they are not the right length.
4. Always pay attention to component and cable management in general, especially when it comes to arranging jumper wires. Otherwise, one will end up with a tangled, disorganized board.
5. Jump wire kits can provide the various lengths and color-coding options that will help organize a project as the project gets more intricate.
6. Do not wire individual components directly to power source. Instead, use the power rails.
7. A digital multimeter should be used often to check connections between holes and rails.

11.3.4 PCB Board Lessons

The following are lessons learnt during the PCB board design process that are important to follow.

1. Draw and overview plan of where the different circuit components will be located.
2. Allow adequate board area for the circuit.
3. Do not place traces at right angle.
4. Ensure same orientation while placing components.
5. Keep power and control ground separate from each other.
6. Allow sufficient space for cooling around hot components.
7. Consider track size for lines carrying current.

11.3.5 Project Documentation Storage Lessons

Perhaps the most important lesson of all regards the project's documentation storage. Storage and backup of the project's documentation should be paramount at any stage. These documents must be kept in a secured storage area and include availability redundancy.

While document storage might seem somewhat inconvenient, costly, and rather time-consuming, the loss of a project's documentation will cost a great deal more, not only to the project designers, but for the partners, clients and staff as well. Using a secure document storage facility is the safest, easiest and most cost effective way to ensure proper storage of documents. Therefore, MAIDS made use of OneDrive by Microsoft and GitHub to secure and store all documentation pertinent to the project. There is nothing more frustrating and catastrophic than losing all the documentation about a project due to human error, data loss or corruption, theft, sabotage or malware attack.

11.3.6 Technical Lessons

During a project's life cycle, it is important to ensure consistent and timely progress reporting. Furthermore, the accuracy of the information and report data must be guaranteed. Finally, one needs to anticipate and exploit evolving technology.

11.3.7 Organizational Lessons

Organizational lessons include the need to clarify project and functional roles and responsibilities and understand the skills required. Also, we need to heed and measure the capacity to develop the project successfully. Finally, it is important to establish a consistent reporting process that can be used to improve decision making.

11.3.8 Marketing and Sales Lesson

Creating something great is not the path to success. Creating something great and being able to market and sell it is the key to success.

11.3.9 Final Lesson

The key to business success is always to build, test, learn, and repeat.

11.4 MAIDS Project Proposed Improvements

In order to further improve the MAIDS system, the following subsequent improvements should be undertaken:

1. Tamper Proof: Provide some type of alert if the alarm device has been tampered with or opened.
2. Protective Covering: Provide protective covering for surface-mounted contact switches, wire connections, and wire distributions. These protective coverings must be strong enough to withstand damage due to collisions and bumps.
3. Power Supply/Batteries: Alarm sensors need a power supply that cannot be interrupted. Backups and/or batteries will be required.
4. 2-way calling: Configured to allow two-way calling with your alarm company. This will allow you to speak to your security system provider without picking up the phone.
5. Away Mode: Provide and automatic Away Mode - the system assumes that you are out of the house, and will therefore enable all sensors between certain daily hours.
6. Central Monitoring: Provide a central monitoring station connected to the home/business security system for action in times of emergency.
7. Keypad Authentication: Addition of a keypad for authentication, arming/disarming of MAIDS.
8. Add-ons and Integrations: Allow users to create custom zones using a combination of sensors and cameras.
9. Future Technology Implementation: Concerns about future technology developments, including component obsolescence, can render an entire product

difficult to sell. The MAIDS project tried to mitigate component obsolescence by incorporating the latest available modules into its construction.

10. Future Programming Implementation: In order to thrive in there is an inherent need to keep on top of programming developments. MAIDS should be updated to use the Paramiko library which implements the SSH2 protocol as an alternative to SSL for making secure connections between python scripts. All major ciphers and hash methods are supported. SFTP is also supported by Paramiko.
11. Emerging Artificial Intelligence (AI): Emerging technologies like AI can disrupt industries as well as providing new opportunities. For example, MAIDS video camera should be updated with AI with facial recognition functionality to identify whether the moving object is an intruder or a home member. This will provide a new mechanisms that improves accuracy in detecting intrusion into the home while reducing the chance of false alarms.

11.5 Project Best Practices

In order to have MAIDS function properly, the following best practices should be implemented upon deployment of the system.

1. Optimal Placement: The optimal place to install MAIDS is in a corner, so the 90 degrees of coverage run along each wall, effectively covering the maximum amount of space.
2. Optimal Angle: Motion detectors take a longer time to react to someone walking in a straight line directly towards the motion detector's lens, therefore, motion detectors are best suited to detecting movement made across the room, parallel to the lens.
3. Minimum Height: Install motion sensors at a height between 7 and 8 feet above the ground pointing downwards at an angle to cover the room.
4. Pet Proofing: Pet-proof motion detectors require a minimum of six feet between the motion detector and the animal to be effective so base your height placement on the height of your cat/dog at his tallest point when standing or jumping, depending on temperament.
5. Designated Surveillance Areas: Confine pets to areas that are not covered by your motion sensors while you are away.

12.0 Conclusions

Mass production (also referred to as flow production, repetitive flow production, series production or serial production) is the process of manufacturing large quantities of a product employing computerization technology. In mass production, automation is used to achieve high volumes, organize material flow, and control quality standards. Mass production "…provides a rigorous way to monitor production resulting in lower costs, use of fewer resources, high levels of efficiency, quick assembly, prompt distribution and marketing creating a competitive advantage and higher profits" (Banton, 2020). Unfortunately, there are also disadvantages such as a significant upfront investment of time, money and resources. Therefore, it is imperative that a balance be obtained.

12.1 Before Mass Production Starts

It is recommended, before the MAIDS device is mass produced, that the following initial steps be taken into consideration and implemented:

1. Market Research: Attending industry trade shows will provide an idea as to the viability for product sales. It will provide an idea on which side of the market spectrum the MAIDS device will be placed successfully.
2. Securing Some Early Funding: It is imperative that production costs be considered. Providing the necessary capital for the first production run may include one or a combination of the following: personal wealth, find and investor or take out a bank loan.
3. Implement a Non-Disclosure Agreement (NDA): Implement an NDA (non-disclosure agreement) in place: Have people sign it to prevent people that know details of the MAIDS device from stealing the idea or telling others about it.
4. Learn About Certifications Required: In Canada, all products are regulated by some sort of federal, state and/or local agency that prevent the manufacturer from breaking any rules. It is imperative to learn about the certifications required for the particular product before starting the project. Implementing national standards assure consumers that the MAIDS device meets consistent and uniform rules but might prove too costly or unattainable.
5. **Licensing:** One major decision to make is whether to produce and sell the product yourself or license the idea to a company with the means and experience to handle it. The company handles everything – the manufacturing, marketing, distribution – and then pays you royalties based on sales. No upfront investment is required.
6. Setup a Formal Business Structure: A sole proprietorship is a business that is owned by one person and it is the easiest, least expensive type of business to

start. It is advisable that MAIDS start with a sole proprietorship, but switch to an LLC before beginning to sell it.

12.2 Mass Production Cost Considerations

Most entrepreneurs drastically underestimate all of the costs required to develop, scale and manufacture a new electronic hardware product. This is one of the main reasons so many businesses ultimately fail. Therefore, one must give careful consideration to the costs outlined below.

12.2.1 Development Costs

Development costs for most hardware products are broken down into three categories: the electronics, the plastic and other mechanical parts, and the retail package. The electronics does all of the magic, the plastic and mechanical parts hold the product together, and the retail package protects and sells the product.

12.2.2 Electronics Cost

The electronics will usually be the most complex and expensive part of your product to develop, unless, one does their own product design. Prototyping the electronics is divided into two steps: production of the blank Printed Circuit Board (PCB) and soldering of all the electronic components onto the PCB. The PCB is what holds and connects all of the individual electronic components. So in most cases, it is bets to use standard through-hole vias. In the MAIDS project, the ratio of electronic prototyping costs to board assembly costs were 1:2. So, it is recommended that small prototyping quantities are produced initially and then potentially increase the quantity through each iteration. Once functionality has been confirmed and bugs have been resolved it is recommended that prototype quantities be increased and samples shared with investors and potential customers.

12.2.3 Enclosure/Mechanical Development Cost

MAIDS will require an enclosure which is made of plastic. The appearance and ergonomics of the MAIDS device are critical for the product, and in turn, will increase design costs. It is recommended that 3D printing technology be used to bring down the cost of creating plastic prototypes, it provides fast turn-around time (less than 24 hours) and lower costs when small volumes are required, as is the case during the design phase of the project. Therefore, it is recommended that a 3D printer be purchased as the most cost effective strategy.

In regards to mass production, it is recommended that injection molding be used because it is the most economic option, due to mechanisms of economies of scale. Injection molding refers to the "…process of creating a components by injecting under pressure melted material into a die. The material fills the hollow cavities of the mold and when it cools it solidifies, taking the form of the die." (Varotsis, 2020) Injection molding can yield very high production rates.

12.2.4 Scaling Costs

From prototypes to large volume production there is a big difference. Mass production must take into account scaling costs but oftentimes it is one of the most underestimated steps in launching a new product. Scaling costs include: certification costs,

12.2.4.1 Manufacturing Setup Costs

For MAIDS, it is recommend to start the manufacturing process with a local manufacturer within Canada. When manufacturing volumes approaches more than ten thousand pieces, then migrate to an Asian manufacturer. It is also recommended that help from experts in Asian manufacturing is sought when the time comes to shift production to an Asian country. Consequently, it is recommended that MAIDS use multicultural marketing resources, such as Expert's Directory (a resource that features a range of ad

agencies, marketing, research, communications and PR firms, media companies, consultants and others), who are experts in outreach to all Asian segments. See appendix X for a partial list of Asian Market experts.

12.2.4.2 Certification Costs

Products require multiple certifications before they are release into the Canadian and American markets. Certification costs may be a few thousand dollars or as high as a few tens of thousands of dollars. It depends largely on the product and to a large extent how any wireless features are implemented. The main certifications required by the MAIDS system include:

1. FCC (Federal Communications Commission) Certification: It is required of all electrical products sold in the U.S.A. All electrical products radiate electromagnetic energy so governments want to ensure they do not interfere with RF communication. MAIDS is classified as an intentional radiator product (they intentionally radiate radio waves) and therefore will cost about ten times more than non-intentional radiator products. In order to reduce costs pre-certified modules (an electronic circuits developed to perform a single function and to be incorporated into other designs) will be used. At higher production volumes wireless module should be transitioned to a custom wireless design to increase profit margins.
2. Underwriters Laboratories (UL) or Canadian Standards Association (CSA) certification is required for any product that will be sold in the USA or Canada that plugs directly into an AC electrical outlet. This cost can be removed by selling the product online. However, UL and CSA certifications will be required when sold in large retail chains. The recommendation for MAIDS is to start with online sales,

wait to see if the product sells well, and if it does, move to retail stores (a step which will then require certification costs, not before).

3. CE certification is necessary for electrical products that will be sold in the EU (European Union). It is similar to a combination of FCC and UL certifications. Since California is a huge market, MAIDS should be CE certified.
4. RoHS certification guarantees that the product is free of lead and is necessary for any electrical product that will be sold in the European Union (EU) and California. MAIDS should be RoHS certified to instill on the customer the company's regard for the environment.

12.2.4.3 Landing Costs

No doubt about it, the landed production cost is the most important cost for the MAIDS project. The landed production cost is the total cost to produce and transport a single unit to the warehouse. MAIDS will always be striving to reduce this cost so the company can ultimately achieve greater profits. For most products, one can estimate the suggested sales price to be 3-5 times the landed production cost. The landed production cost will definitely be the most important cost since it determines the profit, sales price and inventory cost of the MAIDS system. Some of the many costs that make up the landed production cost include:

1. Electronic Costs
2. PCB production and assembly
3. Injection molded plastic parts
4. Final Product Assembly
5. Testing
6. Packaging
7. Returns
8. Freight
1. Duties

12.3 Retail Package Development

The retail package is just as important as the product itself. Sometimes it is even more important. One can have the greatest product in the world but if the retail package does not convey this point to the customer, the product will not sell. Since the MAIDS device is small it is recommended that clamshells be used. Clamshells consists of two parts: a custom shaped plastic piece to hold and protect the product, and a cardboard artwork piece to convey the sales message. A reduction in cost can be achieved by using a custom molded blister (the part of the clamshell that custom fits over your product). Blister packaging is an inexpensive option for creating packages that are durable, transparent, and tamper proof. In addition, the clamshell insert card can also be printed on regular paper prototypes to reduce costs further.

12.4 MAIDS Retail Price Determination

Choosing MAIDS retail price is a very important consideration that should be addressed promptly. If the price is too low, the MAIDS project would not make sufficient profit. It the price is too high, the MAIDS device will not sell. The strategy for the MAIDS device is to set the price high so that if need be the price could be lowered later on. This is a tricky situation because if the price is too high sales might not recover even after lowering the price. In order to estimate the optimal price for the MAIDS device it is imperative to know how much the device costs to make. Calculating the cost of the device is called Cost-of-Goods-Sold (COGS). In order to calculate the COGS all the costs to produce the MAIDS device are added up. These costs include the following:

1. Electronic components (sensors, connecting wires and pins)
2. Production of your Printed Circuit Board (PCB)
3. PCB Assembly (soldering of components onto the PCB)
4. Enclosure Plastic Parts (injection molded plastic)
5. Product assembly
6. Product testing/Quality control
7. Import and/or export duties and taxes
8. Warehousing and logistics

Estimation of the abovementioned costs allows one to decide if the MAIDS device will be profitable before spending money in development.

12.5 Product Positioning

The MAIDS device will target the elderly market. This demographic market includes elderly families that want a trained professional installing their alarm system in a large home with a substantial number of doors and windows and a secluded garage door. At the same time, one must not alienate the millennial and younger generation since they are the homeowners of the future.

12.6 Distribution strategy

Initially, the best distribution strategy for the MAIDS device is web-based. In other words, sell the MAIDS device via a website. Selling the product in this manner will increase profits more than selling it through a retail store because one can charge a lower price; the profit margin is greater without a retailer taking a cut. Eventually, MAIDS is likely to move up to selling in retail outlets and through multiple distribution channels.

A Family Security Blog (FSB) can greatly assist in building brand awareness and product audience. Within the blog, one can provide valuable free content, such as, MAIDS product information, discussions regarding the alarm industry and areas of expertise. The point of the blog is to present the MAIDS project as an expert in the field, collect email addresses for advertising and selling purposes, product validation and obtain feedback on the product.

12.7 Social Cost of Mass Production

There are political, economic and social costs that need to be taken into account as a responsible MAIDS device manufacturer. These costs include:

1. Misuse of natural resources
2. Pollution generated by factories and transport of goods
3. Pollution generated by plastic
4. Electronic Waste Created
5. Greenhouse gases generated
6. Water Pollution

These factors must be given careful consideration because of the political, social and economic problems that might arise.

Therefore, taking a responsible approach to MAIDS manufacturing the MAIDS project assumes an extended producer responsibility (EPR). ERP is a "…practice and a policy approach in which producers take responsibility for management of the disposal of products they produce once those products are designated as no longer useful by consumers. Responsibility for disposal may be fiscal, physical, or a combination of the two." (Surak, 2020)

12.8 Minimizing Risk

The MAIDS device is successful if the costs and time put into it are minimized from the very beginning. The MAIDS project minimizes risk by employing the following criteria:

1. Minimize complexity by using modules (i.e. sensors, LED module, etc.)
2. Use standardized communication protocols such as Wi-Fi or Bluetooth that require standard electronics
3. Use pre-certified and tested modules
4. Minimize Certification Costs
5. Review the MAIDS device with an independent engineer to mitigate issues.
6. Review it to make sure that there aren’t any issues.
7. Simplify the Enclosure
8. Focus on minimizing the total cost you have to spend upfront

Prescreening Checklist

1. Has a Proposal for a Technology Report been submitted and accepted and a copy of the approved proposal included in the Technology Report?	Yes, a proposal for a technology report was submitted, accepted and included in the Technology Report.
2. Has the Technology Report been submitted within one year since the proposal was approved?	Yes, it was submitted within a year since proposed.
3. Is the Technology Report consistent with the Proposal (as approved and with the comments and suggestions made by the proposal reviewer)?	Yes, it is consistent with the proposal.
4. Is the Technology Report typed, double-spaced and justified left?	Yes, the report is typed, double-spaced and justified left.
5. Has a 12 point Arial, Univers, or similar Sans Serif font been used?	Yes, and it uses 12 point Arial font.
6. Is the body of the report a minimum of 3,000 words?	Yes, however, it is much more extensive than the 3000 word requirement.
7. Are the components included and in the following order: Title Page; Declaration of Authorship; Approved Proposal; Abstract/Executive Summary; Table of Contents; Lists of Illustrations/Diagrams; Body of the TR; Conclusion(s), and if applicable Recommendation(s); Bibliography/Technical References; and Appendices?	Yes, most section are present in the report except for: approved proposal.
8. Is there a signed Declaration of Authorship?	Yes, it is present and conforms to OAECTT requirements.
9. Is the report dated?	Yes, it is dated and conforms to OAECTT requirements
10. Is the Technology Report current? (The Technology Report should be less than 5 years old.)	Yes, it is less than five years old.
11. Is there a Title Page?	Yes, it is present and conforms to OAECTT requirements
12. Is there a Table of Contents?	Yes, it is present and conforms to OAECTT requirements
13. Does the Table of Contents correctly reflect the Components: Headings, Illustrations/Diagrams and Appendices?	Yes, the table of contents correctly reflects all sections of the report accurately.
14. Are the pages numbered with appropriate page breaks?	Yes, they are and conforms to OAECTT requirements

15. Is there an Abstract/Executive Summary and Introduction?	Yes, an executive summary is present and conforms to OAECTT requirements except that due to course requirements it exceeds the 75-100 word limit. No abstract present.
16. Does the body of the report contain Section Headings?	Yes, the body of the report contains section headings
17. Are there Conclusion(s), and if applicable, Recommendation(s)?	Yes, there are conclusions and recommendation in the report
18. Is there a Bibliography with appropriately cited Technical references?	Yes, it is present and conforms to OAECTT requirements

Report Mechanics and Structure Checklist

1. Does the Title, in ten words or less, inform readers of the precise subject matter contained in the TR?	Yes, and it conforms to OAECTT requirements
2. Does the Abstract or Executive Summary provide a brief overview of the report in approximately 75 to 100 words?	Yes, an executive summary provides an overview of the report, however, due to course requirements it exceeds the 75-100 word limit. No abstract present.
3. Does the Abstract or Executive Summary summarize the Conclusion(s), and if applicable, the Recommendation(s)?	Yes, an executive summary summarizes the conclusion and recommendations of the report
4. Does the Introduction state the reason the work was undertaken? What is the industry, organization or context? What is the problem?	Yes, the introduction states the reason for the project, the industry to which it applies and the problem to be solved
5. Does the Introduction cover the scope of the report? What is included and /or admitted, and what procedures are used?	
6. Do the headings and subheadings in the Body adequately and accurately describe the section or subsection content?	Yes, the headings accurately and adequately describe section and sub-section contents
7. Does the Body include information regarding the methodology? Does it indicate materials, equipment and procedures used and why they were selected over alternatives? Is there sufficient detail so that that the methodology can be duplicated by others?	Yes, the body includes all section required conforms to OAECTT requirements
8. Does the Body include recent research findings?	No, the body does not include recent research findings since it was not a research project. However, comparison research was done on the possible market competition and included in one of the appendices of the report.
9. Does the Body include results/data from the study?	Yes, the body includes results and data regarding design, implementation and production of the device
10. Are illustrations, tables, diagrams and charts clearly drawn, labelled and numbered?	Yes, and it conforms to OAECTT requirements

11. Is each Conclusion, and if applicable, each Recommendation, stated in a separate paragraph and in a positive way?	Yes, and it conforms to OAECTT requirements
12. Are the References/Bibliography complete?	Yes, references are complete and conform to OAECTT requirements
13. Do the Appendices support the study?	Yes, appendices provide datasheet information on modules used, as well as, research data, and source code. No extraneous material was included.
14. Is the spelling correct?	Yes, consistent USA spelling was used throughout the report
15. Is the language free of jargon? Are acronyms properly introduced? Are abbreviations appropriate and correct? Can someone without specific expertise in the field read and understand the TR?	Yes, the language used in the report is free of jargon. All acronyms are explained prior to their use. All abbreviation are appropriate and correct. Report can be read by anyone without specific expertise in the field.
16. Is the same voice (I, one, person, etc.) used consistently throughout the Technology Report?	Yes, active voice was used throughout the report
17. Do the grammar and punctuation follow normally accepted rules of use?	Yes, proper grammar was used in the report
18. Are thoughts and illustrations, diagrams, charts that do not belong to the writer properly identified and footnoted in the text? Are quotations indicated correctly? Are the authors referenced in footnotes and/or reference list? Do they include the author's name, the title of the article/book, the date of publication, and the publisher?	Yes, all illustrations and diagrams are properly cited. No charts were employed in the report. All quotations indicated properly. All authors referenced in reference list and conform to OAECTT requirements