

Humber College Institute of Technology & Advanced Learning

MAIDS HOME/BUSINESS INTRUSION DETECTION SYSTEM REPORT

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Status

/1 Hardware present?

/1 Title Page

/1 Declaration of Joint Authorship

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# **DECLARATION OF SOLE AUTHORSHIP**

I, Claudio F. Meis, confirm that this work submitted for assessment is my own and is expressed in my own words. Any uses made within it of the works of any other author, in any form (ideas, equations, figures, texts, tables, programs), are properly acknowledged at the point of use. A list of the references used is included (OAECTT, 2017)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Date: January 8, 2020

# **PROPOSAL**

MAIDS (Meis Alert Intrusion Detection System) is a real-world Internet of Things (IoT) project aims to satisfy the following requirements: 1) Provide an affordable (under $200) home or business intrusion detection system (IDS), 2) Provide a small and easily deployed DIY IDS for any space, 3) Provide the user with a simple IDS Android-based application interface, 4) Provide rapid-response and reliable multiple-channel intrusion alerts in real-time, 5) Eliminate monthly monitoring fee (self-monitoring system) and no contract required, and 6) Provide database information for authorities use.

MAIDS is an IoT-based home/business security device built around a 3-tier model distributed computing model. It runs on a Raspberry Pi 4 Model B 1.5GHz quad-core 64-bit ARM Cortex-A72 CPU platform interfaced with a customized PCB board. The customized PCB board includes three main components: 1) a small size PCB board (34mmx16mmx15mm) HC-SR501 Human Sensor Module Pyroelectric Infrared PIR Sensor Detector with as cone angle of less than 120º, 2) a small PCB board size (37mmx25mmx20mm) High Sensitivity Sound Microphone Digital Sensor Detection Module with an operating range between 16 to 20 kHz and 3) a small PCB board size (20mmx20mm) SunFounder Dual Color LED Sensor Module for Arduino and Raspberry Pi capable of emitting light of two different colors (red and green); all main PCB components operate at DC 5V. Remote Central access to MAIDS by a custom Android application displays an intrusion database developed with HTML, CSS, PHP and MySQL, via the Internet on a locally located Apache HTTP Server version 2.4.41 service. Furthermore, MAIDS has the capability to connect to an enterprise size wireless domain and store certificates to receive multi-channel alerts (e-mail w/ photo, SMS messages, push notification and a phone call). The prototype is surrounded by a small and elegant custom 3-D and laser-cut/etched white acrylic enclosure designed for component protection. The accompanying technical report conforms to OAECETT certification guidelines.

MAIDS further feature development requires continued skills development in the following areas: 1) SSH Android application development with Java, 2) Static IP address network configuration for Raspberry Pi 4, 3) Apache server security configuration, 4) Configuring Iptables or Firewalld for Linux system internal security, 5) Intranet network setup and router forwarding configuration, 6) KVM installation and configuration, 7) Samba server setup and configuration to exchange data and files with Windows systems, and 8) SCP and SFTP configuration and usage.

MAIDS project phases (specifications, design, development and status) are reviewed by Mrs. Marilyn MacGhee, M.A., owner and operator of several Canadian-based franchise outlets in the city of Etobicoke and potentially hiring me upon graduation as her business network administrator, database developer and technological advisor. Mrs. MacGhee’s franchises have been in business for over 20 years and employ over 150 employees. Depending upon availability, Mrs. MacGhee will attend the ICT Capstone Expo.

The small MAIDS physical prototypes built is “…small and safe enough to be brought to class every week as well as be worked on at home. In alignment with the space below the tray in the Humber North Campus Electronics Parts kit the overall project maximum dimensions are 12 13/16" x 6" x 2 7/8" = 32.5cm x 15.25cm x 7.25cm.” (Medri, 2020)

In order to maintain MAIDS within safety and Z462 guidelines, it will use a maximum DC voltage of +5V, < 50 mA current and maximum power consumption of 20 Watts. The MAIDS prototype is never left unattended during transport, manipulation, displaying and modification and/or testing.

**EXECUTIVE SUMMARY**

Break-ins occur every 90 seconds in Canada. (King, 2019) According to research studies, homes and businesses with a monitored security system are 2.2 and 4.5 times less likely burglarized. (Woodall, Canadian Crime Rates Burglary & Home Invasion: A Real Threat, 2019) MAIDS intended use as an intrusion detection alarm systems provides premise-protection (home/business) of spaces and other secure areas. Strategically placed motion/sound sensor devices within MAIDS initiates and transmits local/remote audible/visible alerts to home/business and/or police department via email with picture, Android Push Notifications, SMS Messaging and phone calls using Internet services like Twilio and PushOver. Furthermore, MAIDS separate signal processing circuitry incorporates a sound sensing unit that detects continuous attack noises in the audio frequency range up to 20 kHz. In addition, the motion sensing unit discerns between object movement and human movement as it covers a motion cone of up to 120° and distances of up to 7 meters within operating temperature from -20° to +80° Celsius and with a low power consumption of 65 mA. The camera takes a photographic record of the intrusion event when the alarm activates attaching a caption containing time of entry, place of entry and address of home/business. Photographic/video record is then included in an email message to the owner and can help law enforcement track down potential criminals or trespassers. An Android-based phone/tablet application provides remote control capabilities. A database records intrusion information and is reachable via the Android application. Accordingly, MAIDS is capable of connecting to enterprise size networks and accept certificates. Finally, MAIDS, is enclosed in a tough acrylic enclosure designed to protect the internal sensing devices from damage.

MAIDS is an affordable, small, easily deployed and low-cost alternative that protects and secures your home or business through constant 24/7 remote monitoring using an indoor camera and motion and sound detection sensors. MAIDS provides peace of mind by providing a rapid-response and reliable multiple-channel intrusion alerts (email w/ photo, Android push notifications, phone call and SMS messaging) in real-time when you are not around. It is also capable of dispatching emergency personnel, if necessary. MAIDS also protects your pets from harm and lower Home Owner’s Insurance premiums. While other competitors charge you an extravagant monthly monitoring fee between $30 and $45 dollars per month on a 42 to 60 month contract (i.e. between $1300 and $2700 per year) (Woodall, Top 5 Best Home Security Systems in Canada 2020, 2019) MAIDS costs less than $200! Procuring MAIDS, keeps your home and business safe at an affordable price and reduces the stress when you are not home to protect your loved ones, property and valuables.

MAIDS is a record of a successful project that demonstrates expertise in agile development processes, a strong work ethic and experience that contributes to an organization daily. It also demonstrates the software and technical skills to design and develop projects from proof of concept to deliverables by carrying out complicated tasks and duties efficiently. Moreover, MAIDS reveals an enthusiastic worker that is passionate and driven to deliver high-quality work, every time. Finally, this technical report indicates an effective communicator with strong interpersonal skills that promote cooperation and group cohesiveness, and influences business cultures affecting job performance positively which in turn aids a company's success.

# Bibliography

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