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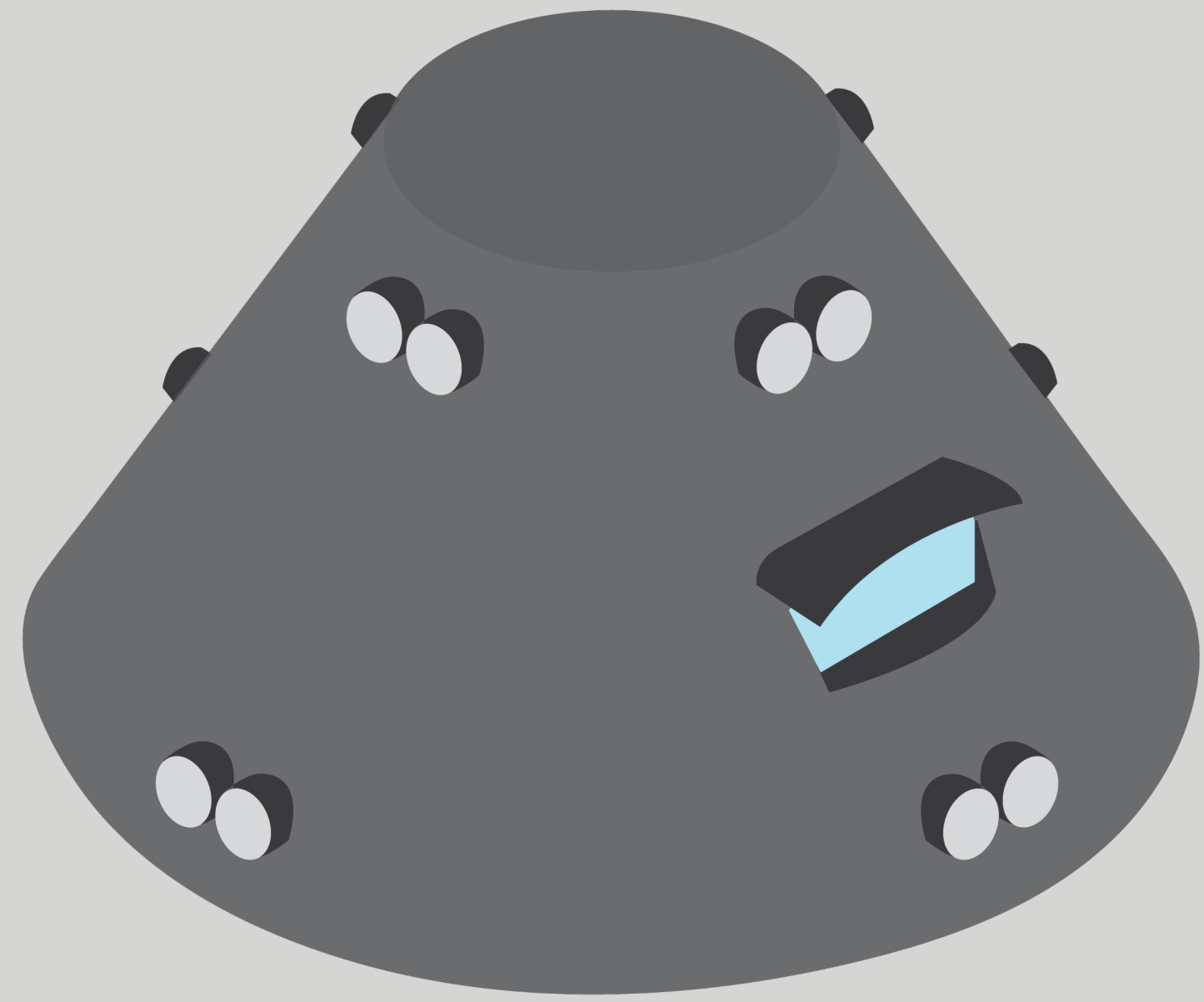
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CIVILIAN ACQUIRER FOR FIRE SAFETY (CAFS)

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Electronics Engineering Technology - Pittsburg State University



INTRODUCTION

The department of Electronics Engineering Technology (EET) of Pittsburg State University has designed a prototype of an autonomous rover to help firefighters find lives trapped in a building during an event of fire. The rover prototype has been named CAFS, which is the abbreviated form for Civilian Acquirer for Fire Safety. This device intends to produce the first ever autonomous system to locate, record, and transmit people's location from within a building to a user outside of the building.

ABSTRACT

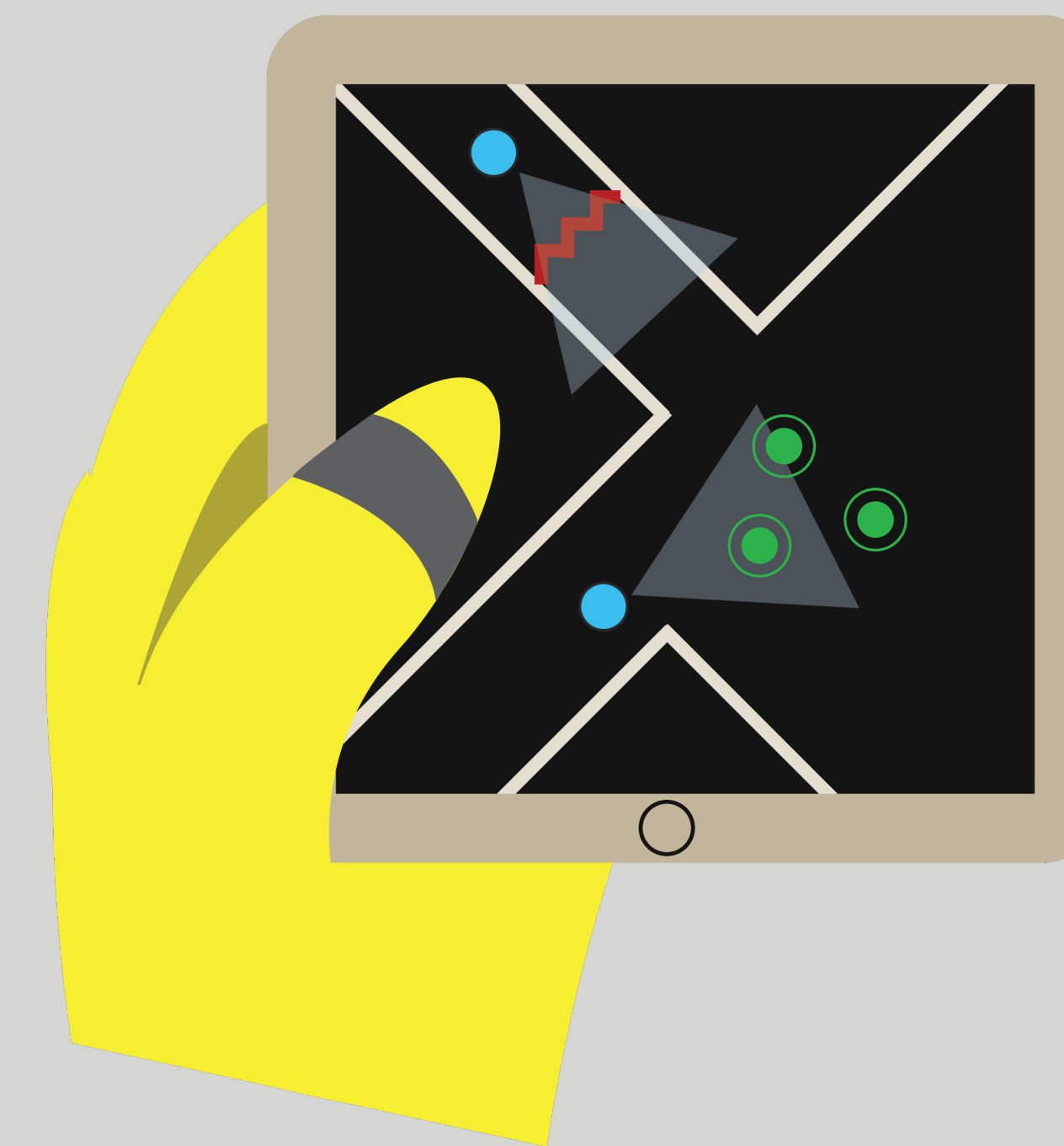
The Civilian Acquirer for Fire Safety, or CAFS, is an autonomous rover that moved throughout a building to identify those trapped in a room or part of a building during an event of fire. CAFS units reported the number and location of people to firefighters so the firefighters could know where people were within a building and what rooms or corridors might be blocked off by debris. Using the records from CAFS units, firefighters could assess a situation on their way to the scene and could best determine a way to deploy their teams to minimize potentially casualties. CAFS units were battery powered and drove throughout sections of the building. They communicated with other CAFS units on the floor so that each unit could contact firefighters with recorded data. CAFS detected debris and maneuvered around it, and if it could not get around the debris, it would report the blockage and go in a different direction to continue with its job. CAFS units were made of heat resistant, fireproof, and waterproof material and was constructed in a way that was less likely to be destroyed if something fell on a unit or if a unit went into a extremely hot room during a fire.



PURPOSE

According to the National Fire Protection Association (NFPA), on 2017, 72% of the fire that happened in the USA was structural fire, which brought 77% civilian fire deaths that occurred inside a building. The U.S. Fire Statistics states that, fire deaths have increased by 9.6% from 2008 to 2017. People now needs a solution where the existing fire safety system is failing. Therefore, CAFS is under development. It is a motorized rover which follows a pre-programmed path and navigates through debris and obstructions using its onboard sensors to detect and record the amount of people within a room and transmit the data out to a firefighter via wireless communication. Intended to be used during fire hazards, upon a successful build and design in future, this device has the potential to save many lives, including victims of a fire and firefighters alike.

DETECTS BLOCKAGE AND LOCATES SURVIVORS

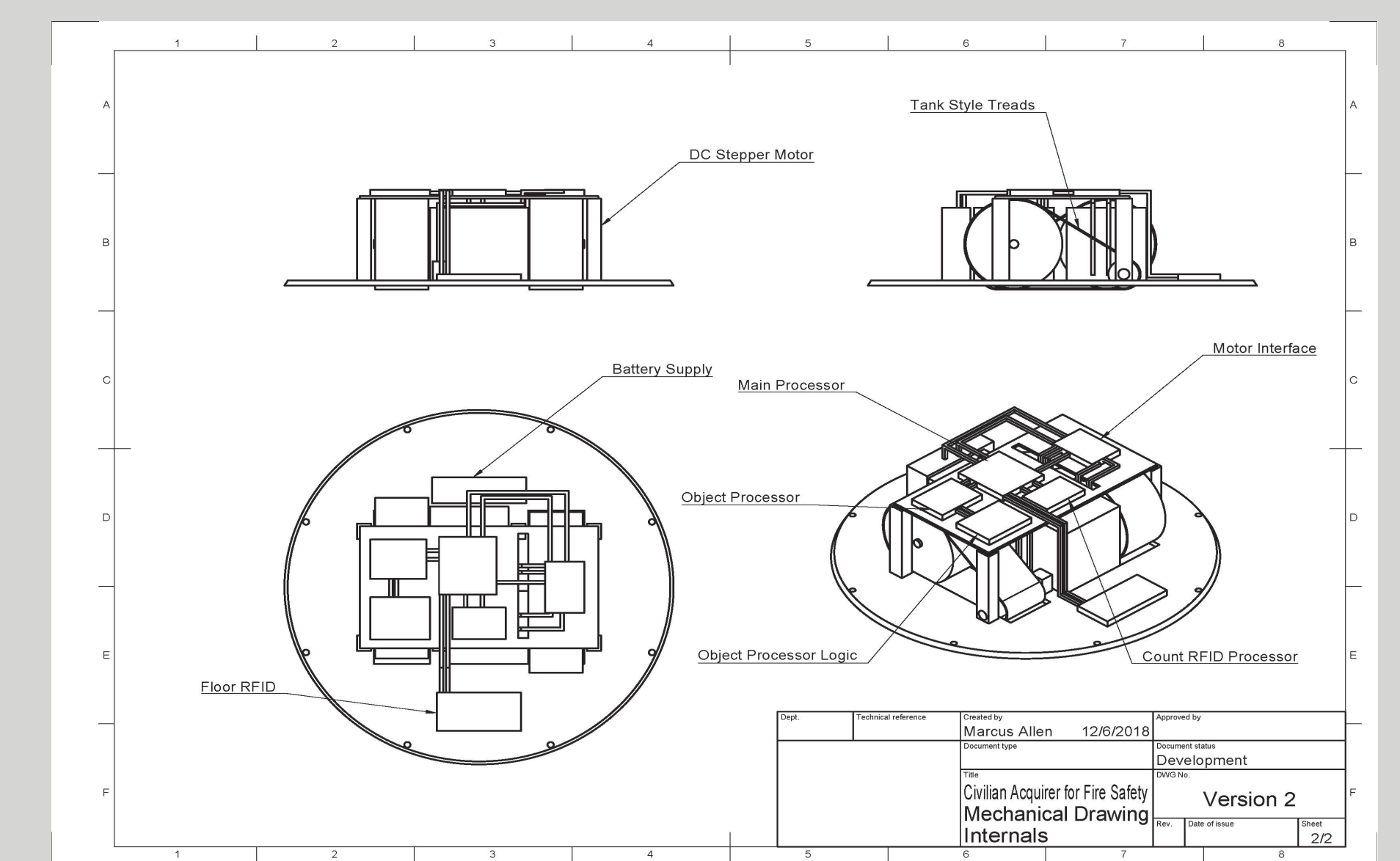
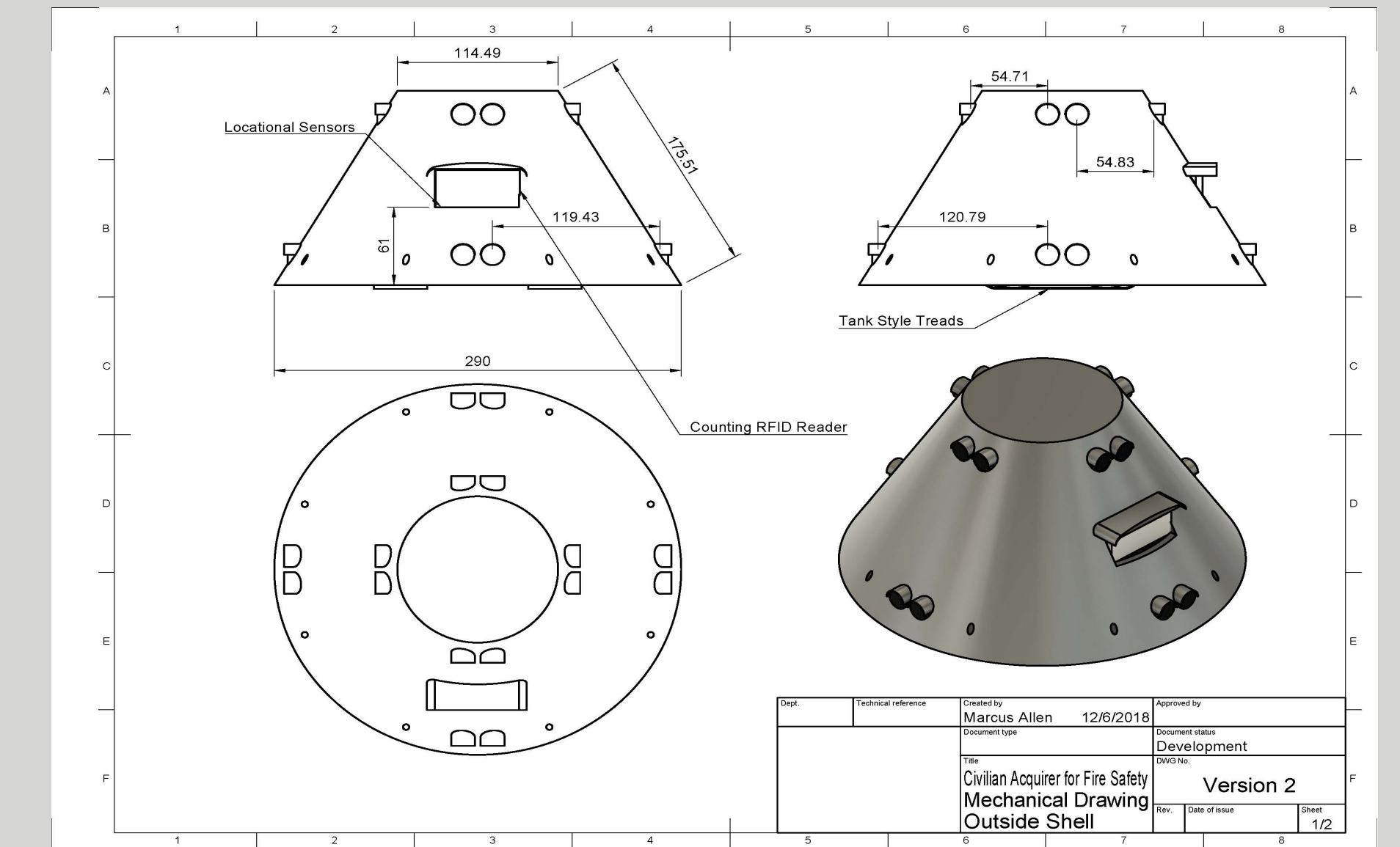
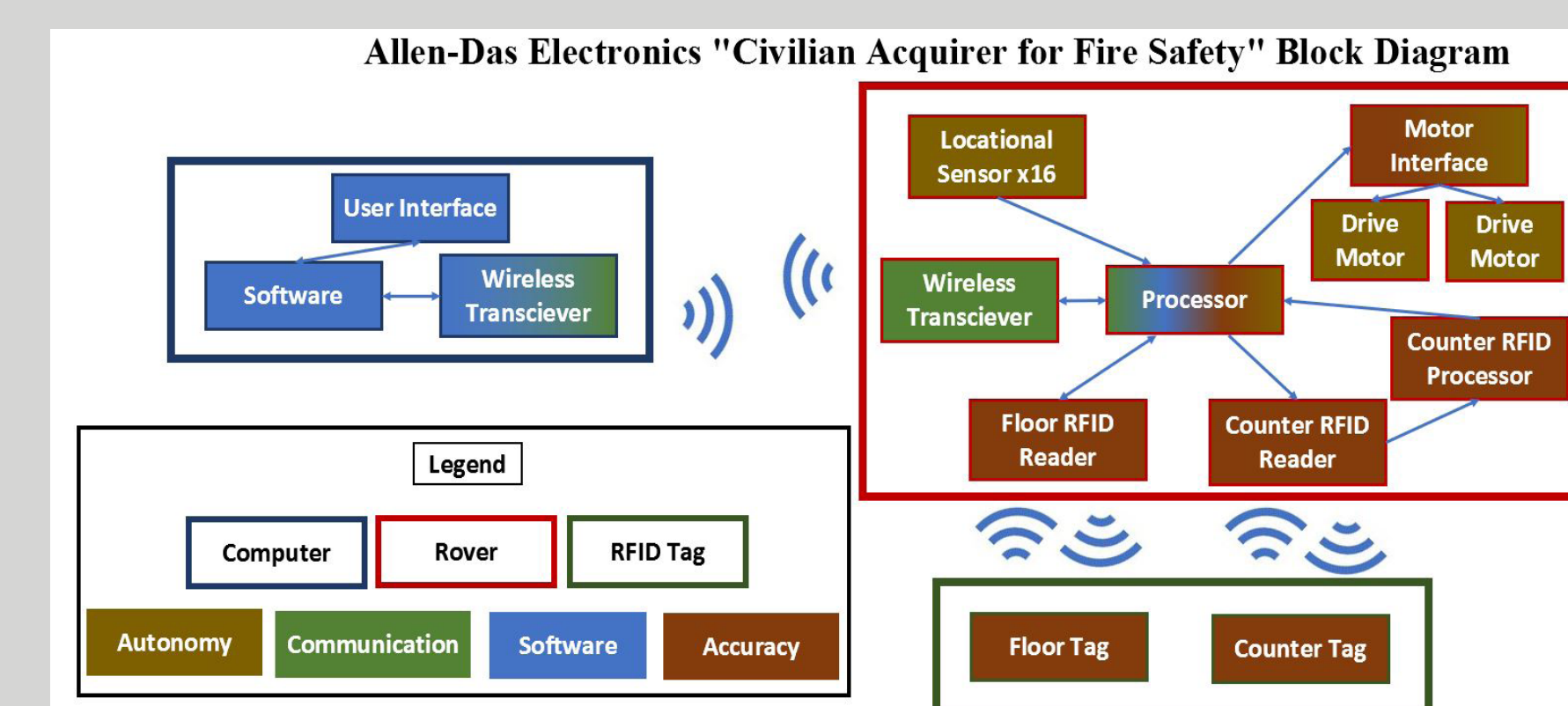


MATERIALS/METHODS

CAFS system is meant to solve the issue in fire protection systems that stems from the lack of knowledge of a buildings layout and the approximate location of people within the building. The main elements of the CAFS system are given in four categories:

- (i) Autonomous Reliability
- (ii) Accuracy
- (iii) Communication
- (iv) Software

Some of the components used to design the rovers are: RFID tags (as locational sensors and to detect humans), long range RFID reader, DC Stepper motor, 3100 mAh battery, voltage regulator, several microcontrollers, an android application to see collected data.



CONCLUSION

It is not only important to bring a fire under control as soon as possible, but also to make sure no one is trapped inside a room dying and hoping for someone to save his/her life. By identifying the number of victims and their location ahead of time, CAFS is dedicated to save people's life, along with firefighter's life.

REFERENCES

- National Science Foundation <https://www.nsf.gov/funding/>
- National Fire Protection Agency <https://www.nfpa.org/News-and-Research/Data-research-and-tools/US-Fire-Problem>
- The Society of Fire Protection Engineers, Robotics in Firefighting https://www.sfpe.org/page/FPE_ET_Issue_100/Robotics-in-Firefighting.html
- U.S. Fire Administration <https://www.usfa.fema.gov/data/statistics/#tab-2>