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## Introduction

NAVISCAN Inc. is the leader in organ-specific molecular imaging. The company designs, manufactures, and distributes a high-resolution Positron Emission Tomography (PET) scanner which provides unprecedented visualization of small body parts. While Naviscan's PET scanner can image virtually any body part that can fit into the gantry, it is most often utilized as an adjunct to conventional imaging technologies by clinicians who stage and manage breast cancer.



Russell Arroyo inserting the trigger board into the card cage to be programmed.

Ambient Control Systems was founded in 1999. It is currently developing a suite of hardware and software products that are focused on providing catastrophic event management and mitigation capabilities to our Police, Fire, and Emergency Services Departments; their emergency managers; and field responders. Ambient offers such products to significantly improve real time situational awareness, and is committed to providing the means to enhance the event response capability. This will coincidentally lead to a reduction in mitigation response times, and result in improvements in responder safety. Through this suite of community notification products, the dissemination of accurate and timely information during these critical events supports improved decision making for residents, thereby promoting personal safety.



Main office of Ambient Control Systems, Inc. Poway, CA

## Equipment - NAVISCAN

**Positron Emission Tomography (PET):**  
A nuclear imaging technique that produces a three-dimensional image or picture of functional processes in the body.

**Positron Emission Mammography (PEM):**  
An organ specific high resolution PET scanner capable of functional imaging for breast cancer detection.



Naviscan's award-winning PEM scanner.

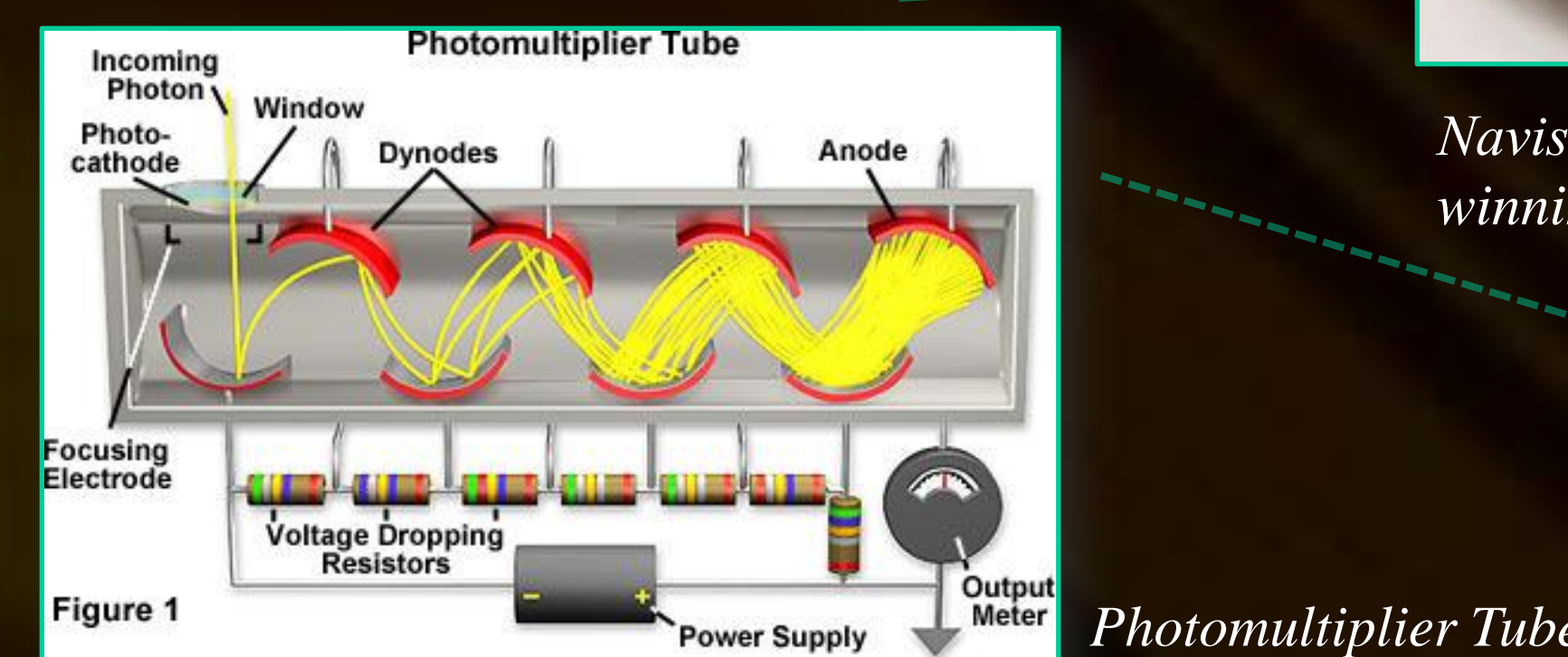


Figure 1 Photomultiplier Tube

**Photomultiplier Tubes (PMT):** detect and multiply the current produced by incident light by as much as 100 million times.

## Equipment – Ambient

**Event Management and Mitigation Platform (EMMP):**  
EMMP is designed to deliver event specific information to all relevant emergency management operatives (EMO).

### FireALERT:

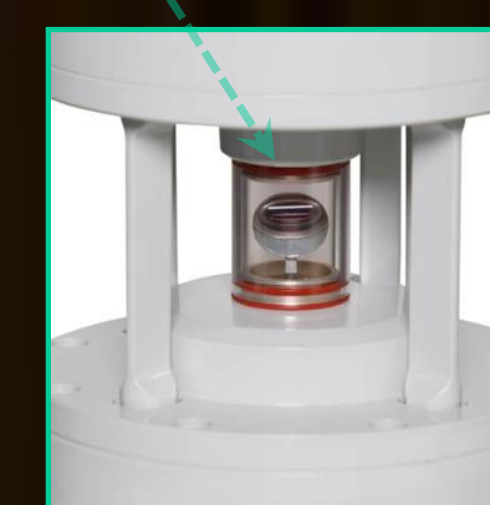
A self contained wildfire detection sensor. In a monitored area, the FireALERT will pick-up the outbreak or approach of a fire event. It will then begin to geo-spatially map and track this event in real time.



FireALERT Sensor

FireALERT Features:

- Uses dual band infrared detectors for highly accurate fire detection.
- Rotates 360° in less than 4 minutes.
- Fire detection range to 6 miles.
- Weather protected in hermetic housing.



Eye of the System

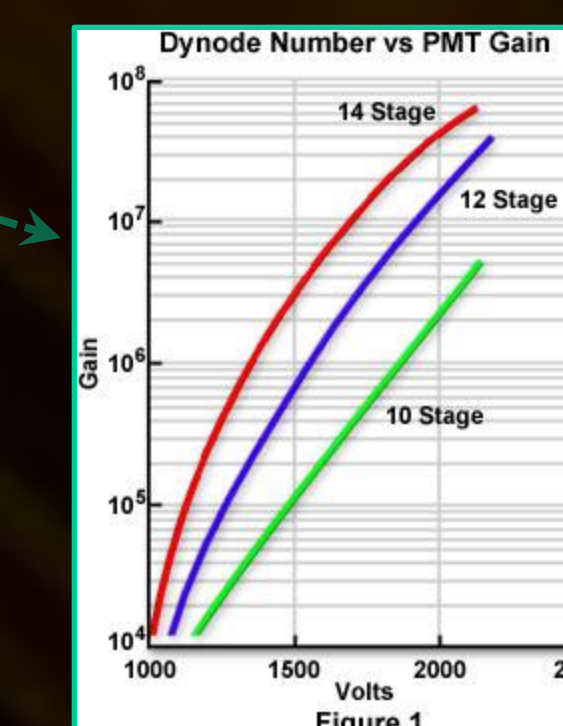
### CommanderALERT:

A web-based application that provides emergency managers and other authorized users the ability to share real time information on the developing fire event incident.

## Methods - NAVISCAN

### Russell's Projects at NAVISCAN:

- Research alternative devices for existing parts that qualify the Restriction of Hazardous Substances (RoHS) certification and is lead free.
- Solder small devices and program code to control the speed of LED lights.
- Measure a given resistor on an MSP430 LaunchPad via Oscilloscope.
- Program and calibrate the trigger boards to 800v, and testing them for accuracy.



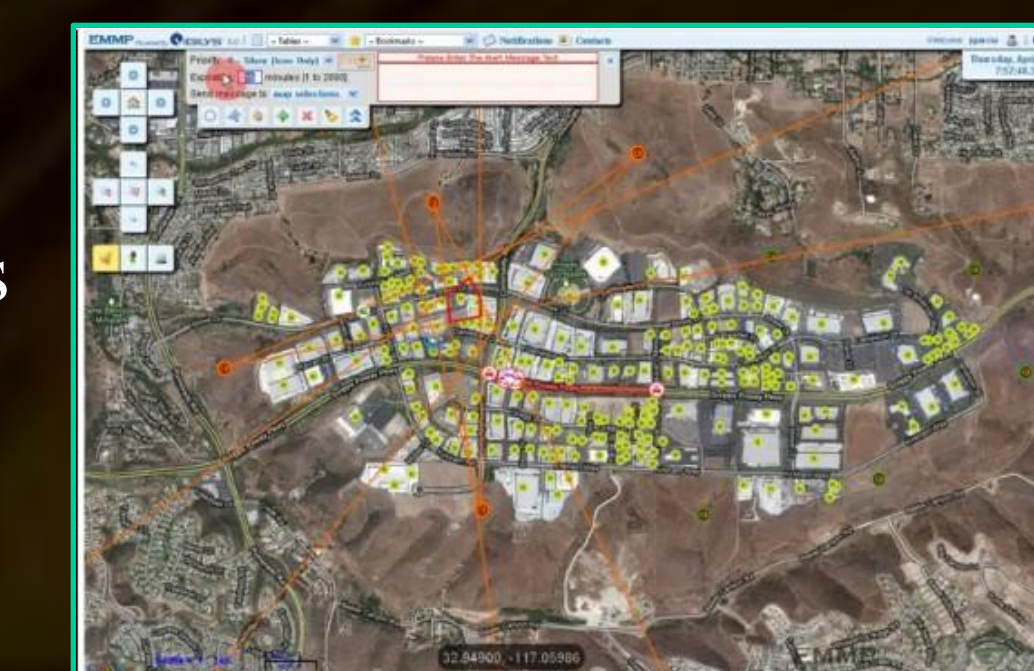
Dynode Number vs. PMT Gain

The surface composition and geometry of the dynodes determines their ability to serve as electron multipliers. Increasing the amount of stages of dynodes in a PMT will result in increased PMT Gain.

## Methods - Ambient

### Arielle's Projects at Ambient:

- Develop and write a Software Requirement Specification (SRS) Document for an application programming interface (API).
- Create a Java-based testing tool using an integrated development environment (Eclipse IDE) that generates messages for testing.
- Create a series of training/help tutorial videos for EMMP.
- Design a test methodology that will attempt to stress various functionalities of EMMP. Proceeded to set up the test scenarios that will perform the proposed functional stress testing.



Screenshot of CommanderALERT

## Conclusion

We are both grateful for having the opportunity to participate in the NSF Summer Team Internship. We gained valuable industry experience, including:

- An overall perspective about the engineering industry environment.
- A feel for the importance of collaboration with communication and teamwork to reach a common goal.
- Entry-level experience for researching compatible parts to pre-existing Printed Circuit Boards (PCB).
- A basic understanding of laboratory equipment and usage.
- A prospective outlook on future research in applied engineering in medical and environmental practices.
- Understanding the value of real time sensor and data driven situational awareness to promote responder effectiveness and, through notification, community safety.

## Acknowledgements

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