

# ~ *The Rapid Responder* ~

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**MONMOUTH  
UNIVERSITY**

where leaders look forward<sup>SM</sup>



**Rapid Response Institute**  
*Established 2004*

**PREVENT  
PROTECT  
RESPOND  
RECOVER**

## The Rapid Response Institute Conducts Pilot School Safety Exercise at Colts Neck High School

The State of New Jersey has made school safety a priority. Personnel from the Office of Emergency Management (OEM), Prosecutor's Offices, local fire, police, and school officials of the various counties in the State have already conducted numerous school safety initiatives (lockdowns, evacuations, fire drills, etc.)

A pilot Emergency Management Exercise was conducted at the Colts Neck High School (CNHS) on October 21, 2009, to assess the response to an incident at the school and to evaluate some technologies to aid in that regard. The purpose of the pilot was two-fold:

1. Develop knowledge from a live emergency management exercise to improve the response to an incident at a high school, and
2. Evaluate the ability of FloorView, a software product, to improve the response to such an incident.

The specific incident simulated was a variant on an active shooter scenario with classroom evacuations. The first responder principals were the Colts Neck Police and the Monmouth County Emergency Response Team (MOCERT). Funding for the exercise was allocated by the Freeholders from the Monmouth County Multi-Discipline Working Group Homeland Security Grant Program budget.

FloorView provides the capability to view floor plans in two- and three-dimensional modes and related information about a building including critical data such as fire extinguisher locations and 360 degree movies of rooms within the buildings. In the case of CNHS, this would allow first responders to know details about the building as they responded to the incident to increase the quality and timeliness of decision making and thus to reduce potential casualties. The exercise was intended to learn and assess the value of information technology enhanced emergency response.

The Joint Mobile Command and Training Center (JMCTC) served as the command post for the exercise, it provided a display of the high school security camera feeds, and used mesh network radio prototypes to eliminate radio dead spots in the school. This use of the JMCTC, in addition to the FloorView software, were assessed in this exercise.

The exercise was a wonderful success. First, the physical exercise was effected as planned, and the technology in support of it worked well. As had been expected, FloorView and the other technologies had areas for improvement that were identified, further achieving the objectives of the exercise. The key learnings were:

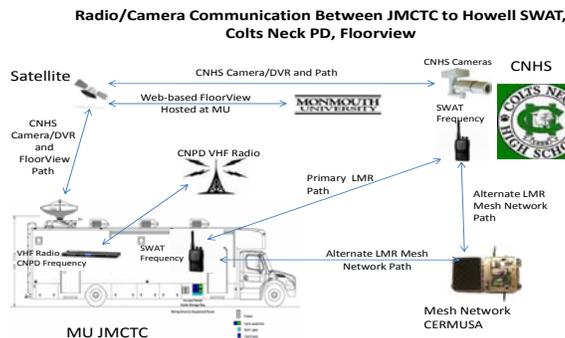
Cont'd on Page 2 (see Colts Neck High School)

Colts Neck High School (Cont'd from Page 1)

- The overall value of FloorView was clear. FloorView could benefit from additional real-time data and increased ease of navigation and responsiveness in some cases. Its value was stronger in methodical emergency response modes than in aiding rapid pursuit incident components.
- The JMCTC was a powerful setting for a command post with excellent communications and information display facilities to allow for collaboration within the vehicle and with the responding tactical team. The County should determine settings in which the JMCTC should be used as a resource in both emergency management responses and training activities.
- The mesh radio network worked well in all tests and experienced a few procedural problems in the actual exercise. It is a strong, economical candidate for reliable coverage in both predictable and unpredictable response settings.
- The security cameras were able to be viewed in the JMCTC but had slower refresh rates than desired. Still, these are powerful tools if this aspect can be addressed.

As a result of this exercise it is recommended that:

- FloorView be adopted for all the high schools in the County and be considered for all schools for both emergency response and day-to-day operations.



- The County make a formal evaluation of the mesh network equipment from CERMUSA to determine its cost performance.
- Further testing be performed with the security cameras from CNHS and others to determine the requirements to make them truly useful in an emergency management setting.
- The County determine the situations in which the JMCTC should be used as a resource in both emergency management responses and training activities and pursue those.

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The Rapid Response Institute begins work on \$3.2 Million Contract For Homeland Security Research

The Rapid Response Institute has begun work on the \$3.2 Million FY2009 DoD Senate Appropriations Awarded to develop and prototype a “Rapid Information Sharing for Event Decision Support” (RISES) database system that will enable the Joint Warning and Reporting Network (JWARN), Joint Effects Model (JEM), and other military classified systems to effectively share tactical information (plume spread, chemical identity, voice and video, GIS map information, etc.) through a web portal in real time in support of catastrophic events without disclosing the classified source of the information.

This initiative continues to build on the Institute’s programs with the Edgewood Chemical Biological Center, CERMUSA of St Francis University, Ft. Monmouth PEO-C3T, Ft. Dix Northeast Regional Response Center and will foster partnering on a critical public mission with key state and local agencies. Work on this contract began in the summer of 2009.

# RRI Conducts Second High School Summer Research Program

Due to the resounding success of the Pilot High School Research Program in the Summer of 2008, the Rapid Response Institute and the School of Science secured funding to continue the program this summer with two teams of students and their teachers from Point Pleasant Borough and Middletown South High Schools.

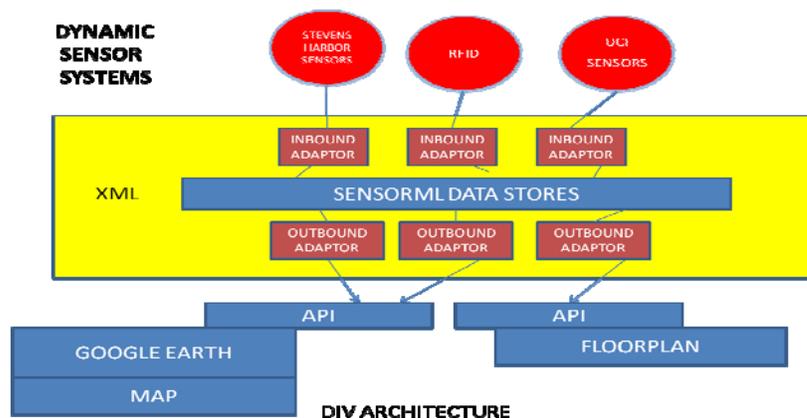


The two teams of high school students and their high school teachers with Professor Robert Kelly

The Point Pleasant team was guided by Point Pleasant High School teacher and Monmouth University Alum Nicholas Gattuso and included students Joseph D. Perello II, Courtney Stanton, Gregory Sciarretta and Melissa Gattuso. The Middletown South team was guided by Middletown South High School teacher Kenneth Kretsch and included students James Masco, Brandon James Wallace, Cameron D. Allen, and Jordan T. Scales. This year's research theme was Dynamic Information Visualization (DIV).

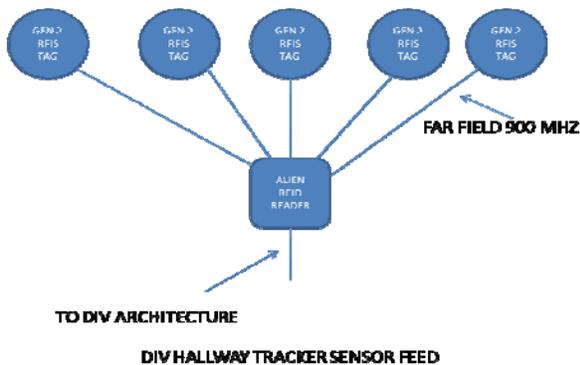
# What is DIV?

At the end of June 2009, these gifted high school students reported to the Rapid Response Institute at Monmouth University ready to begin work on the project entitled Dynamic Information Visualization (DIV) under the direct guidance of their high school teachers, with RRI Professor Robert M. Kelly, Jr. providing overall guidance. The objective of this project was to explore the issues associated with mapping dynamic data onto geographic spaces. The project was designed to support the development of emergency management related capabilities using software prototypes. DIV is a very broad topic; therefore, the students focused on two areas: radio frequency identification (RFID) sensors and water sensors.



# Passive RFID Sensors

The students seized the opportunity to really put the radio frequency identification (RFID) to work. They came up with an idea to build radio frequency sensors that would track down a device's location with antennas. The students built a robot and eight antennas to determine if the antennas were able to trace the robot's location at every moment.. At the culmination of the project, this goal was accomplished. This application was determined to be productive because it can be used in other real-world scenarios as well. For example, this application can be used to aid a fire fighter going into a burning building in finding trapped victims. The fire fighter can have a sensor on his/her helmet so someone from the outside knows exactly where his/her location is in case something goes wrong as well.



Passive RFID Equipment in Howard Hall Ceiling



Little "Iggy" Navigating through Howard Hall

# Urban Coast Institute Sensors

The other sensor that the students experimented with was the water sensor. The water sensor was deployed by Monmouth University's Urban Coast Institute (UCI), and the harbor sensors were deployed by Stevens Institute of Technology. The Urban Coast Institute (UCI) at the University has sensors deployed along the inlets of the North Jersey Coast. These sensors measure 5 parameters: temperature, salinity, chlorophyll, dissolved oxygen, and water level. Some combination of these parameters can provide insights into health and environmental events, like fish kills. Effective depiction of this data can aid in those insights. The students customized software that can acquire signals from the water sensors that can read off how the current is flowing in the ocean. These sensors can be used for a multiple of reasons and can be combined to work with Google Earth as a floor plan.

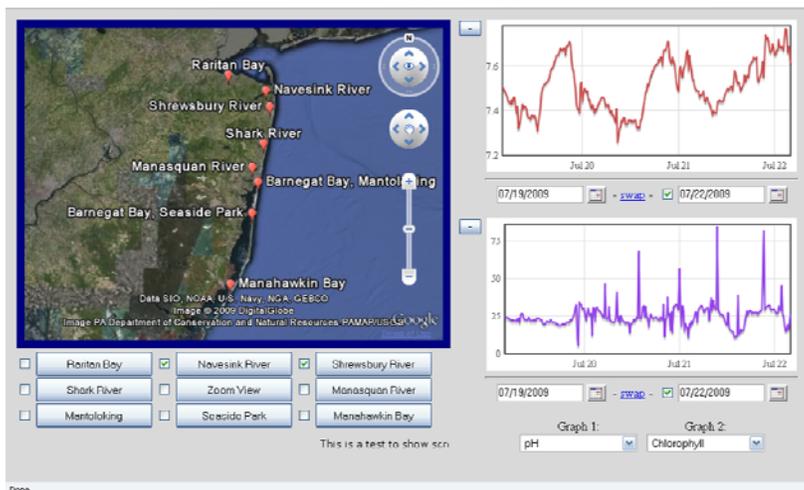


Figure 1

Parameter	Units	Precision	Accuracy
DO	% Saturation	0.1%	± 2%
DO	Mg/L	0.01 mg/L	0.2 mg/L
Salinity	ppt	0.01 ppt	0.1 ppt
Temperature	°C	0.01° C	± 0.15° C
pH	unit	0.01 units	± 0.2 units
Turbidity	NTU	0.1 NTU	2 NTU
Chlorophyll	µg/LChl	0.1 µg/LChl	—
Depth	Feet or Meters	0.001ft (0.001m)	±0.06ft (0.018m)

Figure 3



Figure 2

Figure 1 displays the Urban Coast Institute Sensors. The Urban Coast Institute is administrating a network of eight long-term, real-time water quality monitoring stations in the northern waterways of New Jersey in collaboration with the New Jersey Department of Environmental Protection Bureau of Marine Water Monitoring (NJDEP BWM), Barnegat Bay National Estuary Program, Monmouth County Board of Health, local and regional watershed management groups, and other contributors. The Continuous Monitoring Stations exercise the use sensors like the YSI 6600 Multiparameter Data Sonda, which is displayed in Figure 2. Figure 3 displays the parameter information.

# Stevens Institute of Technology

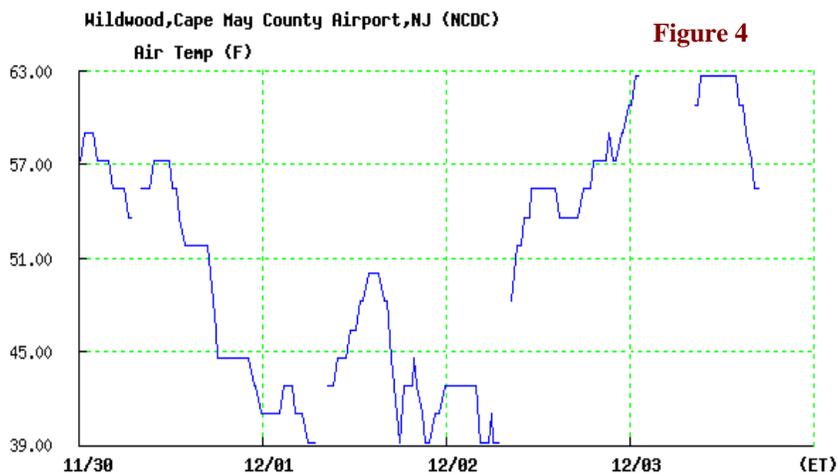


Figure 4

The Stevens Institute of Technology established the New York Harbor Observation and Prediction System (NYHOPS) which conducts a real-time assessment of ocean, weather, environmental, and vessel traffic conditions throughout the New York Harbor and New Jersey Coast regions. Figure 4 displays an example of how the Stevens Institute presents its information. It shows the air temperature in Wildwood, Cape May County. On the website, the wind speed, barometric pressure, and wind direction can also be plotted.

# RFID

Alien Higgs- 3 Tag



Alien Reader



Active Sensor



Active Reader

The high school research team performed a substantial amount of work on active Radio Frequency Identification technology, also referred to as RFID. RFID technology is put to use through the transmission of an identification number that is exclusive to tags that are attached to different objects. Within a certain margin, a receiver is able to read the identification number of the tag. This number is then reported over TCP/IP to software. The objective that the team was working towards was the discovery of the possible applications of the active RFID tags. They also wished to learn the amount of time it would take to find one of the active tags. In order to reach this goal, the team set up a series of experiments to test the liaison, if any existed, between the signal strength of the tags in relation to how far they were placed. A software, known as Tavis software, was used during the experiment. This program was able to formulate a text file from the data obtained from the receivers. Data was then formatted into *input.csv* through the Java program. Once the formatting portion is complete, AdapterC converts the *input.csv* into another type of file, called an *xml* file, from which a *kml* file is later generated. Finally, Google Earth is able to

read this *xml* file in order to provide the approximate location of the tag as well as the readers' whereabouts. To begin the research, five tags were positioned on a ladder, and were moved farther back by five meters during each trial.

In general, the DIV project was an effort to effectively collect and display real-time data to emergency management personnel. This software is capable of delivering such information to leaders responding to incidents. The main purpose was to give this project a specific approach in which the information that would be displayed would be wide ranging and dynamic; the goal was to establish a flexible and extensive architecture and develop software prototypes.

On Thursday, August 27, 2009, the two high school teams presented the results of their research. In attendance at this presentation were MU President Paul G. Gaffney II, Assistant Dean of the School of Science John Tiedemann, Admissions Director Lauren Vento Cifelli, and representatives from Stevens Institute of Technology, Monmouth County Health Department, Point Pleasant and Middletown South High Schools and Boards of Education, as well as the parents and families of the high school students.