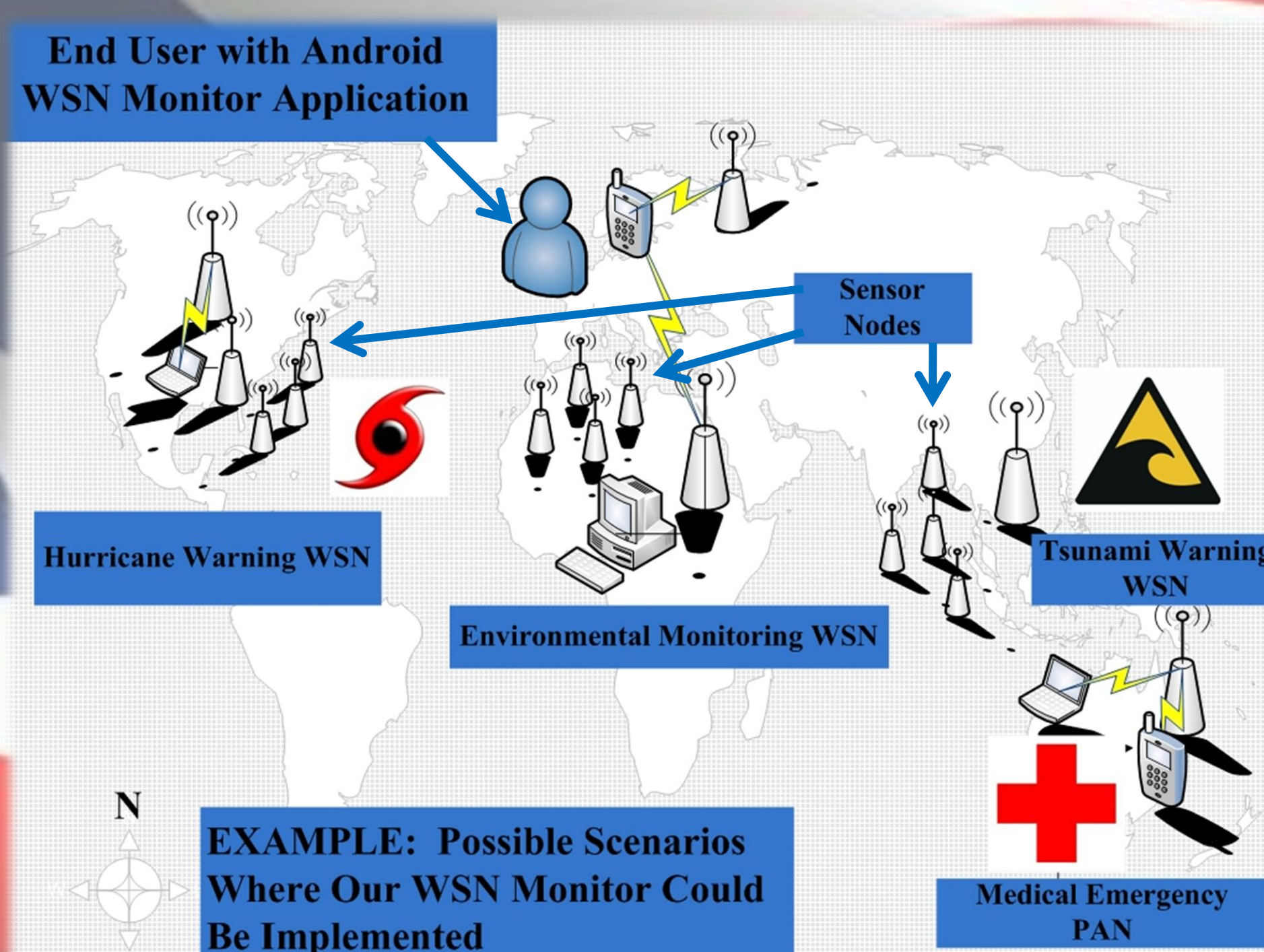## I. Research Overview and Outcome

INTENT

This architecture will describe how to achieve a TCP connection which will receive data and control a wireless sensor network from an Android smart phone application to a specific static network cluster base station or mobile sink for data collection and manipulation purposes. The application is also easily adaptable for other implementations such as patient monitoring, population alert and notification in severe weather threats, and a wide variety of other scenarios.

OUR SOLUTION

Proposed and currently under development is our Android based smart phone application. Our WSN Monitor will both send and receive information from wireless sensor networks, providing important information to people about weather threats and warnings, and researchers with vital information about the patterns these hazards create. Our application will also provide qualified medical and health care personnel with a means with which to access patient and client data, observe vital health attributes of these patients, and a great diversity of other information wherever they have the possibility to connect to the internet or over a local network connection.

There are a great number of wireless sensor systems available for use in many different scenarios. For our research we have implemented a wireless sensor network comprised of sensing hardware manufactured by Crossbow Technology Inc. which utilizes TinyOS for transmissions between the motes and the base station. The smart phone with which we developed the application utilizes the Android 1.6 operating system. All applications for this OS are written in Java and use the Android SDK to provide interactivity with the hardware as well as other functionality.

End User with Android WSN Monitor Application

Sensor Nodes

Hurricane Warning WSN

Environmental Monitoring WSN

Tsunami Warning WSN

Medical Emergency PAN

N

EXAMPLE: Possible Scenarios Where Our WSN Monitor Could Be Implemented

PROBLEM STATEMENT

Currently technologies have not been properly implemented to help scientists and researchers gather information about natural disasters due to several critical parts missing from the creation of a complete monitoring system. Emergency personnel suffer from the same predicament and rely heavily on legacy systems to retrieve weather and storm system information as well as broadcasting warnings to the public in crisis situations. Trained medical staff and health care professionals are in desperate need of new ways to diagnose and observe individuals that require only minimal in house and outpatient care due to their limited numbers.

CONTEXT

Many facets of our lives are in need of monitoring by sensor networks whether it is on the local level such as personal medical sensing or on a global scale such as monitoring weather patterns. With the integration of these networks, we also need the ability to monitor the data transmissions and the adjustability of the algorithms they implement from both local and remote locations to avoid hazardous situations or possibly to compensate for inadequate numbers of qualified and trained personnel.
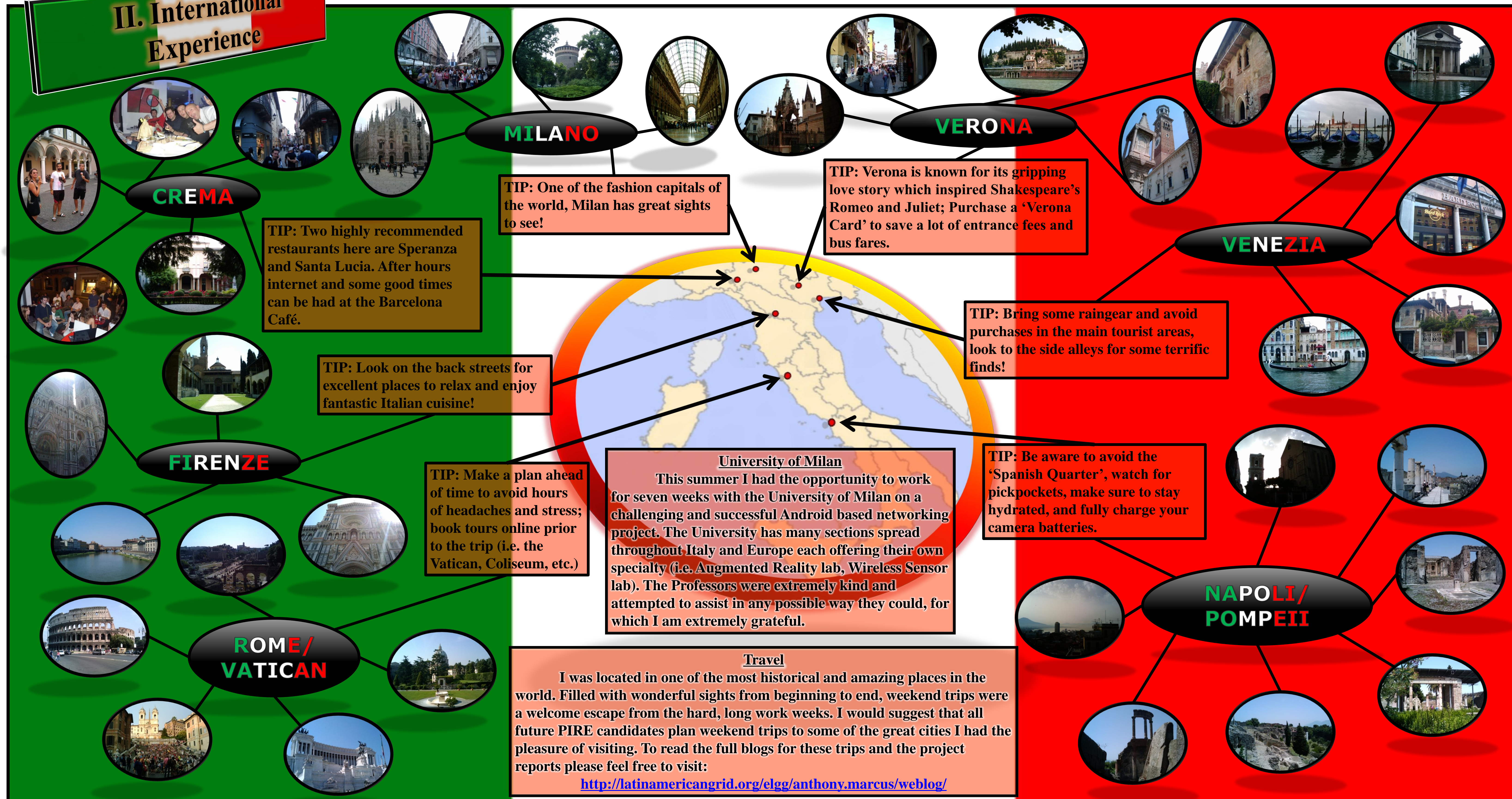
CONCLUSIONS

We have shown that there exists a vast quantity of possible scenarios for the implementation of WSNs to monitor our surroundings. These networks provide us with important information and statistics that help us better understand the patterns that occur in nature and supply us with the ability to notice when some irregularity exists within a given pattern. Depending on the environmental conditions, WSNs provide us with a highly adaptable solution with which we can easily monitor specific attributes with only minor modifications to the sensor boards or simply weather-proofing the motes themselves to prevent corrosion or water damage to the internal components.

After our observance of several implementations of WSNs in both personal area networks and natural disaster mitigation, we observed the need for some technology that would be able to access the sensed information via a wireless connection. Our solution is based on the current widespread use of cellular phones, specifically the emergence of the Android based smart phone. Using our highly adaptable application, individuals are able to read and manipulate the data from these networks via a local wireless connection or remotely through an internet connection.

II. International Experience

MILANO

VERONA

CREMA

VENEZIA

TIP: Two highly recommended restaurants here are Speranza and Santa Lucia. After hours internet and some good times can be had at the Barcelona Café.

TIP: One of the fashion capitals of the world, Milan has great sights to see!

TIP: Verona is known for its gripping love story which inspired Shakespeare's Romeo and Juliet; Purchase a 'Verona Card' to save a lot of entrance fees and bus fares.

TIP: Bring some raingear and avoid purchases in the main tourist areas, look to the side alleys for some terrific finds!

TIP: Look on the back streets for excellent places to relax and enjoy fantastic Italian cuisine!

FIRENZE

TIP: Make a plan ahead of time to avoid hours of headaches and stress; book tours online prior to the trip (i.e. the Vatican, Coliseum, etc.)

University of Milan
This summer I had the opportunity to work for seven weeks with the University of Milan on a challenging and successful Android based networking project. The University has many sections spread throughout Italy and Europe each offering their own specialty (i.e. Augmented Reality lab, Wireless Sensor lab). The Professors were extremely kind and attempted to assist in any possible way they could, for which I am extremely grateful.

TIP: Be aware to avoid the 'Spanish Quarter', watch for pickpockets, make sure to stay hydrated, and fully charge your camera batteries.

NAPOLI/ POMPEII

ROME/ VATICAN

Travel
I was located in one of the most historical and amazing places in the world. Filled with wonderful sights from beginning to end, weekend trips were a welcome escape from the hard, long work weeks. I would suggest that all future PIRE candidates plan weekend trips to some of the great cities I had the pleasure of visiting. To read the full blogs for these trips and the project reports please feel free to visit:
http://latinamericangrid.org/elgg/anthony.marcus/weblog/

III. Acknowledgements