

Robotics, Prototyping Neutron Detectors, Software Metrics and Sea Water Antenna

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Operational Sea Water Antenna

Methods

Neutron Detectors

-Using an existing He-3 neutron detector to prototype a radiation detector that will be fitted into future projects.

Software Metrics

-Metrics such as complexity values provide a quantitative basis for the development process to improve software quality.

Sea Water Antenna

-Using network analyzers to determine the voltage standing wave ratio (VSWR) and gain of various water based monopole antennas.

Robotics

-Using ROS Viz as a simulation tool and Google Earth as an interim visualization tool for displaying multi-story buildings maps created by autonomous robots for proof-of-concept.

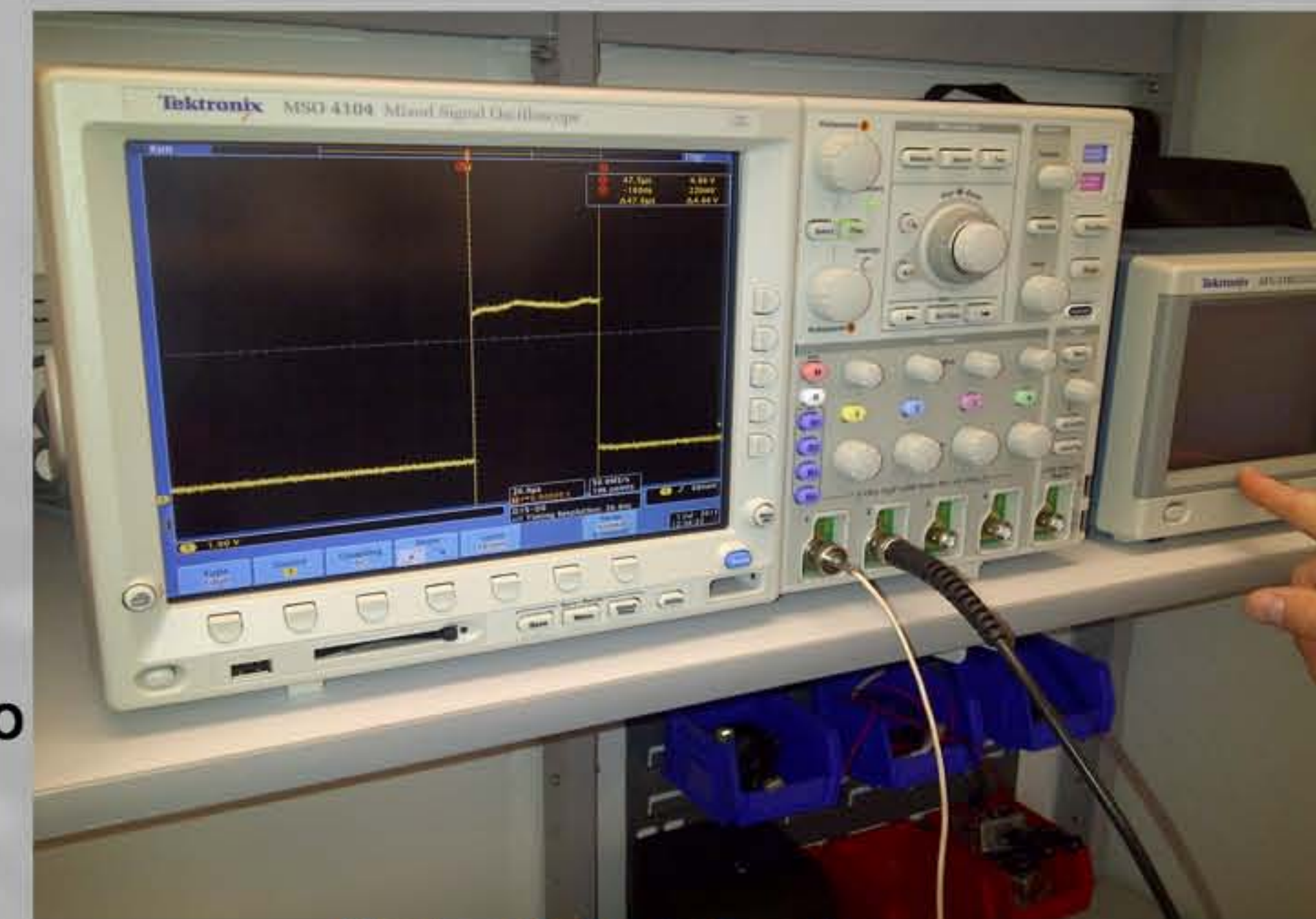


Blueprint of an underground World War II bunker displayed on Google Earth based on the map created by a robot.

Introduction

SPAWAR Systems Center Pacific (SSC PAC) is the US Navy's Research, Development, Acquisition, Test and Evaluation facility which emphasizes Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR).

At SSC PAC we have worked on robotics, antenna and computing software metrics.



Neutron Pulse in Oscilloscope



Helium-3 Neutron Detector

Conclusion

Through this internship, we have gained valuable experience which will guide us into our future careers. The mentors and other professionals who we have worked shared their knowledge and expertise. By researching in our respective fields, we have seen what new technology will become available in the near future. We can now effectively maintain a focus on what's important within software metrics, determine with instruments neutron collisions and antenna radiation, as well as modeling buildings with robotics. These skills will have forever shaped our future careers in Science, Engineering and Technology.

Results

Neutron Detectors

-The prototype will count the neutron incidents and relay the information remotely.

Software Metrics

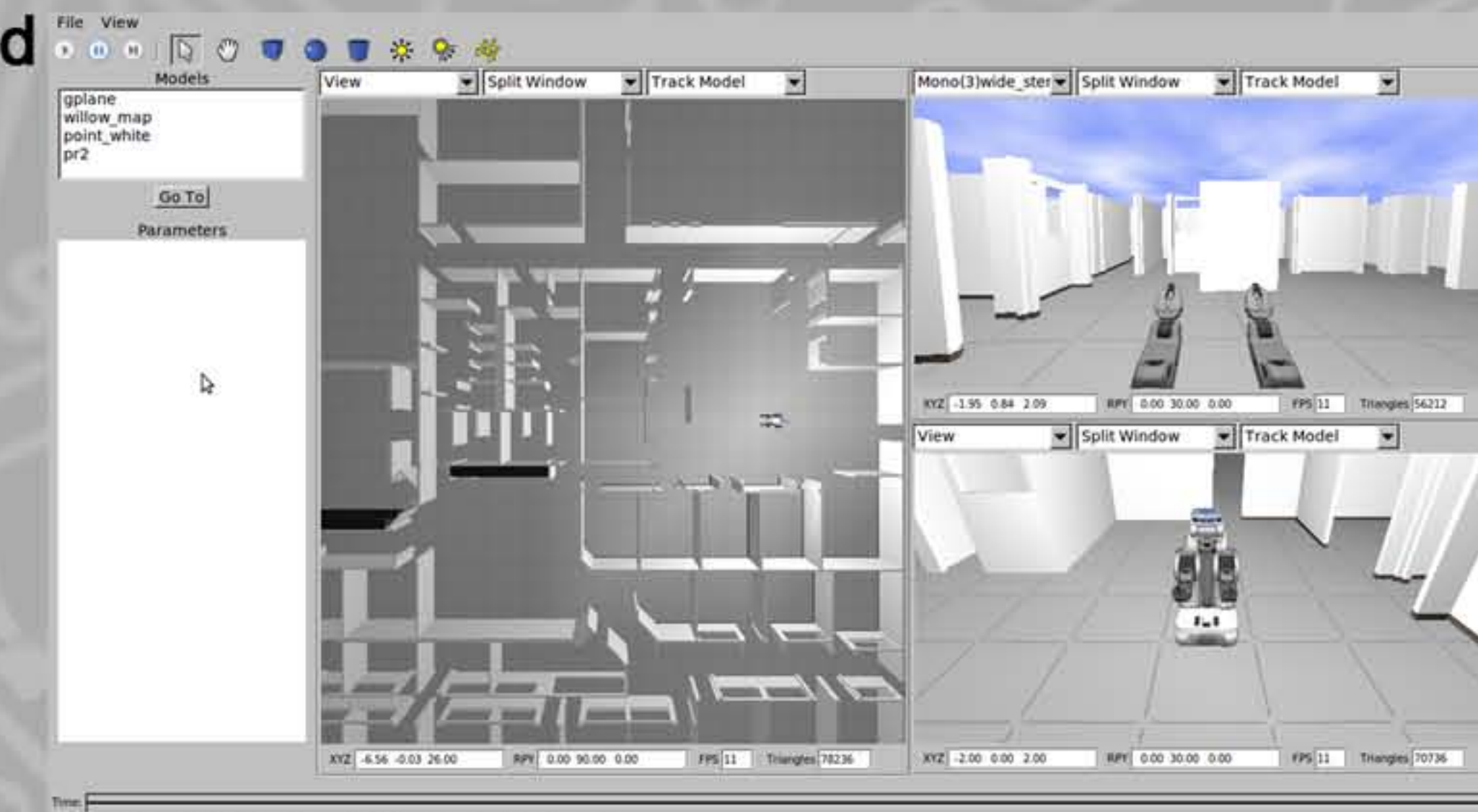
-Measurement results include control type metrics which are used to monitor software processes and identify areas in the source code where action is required.

Sea Water Antenna

-While the length of traditional metallic monopole antennas is related to frequency by $L = \lambda/4$ and $f = c/\lambda$, Water based antenna vary by the saline concentration

Robotics

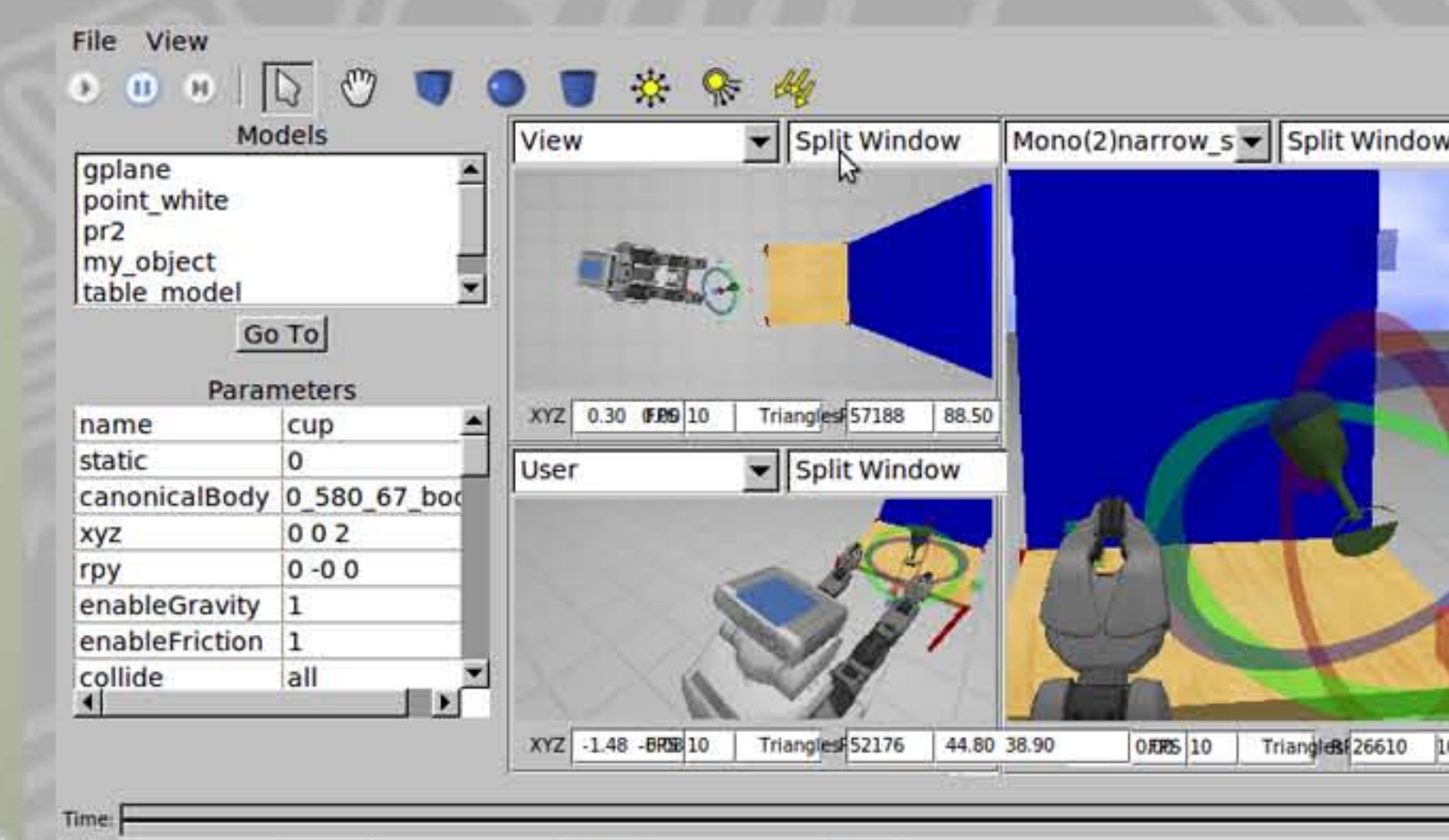
-Autonomous exploration of multi-story buildings inside ROS worlds accelerated development work and displaying the results on Google Earth helped prove the concept.



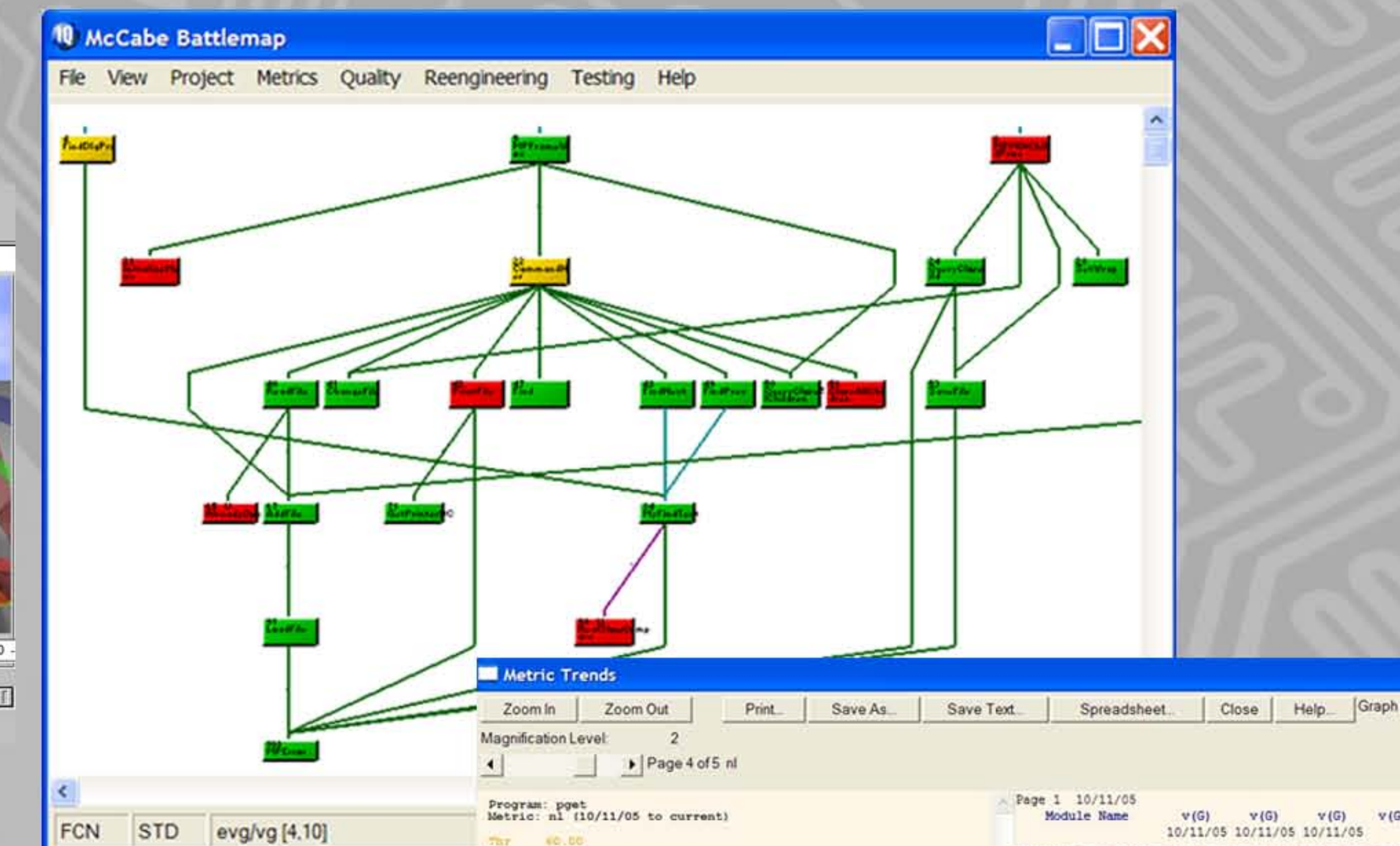
Simulation of robot in building floor environment



Detector and Incident counter



Simulation of Object Manipulation



Developing and validating models of software development. Metrics can be used to improve software quality.



Demo of the Sea Water Antenna with Mentors and Congresswoman Susan Davis

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