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Virtual Crime Scene Reconstruction Laboratory

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Pace University
Forensic Science Program
Dyson College

Virtual Crime Scene Reconstruction Laboratory

Final Report for Thinkfinity Grant
Cornerstone 1

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The crime scene is a very unstable environment and **as a result must** be documented well. Out of all of the different kinds of documentation, photographic evidence (establishing, medium range, and close-up) is one of the most widely used. The purpose of this research project is to enhance the current method of photographic evidence to include the necessary information of a crime scene without the unnecessary destruction that occurs with too much activity. **The completion of this task will** use a digital camera with a fisheye lens to take pictures of an area (including a designated crime scene room) and then create a panoramic using a special computer program. The program will allow analysts to view an undisturbed crime scene in its highest possible integrity **and at the highest possible resolution**. The program even **includes a measurement function** that is useful in determining and recording measurements of the crime scene.

The project started in the summer of 2009 and there are two graduate students involved, Eric Sorrentino and Michael Mosco. **It began by** taking pictures of each lab room and different sections of the prep area in the Chemistry and Biology departments. The original plan was to use a Nikon D300 digital camera equipped with a fisheye lens to take six pictures in one 360-degree turn of the camera (the pictures being taken in intervals of 60 degrees) and to take them from as close to the middle of the room (measured from each wall and the ceiling) as possible. From there the pictures are uploaded onto a Dell optiplex 960 computer set aside for research purposes. Using the Autopano Pro 2 program, the six pictures are stitched together creating a 360-degree panoramic view of the scene. The panoramic can be put into use using the Crime Scene Virtual

Tour program, which allows the user to pan, left, right, up, and down. By adding more than one panorama to the list the program can link other files together creating the virtual tour. By clicking on the notations, the user can virtually move through the panoramas. One of the issues that we found during this process was the fact that when the Autopano Pro 2 was creating the panoramas, a large black dot appeared at **opposing** poles (top and bottom) of the 360-degree tour. **This was due to the angle limitation of the fisheye lens in the vertical direction.** Many attempts were made to correct this problem. The solution that was agreed upon was as follows: instead of taking six pictures as originally planned twelve pictures shot at different angles would eliminate the black spots. The camera is tilted to a 65-degree angle towards the ceiling and, using the same 60-degree intervals as originally stated, six pictures are taken. The camera is returned back to 0 degrees and six more pictures are taken. When uploaded and stitched together, the large black spot on the north pole of the panorama was filled in with a continuous picture. When similarly tested to extinguish the spot on the southern part of the panorama, the stitching became problematic due to inconsistencies of the legs of the tripod (the legs would not have enough points in common for the program and therefore would appear blurry and inconsistent). Since this new method was successful the lab rooms and areas were all redone to fit this new way. Overall the project has been steadily progressing from the start at the end of January. At this point the virtual crime scene is 90% completed with all of the chemistry labs and areas linked together and most of the biology sections linked. A mock crime scene was also created and photographed using this method and is also included in the virtual tour. The outcomes obtained so far were relatively the outcomes imagined.

One of the activities that are not completed yet is the computer's ability to measure objects in a created panorama. This part of the program, however, has been tested on a number of occasions but has not been perfected yet. The program is supposed to use general measurements of the room (length, width, height) to determine the measurements of smaller items in the scene (i.e. a knife on a table). In the tests that were done the measurements that were determined by the computer and the measurements made on the actual object were off by a few millimeters. This discrepancy was probably due to certain settings in the program that need to be further investigated and adjusted.

This project has **directly affected both the students and faculty members of the Forensic Science Program at Pace University**. **The program along with the camera was**

used in the Crime Scene Processing course offered for forensic science majors. More specifically, it was used in the laboratory setting of the course to teach students the fundamentals of photography as well as advanced techniques associated with the research being conducted. The program proves to be an exceptional teaching tool and will remain a part of the curriculum **for the foreseeable future.**

This project has the potential to change the future of crime scene photography and the preservation of evidence. In the upcoming weeks, the virtual tour will be completed in its entirety. Both the chemistry sections and biology sections will be linked together along with the mock crime scene. The important objects in the crime scene will also be labeled. The measurement application with also be assessed and applied as well.