2014 CIS SUMMER INTERN PRESENTATIONS

AUGUST 15, 2014

9AM

CARLSON AUDITORIUM

R·I·T | College of SCIENCE

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Senior Associate for Outreach and Communications

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CLOSING REMARKS

ABOUT THE CIS HIGH SCHOOL SUMMER INTERNSHIP PROGRAM

The summer of 2014 marked the fifteenth year of the high school summer internship program at the Center for Imaging Science. This unique program offers a limited number of highly qualified juniors the opportunity to work side-by-side with world class scientists on a variety of imaging-related research projects. These internships give students the chance to get valuable hands-on experience in a real laboratory setting as contributing members of a research team. The 2014 interns, who represented 14 local and 1 out-of-state high schools, performed research in eight different labs throughout CIS. Special events throughout the summer included Friday cookouts, a picnic dinner field trip to Mees Observatory, an exclusive Skype session with CIS alumnus and NASA employee Matt Montanaro, and weekly Center-wide programs including movies and seminars. Interns were asked to keep daily online journals of their experiences, the links to which are listed after project abstracts in the following pages. More information can be found at: http://www.cis.rit.edu/interns

INTERNSHIP PROGRAM LEADERS:

Bethany Choate, Senior Associate for Outreach and Communications, Chester F. Carlson Center for Imaging Science – Program Director

Bob Callens, Physics Educator, Honeoye Falls-Lima High School – Lead Program Coordinator

Joe Pow, Associate Director, Chester F. Carlson Center for Imaging Science

Dr. Stefi Baum, Director, Chester F. Carlson Center for Imaging Science

ANALYSIS OF YOUNG, PRE-MAIN SEQUENCE STARS

Wesley Smith (Brighton) and **Lindsay Haefner** (West Irondequoit)

Laboratory for Multiwavelength Astrophysics

Advisor: Dr. Joel Kastner

To adequately model young star protoplanetary systems, constraints yet to be determined must be placed on mathematical models; as a result, scientists are not sure exactly how planets are formed. In this experiment, we will analyze and identify characteristics of young stars (<100 million years old) near the solar system with the help of the Set of Identifications Measurements and Bibliography for Astronomical Data (SIMBAD) and previous studies. Collection of data such as spectral type, distance from the solar system, and x-ray source information will allow for the creation of a comprehensive grouping of stars that meet our criteria. Our analyses of the approximately 2000 stars will culminate in determining whether each star is a candidate for planet formation, which will allow further research to be conducted in the area of protoplanetary systems.

http://wjs2014.tumblr.com
http://lindsaycis2014.tumblr.com

PREDICTIVE TENDENCIES IN HAND-EYE COORDINATION

Victoria Thrasher (Gates-Chili)

Perform Laboratory

Advisor: Dr. Gabriel Diaz

Humans are constantly using hand-eye coordination. However, the human nervous system is hindered by a 100-150ms latency between when the eye documents an altercation and when the hand accommodates accordingly. A virtual reality system can be used to deduce if the human brain predicts an external action to compensate for this latency. Data taken from a previous experiment was utilized to determine the velocity of the hand and to create a simulation demonstrating the hand's movement path during each trial. This simulation allows the user to recognize if the hand's motility was in a predictive fashion. These tools can then be used to see if the predictive adjustments occur regularly or inconsistently.

http://vic07kyt.wordpress.com

DEVELOPING A DIY CAMERA

David Lewis (Wheatland-Chili), **Madeline Wolters** (Hilton), and **Rachel Shadler** (West Irondequoit)

DIY Camera

Advisor: Joe Pow

There are many DIY cameras on the market today. However, these kits are either too challenging or not challenging enough. As a result, the DIY camera lab was developed. We set out on the task of creating a DIY camera for prospective imaging science students, with the main premise of teaching them about imaging systems and how they're built, by requiring the person to do more than just use a screwdriver. By observing and identifying elements of the imaging chain, we were able to develop an idea of what we wanted to do. However, given the time constraints, this camera isn't the final product, but rather a platform to build upon in the years to come.

http://mudo146.wordpress.com
http://zyxwvutsrqponmlkjihgfedcbaintern.tumblr.com
http://the-rit-intern.tumblr.com

THE SUN TIME-LAPSE NAVIGATOR: A TOOL FOR SOLAR EDUCATION

Rory Bloechl (Harley) and **Jimmy Shih** (Webster Schroeder)

Insight Laboratory

Advisor: Dr. Stefi Baum

In the past few decades, technology and the sciences have made great strides; however, these great strides have left the average person behind. We hope to expand interest in the sciences—especially in Astronomy—by designing and building innovative technologies with interactive visuals. Our latest development is the Solar Time-lapse Navigator (STN), an interactive time-traveling projection of the Sun. By utilizing the libraries of the Solar Dynamic Observatory (SDO), the STN creates an interactive model, consisting a timeline of the images of the sun. This allows the user to go back in time and observe the Sun's rotation, as well as solar flares and magnetic fields. Features such as wavelength viewing options will enhance the experience and perhaps shed new light on the various layers of the Sun. If successful, the STN can provide a unique experience to kids and adults alike, which may foster a greater interest in the cosmos.

http://rkbpci.blogspot.com
http://jfspci.wordpress.com

REMOTE SENSING OF GRANULAR MATERIALS, MODELING, CALIBRATION, AND VALIDATION USING GRIT

Abraham Glasser (Pittsford Mendon)

The Digital Imaging and Remote Sensing Laboratory

Advisor: Dr. Charles Bachmann

Current remote sensing models of light matter interactions with granular materials have proved to be not fully reliable. For example, several of said models have significant errors, especially when the scatter is strong and anisotropic. However these models can be useful, as Hapke's model has shown itself as a good starting point for our own models. The recently developed Goniometer at the Rochester Institute of Technology (GRIT) will be used to produce more suitable models for study. The GRIT has been designed to capture the bidirectional reflectance distribution function (BRDF) of the various samples it is subjected to. Analysis of these BRDF's will show how they change with density, composition, grain size distribution, and moisture content of the material. Also, this will be used alongside hyper-spectral imaging to assist in validation of the resulting data. This data will go on to create final, satisfactory models for light-matter interactions within various granular materials.

http://ritcisremotesensinginternship.blogspot.com

USING REMOTE EYE TRACKING TO DISCOVER DIFFERENCES WHEN READING OFF OF A PAGE AND A SCREEN

Elizabeth Thrasher (Gates-Chili)

Multidisciplinary Vision Research Laboratory

Advisor: Dr. Susan Farnand

The purpose of this investigation was to determine the differences between how people read off of a page and a screen. Subjects were calibrated with eye tracking equipment to determine their behavior in several different reading situations. Subjects read two pages of a book on a computer monitor and two different pages from the same book that sat in front of the computer monitor. Font size and style were kept the same. Eye tracking technology was then used to compare statistical differences between the two actions such as the number of blinks, fixations, and saccades per second and minute as well as the overall time. After comparing the data, it was found that people typically blinked more often while reading the book than on the screen while the differences in fixations and saccades and time were not large enough to reach the level of significance.

http://lizzythrasherinternship2014.blogspot.com

ANALYZING DIFFERENCES IN EYE MOVEMENTS OF TEENS AND ADULTS WHEN READING

Jacqueline Chan (Webster Schroeder)

Multidisciplinary Vision Research Laboratory

Advisor: Dr. Susan Farnand

Teens may be more capable of learning languages and other abilities than adults due to the fact that they have a higher amount of neuroplasticity than adults. We asked whether this translates into the teens' eye movements while reading, and how these movements progress into adulthood. Both teen and adult subjects read the same series of passages on a computer screen; each passage had a different level of difficulty. The subjects' eye movements were tracked with a remote eye-tracking device. By recording the reading patterns of the teens and adults and comparing them to each other, we hope to determine how one's reading abilities develop from adolescence to adulthood. Their eye movements were also analyzed to determine how the subjects adjusted to the more difficult reading passage. Both teens and adults had longer, more frequent fixations, and shorter saccades during the more difficult passages. In addition, the adults' eye movements varied more between the different passages than the teens' eye movements. This research could improve the way teens and adults are taught to read, and could provide insight on the effects of neuroplasticity on reading.

http://jacquelineritinternship.wordpress.com

RESEARCHING, LEARNING AND BUILDING A LAB WEBSITE

Adam Maier (McQuaid)

Biomedical Imaging and Modeling Laboratory

Advisor: Dr. Cristian Linte

I am spending six weeks this summer learning web development. Today our web presence is literally our face to the world – I am building the face of the new Biomedical Engineering laboratory, the Biomedical Modeling, Visualization and image-guided Navigation lab. As the name suggests, this lab entails the research and development of new tools and techniques for imaging, modeling, visualization and surgical navigation for minimally invasive interventions. I have designed and built two different websites. The first one is a basic hyper text markup language (HTML) and cascading style sheet (CSS) web page. It is built by creating and editing HTML documents in a text editor, such as notepad++. The second site is a based around Drupal, a content management system (CMS). A CMS is a premade program that is used to build a website. It has the core programming already written so that it is easier to assemble a webpage with more complicated programming. This project is designed to lay a foundation for the Biomedical Engineering lab to present itself.

http://ritinternadam.tumblr.com

UNDERSTANDING FACIAL RECOGNITION

Alex Kautz (Brighton) and Emma Pratt (Rush-Henrietta)

Facial Recognition

Advisor: Dr. Andy Herbert

Carrying out seemingly trivial tasks, such as facial recognition, can trigger our minds to perform surprisingly complex procedures. Our objective is to develop a greater understanding of the perceptual, cognitive, and motor skills which are employed in facial recognition. We aimed to identify the prominent facial features used in recognition, as well as discover if these features are recognized in a rapid serial visual presentation (RSVP), resulting in an "attentional blink." Our RSVP paradigm entails participants to view multiple stimuli consecutively, and is unique to its predecessors in that facial features are concealed.

http://alexkautz.tumblr.com
http://esppci.blogspot.com

GAZE ANALYSIS ON 3D RECONSTRUCTED SCENES

Maryam Bahrani (Hotchkiss School, Connecticut)

Perform Laboratory

Advisors: Dr. Gabriel Diaz and Dr. Reynold Bailey

An ongoing challenge with head-mounted eye-trackers is how to analyze the data from multiple individuals looking at the same scene. Previous approaches involve capturing a high resolution panorama of the scene and then mapping the fixations from all viewers onto this panorama. However, such approaches are limited as they typically restrict all viewers to observe the scene from the same stationary vantage point. We propose a visualization method of projecting gaze points onto a 3D reconstructed scene. Data for the 3D reconstruction is acquired using a Microsoft Kinect. The system enables the visualization of gaze data from multiple viewers on a single 3D model of the scene instead of multiple 2D panoramas. To accomplish this, frames from the eye-tracker are matched to images from the Kinect. The result can be viewed on a desktop or within an HMD such as the Occulus Rift to provide a more immersive experience.

http://my-internship-at-rit.blogspot.com

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UTC Aerospace Systems

CONGRATULATIONS TO THE INTERN CLASS OF 2014!