CNAS Undergraduate Research Day
Thursday, May 3, 2018
Abstract Deadline: Wednesday, April 19, 2018

Abstract Instructions:

To present your research at CNAS Research Undergraduate Day, please submit the following electronically to Gale Lininger (GaleLininger@missouristate.edu)

No later than 5:00 pm on April 19, 2018.

- ✓ Name and email address
- ✓ Abstract (WORD document - see format on next page) – Times New Roman 12 pt font (no more than 200 words)
- ✓ Please see the subsequent page of example abstracts and follow the formatting exactly.

Poster Instructions:

- ✓ **All displays must be set up by 1:00 PM on May 3. They will remain posted from 1 pm – 3 pm. Presenters are expected to be on site from 1:15-2:45.**
- ✓ *Wooden display boards will be provided; therefore you must limit the size of your poster to **4 feet tall x 6 feet wide**.*
- ✓ *Presenters will bring their own presentation materials which will be secured to the display board with push pins. Only materials that are attachable to the display board are allowed.*
- ✓ *Push pins will be provided to secure poster materials*

Speaker and the awards ceremony will begin at 3:00 pm.

NEOTROPICAL BIRD POPULATION ASSESSMENT AT BULL SHOALS FIELD STATION. Baillie Shebesta, Biology. Faculty Advisor: Dr. Janice Greene.

Neotropical migratory bird species spend their winters in Central and South America. They then migrate to North America in the spring and summer to breed and raise their offspring. Neotropical birds are sensitive to ecological and environmental disturbances and changes. Monitoring their populations allows biologists to assess the overall health of the environment. Birds were caught in mist nests at the Bull Shoals Field Station. Researchers recorded data for individual birds including species, age, sex, wing length, weight, date, time of capture, and each bird was given a leg band. This study analyzed data from May through August 2010-2015. Analysis of the data revealed some basic patterns such as the Eastern Tufted Titmouse is the most common species caught; birds were most active during the morning; and most birds were caught in June and July. There was a fair amount of recaptures, which means that birds are returning to the area, and their preference for this habitat is an indication that it is strong and healthy.

AUTOMATED LICENSE PLATE DETECTION WITH OPENCV AND OPENALPR ON A RASPBERRY PI CLUSTER. Jade Stobbe, Daniel Fennessey, Kaylen Bates, Aaron Rielly, and Sarah Gabbard. Computer Science. Faculty Advisor: Dr. Razib Iqbal.

Computer vision is a field that includes methods for acquiring, processing, analyzing, and understanding images from the natural world in order to produce numerical or symbolic information. Using the libraries, openCV and openALPR, our system is able to receive an image or video and detect license plates present in them. These images or videos are analyzed and processed on a Raspberry Pi cluster, which is a distributed system running Hadoop Map Reduce. If the cluster detects a license plate, then it will upload the license plate number, location, timestamp, and a snapshot of the vehicle to an online database. Our project was designed to help decreasing the response time of law enforcement officials in crime investigations involving vehicles. For example, if police were using our system, information gathered with our software can be cross referenced against a different database of active arrest warrants, stolen vehicles, amber alerts, or other crimes and our software will alert officials of seen vehicles of interest. In the future, we plan to enhance our our system so that officials could also generate maps of vehicle locations and predict possible routes of transit. However, application of our software is not limited to law enforcement agencies only. It could be repurposed for campus security, automated parking enforcements, or automatic gate operations.

FUNCTIONALIZATION OF DEFECT DENSE GRAPHENE AND A COMPARISON WITH MOLECULAR DYNAMICS SIMULATION, Dan Jones**,** Physics, Astronomy, and Materials Science. Faculty Advisors: Dr. Kartik Ghosh and Dr. Ridwan Sakidja.

I investigate the pH-dependent surface functionalization of few layer graphene and graphene oxide (GO) with a comparison of experimental and computational results. It has been discovered that the defect density of aqueous graphene and GO has a strong pH-dependence, the effect of which can be quantized using the D/G ratio of the corresponding Raman spectra. The effect of low vacuum annealment of drop casted samples on SiO_2 substrates is evaluated via the same D/G ratio, and the effect is found to be a slight elimination of pH-dependence. The experimental results can be verified by a comparison to molecular dynamics simulation of a generated Raman spectrum at various defect densities. This verification is difficult because the defects can arise from a multitude of sources. This examination focuses on defects arising from hydration of surface dangling bonds—a likely result of lowering the solutions pH. The Raman spectra are then correlated to the experimental D/G ratios, and the two spectra are compared, paying specific attention to the wavenumbers, FWHM, intensity, and intensity ratios of the D, G, and 2D peaks. The simulation studies can again be extended to include the effect of annealment before generating a Raman spectrum at various defect densities.