

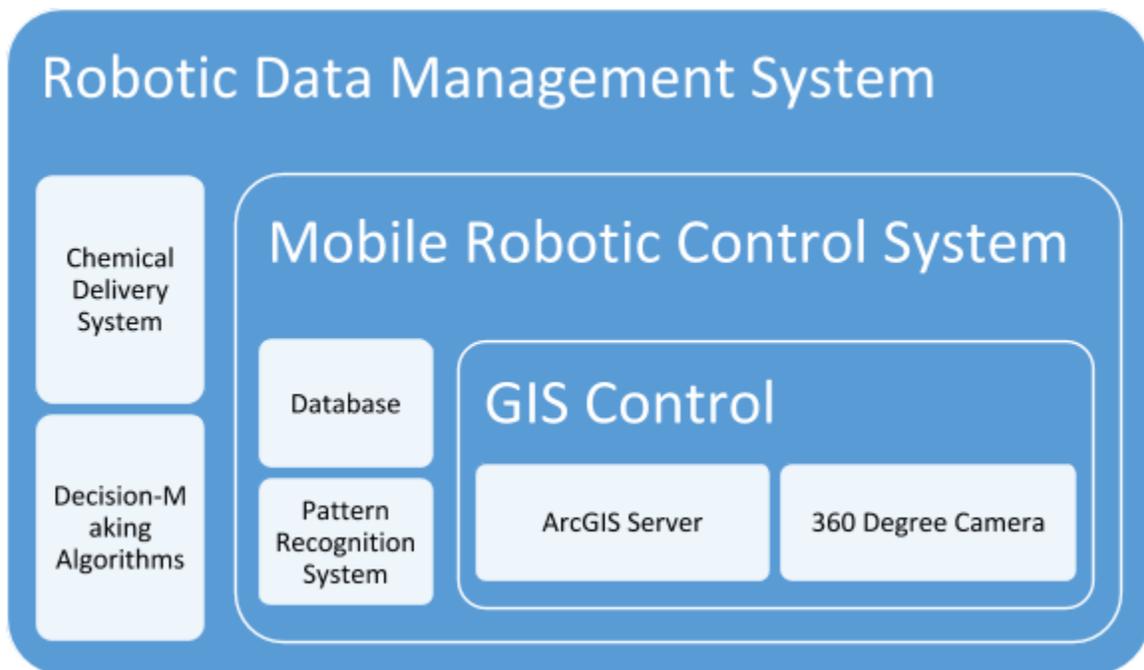
**COSC4340 Special Topic  
Summer 2020**

**Development of an Autonomous Mobile Robotic System for Rapid Detection and Control of Insects**

P.I.: Junkun Ma; CO-PIs: Li-Jen Lester, Qingzhong Liu, David Hoffpauir, Autumn Smith-Herron

This project focuses on the development of an autonomous mobile robotic system that is capable of navigating through unstructured terrains such as pine forest and is integrated with image capture and analysis capabilities for real-time identification of designated species as well as collecting environmental and geographic information. A wireless communication system will be built to allow data collected to be transferred from the robotic system to a base station to assist with rapid decision-making and strategy development. Tools with functions such as spraying pesticide to mitigate and control a potential or existing outbreak will also be designed and integrated into the system for in-situ treatment. The concept of modularized design will be adopted so that the system can be easily configured for rapid survey and detection of other species. A team of computer scientists, mechanical engineer, geographic information system analyst, and comparative parasitologist will be working together, and the ultimate goal is to reduce potential adverse impacts of economic or environmental concerns due to invasive species.

**A Modularized Diagram for Autonomous Mobile Robotic System**



## 1. GIS integration with Beagle Bone Black Robots

Libuvc\_camera

Image\_view

fswebcam

Fall 2019: Created a script to be executed on the master device that automatically logs into the BeagleBone Black (slave) via ssh, navigates to the proper directory, runs the fswebcam application to take a picture, save it to the local SD card, and then sends it over to the master device and saves it to the desktop.

## 2. Python Programming

### 3. Linux

#### Camera Integration and Communication

**Video Stream:** File structure permission issues

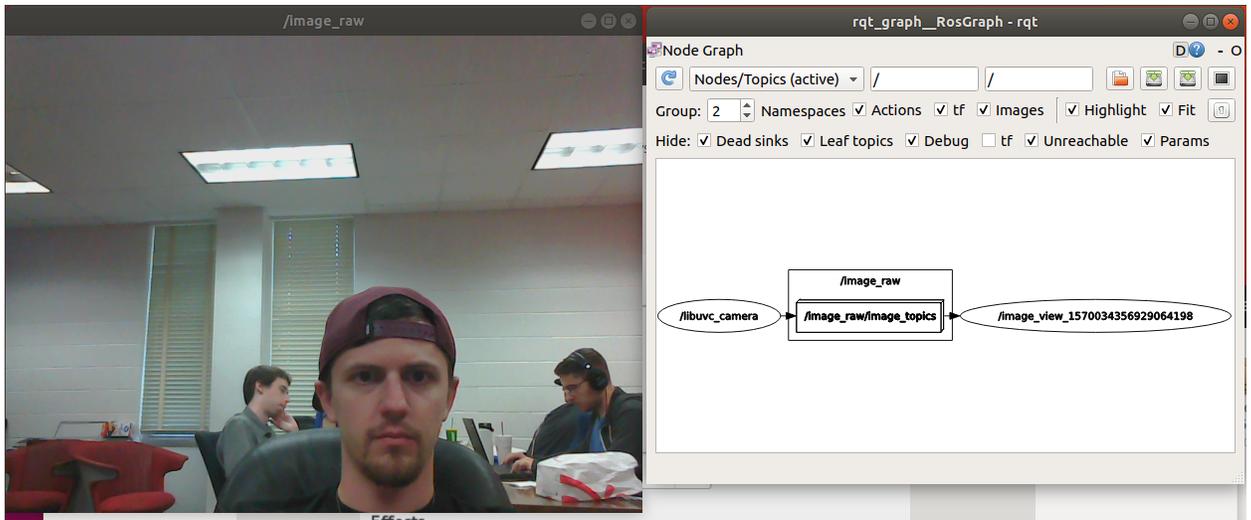
**Self-refreshing html file**

Fall 2019: Successfully built ROS environment on Linux machine

Explored and imported useful ROS packages critical capturing and displaying video feed from USB cameras. Explored ROS concepts of Nodes, Topics, and data publishing and subscriptions. These elements will be critical to the overall project. Implemented ROS tool packages that visualizes the internode relationships, displaying the topic pathways and the flow of published data and subscriptions.

## RQTGraph

•



## 4. Circuits Board, Diodes and Transistor Onsite Database