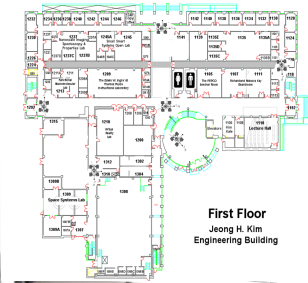
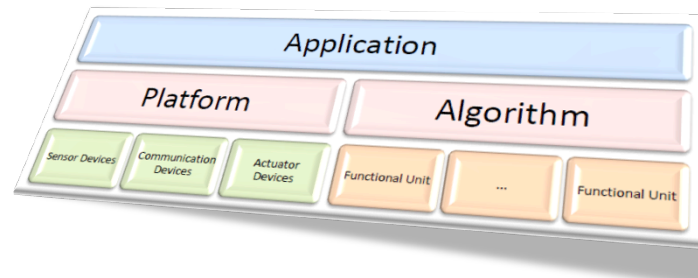


## Technical Summary:

### Robotic Software Framework

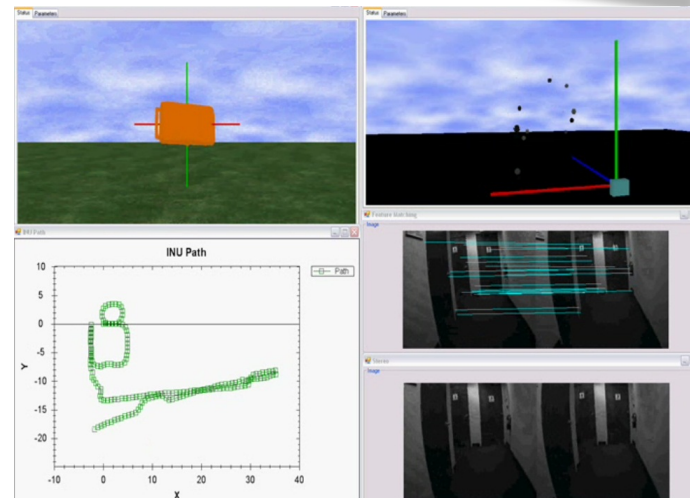
We have developed a software framework to handle any robotic platform. The idea is that the hardware and software should be thought of as separate pieces of the robot. The framework is used for all projects in the Autonomous Systems Lab as well as the Controls Capstone class ENEE408I. The framework has performed well in applications such as robotic soccer, autonomous racing, robotic navigation, and robotic mapping.



### Distributed Mapping and Fusion

In a key experiment the ASL Framework will be used in a series of experiments in distributed map building for applications in surveillance, patrol, and search. Generating maps of regions is an important application for autonomous robots. In this experiment we will have teams of robots cooperate to produce a map of a region and then use the map to solve problems.

In the experiment teams of robots equipped with cameras and other sensors are dispatched into a complex building (or region) to make a map of the region, including the locations and characteristics of specific features. An aggregate map is synthesized by fusing the maps of individual robots, in real-time.



### Cooperative SLAM Research

The focus of the Autonomous Systems Lab is SLAM research, Simultaneous Localization and Mapping. Mapping can be done easily with a known position, and a position can be determined easily with a known map, but when both are unknown, it is difficult to determine one's position and build a map at the same time. Vision based sensory combined with inertial navigation are the heart of the research at the lab. Using natural features in stereo images, the robots can "see" objects at distances, and can use human-like visual cues and inertial detection to determine both movement and environment data.

## Applications:

Robotic navigation and mapping has key applications in exploration, entering dangerous environments, household robotics, and more. When a robot can navigate and map an unknown environment, the applications are endless since any automation can take advantage of such information.