Lance Ragas
EECE 371
Smart Embedded Systems
Assignment 1
February 3, 2018

Robotics:

A search and rescue robot that can be deployed in situations where avalanches have trapped people. This robot will be able to detect where someone is and send its GPS location to a central hub using radio frequencies. Also, the robot will be able to detect the distance from the ground to top of the snow level. Using this information, the robot will be able to detect if the travel path would be suitable for human travel. The components for this system would be a LIDAR sensor, GPS chip, tracks able to handle the snow, encoders for wheel movement, and a RF transceiver. Machine learning can be used to predict where survivors might be knowing where the avalanche occurred. It can also predict, using data from previous avalanches and other suitable paths it should travel, the central hub will be able to give the rescuers a predicted safest past.

Supply Chain:

With a supply chain, you produce a product to be shipped out. You can make a supply chain that does a simple function like populating circuit boards. Using computer vision, a robot and analyze the alignment of the board and adjust it in the right place. Doing this, it can read a stamp on the board to know what components populate the board. Using a similar system to this, there could also be a secondary machine that repairs circuit boards and put new replacement parts on it. The components that make up this system would be a camera, microcontroller board, robotic part placement arm, and a robotic alignment arm. Machine learning can be applied to this by learning how long certain products last in certain environments. It can also be used to predict the use of components in different types of systems. Example, if the circuit is obviously for RF purposes, then it can predict what time of the year they can expect the most board runs for RF purposes.

Smart Home:

In the smart home, it will be able to detect where in the house you are and do tasks accordingly, depending on certain variables in the surrounding. The smart home will be able to detect where a person is in the home and use machine learning to predict things that they might want done. These things will be brewing coffee at certain times, turning lights on if a person is in the room and weather they usually turn the lights on at that time of the day, opening curtains at certain times of the day, and many more. The cameras will be used to detect what the person is feeling by their facial expressions and do things to cheer the occupant up, like play their favorite music. This system will consist of a two cameras in each room, a light sensor, a wearable device to transmit RF signals over 2.4 GHz, 4 antennas to localize where the person is in the room, sensors and various embedded systems connected appliances around the home. Machine learning will be used to predict when the occupants usually do certain activities so that it can do these activities for the occupants.