Informal Robot Proposal **Andy Kobyljanec  
EEL 5666 – IMDL  
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**General Overview**

For this lab I would like to create a swarm robotic system to inspect and repair a large surface on the ground. There will several ‘slave’ robots which roam about the field looking for imperfections, and one ‘master’ robot which will perform a needed task on the imperfection. This type of system could have many applications in industry, such as roof and floor inspection or minesweeping. A hierarchal system would allow me to consolidate the complexity in the system. With this I can build one complicated robot and several simple ones rather than several relatively complex robot. Creating only one complex robot will save trouble and keep the price low.

**Task Overview**

The terrain for this system of robots will be large, relatively flat, black, and smooth. Obstacles may be present, and need to be avoided. The robots will need to know where the edge of the terrain is, so a wall may need to be present on all sides. Imperfections will be represented on the surface by colored spots. If a slave robot encounters a colored spot on the ground, it can lay down a beacon and continue on until it runs out of beacons. The master robot will roam and rotate around until it finds a beacon. When the master does sense a beacon, it will approach it, pick it up, and perform whatever action it needs to do to repair the imperfection (such as lay down a patch). Below is a list of the respective robot tasks:

**Robot Design**

The design for both robot types will reflect their respective tasks. The slave robots will be smaller and carry a module to detect the surface color. They will also carry several beacons, and have a mechanism for placing them on the ground. The master robot will have a sensor array for detecting the relative location of the beacons. The master robot will also carry a mechanism to pick up and store beacons, but no way of knowing where any imperfections are.

**Sensors**

The following sensors would be needed for these tasks:

* Slave Robot
  + IR/Ultrasonic Range detection – obstacle avoidance
  + CdS cell + white LED enclosed in dark box – Color detection module
  + Push-button switches – bump detection
  + Push-button switches – detect if beacons supply is depleted
* Master robot
  + IR/Ultrasonic Range detection – obstacle avoidance
  + IR sensors – beacon detection, if beacons are IR LEDs.
  + Push-button switches – bump detection

**Actuators**

* Motors – drive and steer all robots
* Servos – operate various mechanisms to pick up or drop off beacons