Autonomous Robotics

Winter School of AI & Robotics Problem Statements

1. **Problem Statement I:**
   a. **USP**:
      i. Localization
      ii. Obstacle detection and avoidance
      iii. ROS, Rosserial
      iv. Arduino
   b. **Indoor Mapping Bot**: To build an autonomous bot capable of traversing the boundary of any given room and plotting the corresponding outline using a suitable plotting tool and rosserial communication. The bot may use ultrasonic/IR sensors for obstacle avoidance and must follow a suitable traversal strategy to replicate the task for any closed irregularly bounded area.

2. **Problem Statement II:**
   a. **USP**:
      i. PWM
      ii. Arduino
      iii. Path Planning and Optimization
      iv. Obstacle Detection and Avoidance
   b. **Mine Detector Bot**: To build an autonomous bot capable of detecting and reporting mines (simulated by black dots on a white surface) while optimally traversing a surface and avoiding obstacles(represented by red in the figure, simulated by actual objects).

3. **Problem Statement III:**
   a. **USP**:
      i. Path Optimization and Problem-Solving
      ii. Line Following
      iii. Algebraic Equation Solver Algorithm
   b. **Warehouse Bot**: To build a warehouse inventory bot, that is capable of analyzing user data regarding objects and their target locations, and using line following to traverse the warehouse layout and place all the objects, while optimizing the total time taken.