Smart Sonar Surveillance System

4(S)

1. **System Introduction:**

   The Smart Sonar Surveillance System (4S) is a defense inspired application that integrates an ultrasonic sensor and servo motor, controlled by a Raspberry Pi with integration of hardware and software. The system performs continuous scanning in a semi-circular arc (0–180 degrees) and generates a radar-style visualization of objects within the sensor detection range, marking them with a detection sound for the admin. The system will be used in a wide range of applications as follows:

   - **Military Bases** for Perimeter Intrusion Detections.
   - **Border Security** for unauthorized crossing alerts.
   - **Naval and Maritime Ops** as a simplified SONAR concept
   - **Civilian environments** such as warehouses or smart homes, etc.

   By combining low-cost hardware with software, the system demonstrates how surveillance can be simplified using easy-to-use tools.

2. **Stakeholders**
   - **System Administrator**

     Deploying, configuring, and maintaining the system will be the job of the system administrator.
   - **Security Operator**

     Monitors the Interface / Application and responds to a certain situation accordingly.
   - **Project Team**

     Their (Mine ;) task is to assemble the hardware, code the system, and ensure that I don't burn my laptop or Raspberry Pi ;) and upgrade the system if the need arises.
   - **Defense and Security Organizations**

     They are looking for a student from UP to help them adopt surveillance systems that are cost-effective, rapidly deployable, and adaptable to different environments. No application in the domain of space because sound doesn't travel in space (System can be upgraded for that too). For example, a Forward Operating Base (FOB) might use the system for PIDs (Perimeter Intrusion Detection), while a Coastal Security Unit uses it to monitor maritime approaches.
3. **Needs of Stakeholders**
   - **System Administrator Needs**
     1. Reliable Setup, Calibration tools, Benchmarking individual components
     2. Minimal Downsides and Easy Maintenance
     3. Access to Diagnostics of the system.
   - **Security Operator Needs**
     1. Clear and Simple Interface

2. Real time alerts with Alarms when something is within critical distance
3. Easy to Use

- **Project Team Needs**
    1. Enough Financial Support so we(I) don't have to be homeless ;) and touch grass.
    2. Direct Access to sensor data and test results
    3. Feed Back from other Stakeholders
    4. Expanding and upgrading the project to use signal processing for a real radar rather than just SONAR
- **Defense and Security Organization Needs**
    1. Affordable Alternatives to Conventional Radar Systems.
    2. Adaptable to every domain, including Land, Sea, and Air
    3. The System should be reliable so it doesn't stop working when needed.