CEP Mapping of the Project

1.Knowledge Profile (K's) Mapping

K's Attributes How K's Are Addressed Through Our Project CO PO				
K Code	Attribute	How K's Are Addressed Through Our Project	Related COs	Related POs
K4	Specialist Knowledge	Applied knowledge of robotics, embedded systems, sensor fusion (IR, ultrasonic, PIR), and camera integration for surveillance.	CO1, CO2	PO1
K5	Engineering Design	Designed line-following algorithm (PID), integrated detection & alert system, developed recording/streaming logic using ESP32-CAM / Raspberry Pi.	CO2, CO3,CO 4	PO3, PO5,
K6	Engineering Practice	Practically implemented using Arduino/ESP32, ultrasonic sensors, PIR, IR array, motor driver, buzzer, and laser, following prototyping standards.	CO3,CO 4,CO5	PO4, PO5, PO6

2.Complex Engineering Problems (P's) Mapping

P's Attributes How P's Are Addressed Through Our Project CO PO				
P Code	Attribute	How P's Are Addressed Through Our Project	Related COs	Related POs
P4	Practical Implementation	Assembled modules including IR array, ultrasonic sensors, PIR, motor driver, and camera into one integrated platform.	CO2, CO3	PO4, PO5
P5	Experimentation & Testing	Calibrated line-following PID values, tested ultrasonic distance thresholds, PIR sensitivity, and camera recording quality.	CO3, CO4	PO4, PO9
P6	Prototyping & Validation	Built a functional prototype of the patrol robot with real-time detection & recording, validated through indoor roaming tests.	CO4, CO5	PO5, PO6

3.Complex Engineering Activities (A's) Mapping

A's Attributes How A's Are Addressed Through Our Project CO PO				
A Code	Attribute	How A's Are Addressed Through Our Project	Related COs	Related POs
A3	Teamwork & Collaboration	Worked collaboratively in design, coding, circuit wiring, sensor integration, and debugging.	CO4	PO9, PO11
A5	Ethics & Sustainability	Ensured safe use of laser (<5mW), followed surveillance ethics, used rechargeable batteries for eco-friendly power.	CO3, CO5	PO6, PO7