

## Mini Rover Challenge

### Rooppur Nuclear Response Mission: Shield Restoration Operation

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#### 1. Mission Background

The year is 2085. The **Rooppur Nuclear Power Plant (RNPP) in Pabna, Bangladesh**, the country's most advanced energy facility, plays a crucial role in supplying stable electricity to the national grid.

The plant's **Shield Reactor Unit-2**, which regulates radiation containment and cooling systems, suddenly experiences a **critical malfunction** following a **power surge caused by regional grid instability**.

The containment field begins to weaken, and radiation sensors across the control blocks show rising readings. In response, Dr. Arif Rahman, the on-site nuclear systems specialist, is dispatched to inspect the reactor manually and restore backup power. But halfway through his operation, his protective radiation shield starts deteriorating due to elongated exposure.

With radiation levels continuing to climb, Dr. Arif sends an urgent transmission signal to the **Remote Control Station (RCS)**, a secure command and backup center located outside the main containment perimeter.

The message contained "manual intervention is too risky. The only option left is to deploy our emergency rover.

The rover must deliver an anti-radiation protection kit energy cell, then assess reactor control points, identify and install the faulty reactor power-shield energy cell, and restore the power-shield circuit ensuring the containment system stabilizes before a full-scale radiation event occurs.

## 2. Mission Objectives

Your rover must autonomously complete the following operations to stabilize the reactor containment system at Rooppur Nuclear Power Plant.

### Phase 1: Emergency Deployment and Delivery

- Start Zone – Remote Control Station (RCS)
- Launch the rover from the Remote Control Station, carrying the anti-radiation protection kit energy cell (0.5 kg object).
- Navigate through the Zigzag Path and Narrow Path, debris-filled plant exterior zone. **[change may be required on map]**
- Ensure safe and continuous communication with the control team throughout navigation letting them know your location at all times.
- Deliver the anti-radiation protection kit energy cell to Dr. Arif.

### Phase 2: Reactor Site Investigation

Area – Shield Reactor Unit-2 entrance exterior

- Move toward the Reactor Control Chamber, where visual fiducial markers are located, left by Dr Arif during the repair.
- Detect and interpret all fiducial markers placed in this area; each contains status information about which reactor subsystems have been repaired or remain unstable. [the status information will be delivered to the teams prior to the competition]
- Analyze the decoded data to identify the faulty power-shield energy cell voltage requirement.

### Phase 3: Energy Cell Installation and System Recovery

Area – Shield Reactor Unit-2

- Pick up the power-shield energy cell required for shield reactor unit-2 and carry it to the shield reactor maintenance room.
- Enter the Maintenance Room and install the selected reactor energy cell in the designated area.
- After successful installation, return the rover to the Remote Control Station (Start Zone), completing the round-trip operation.