

Kavach Safety System [UPSC Notes]

The horrifying train accident that took place in June 2023 at Bahanaga Bazar railway station in the **Balasore district of Odisha** has put a spotlight on the safety measures required to stop such tragedies. India successfully displayed Kavach, an indigenously developed automatic train protection system whose implementation is being taken up by the Railway Board. In this article, you can read more about the Kavach Safety System and its working from the [IAS exam](#) perspective.

Kavach Safety System

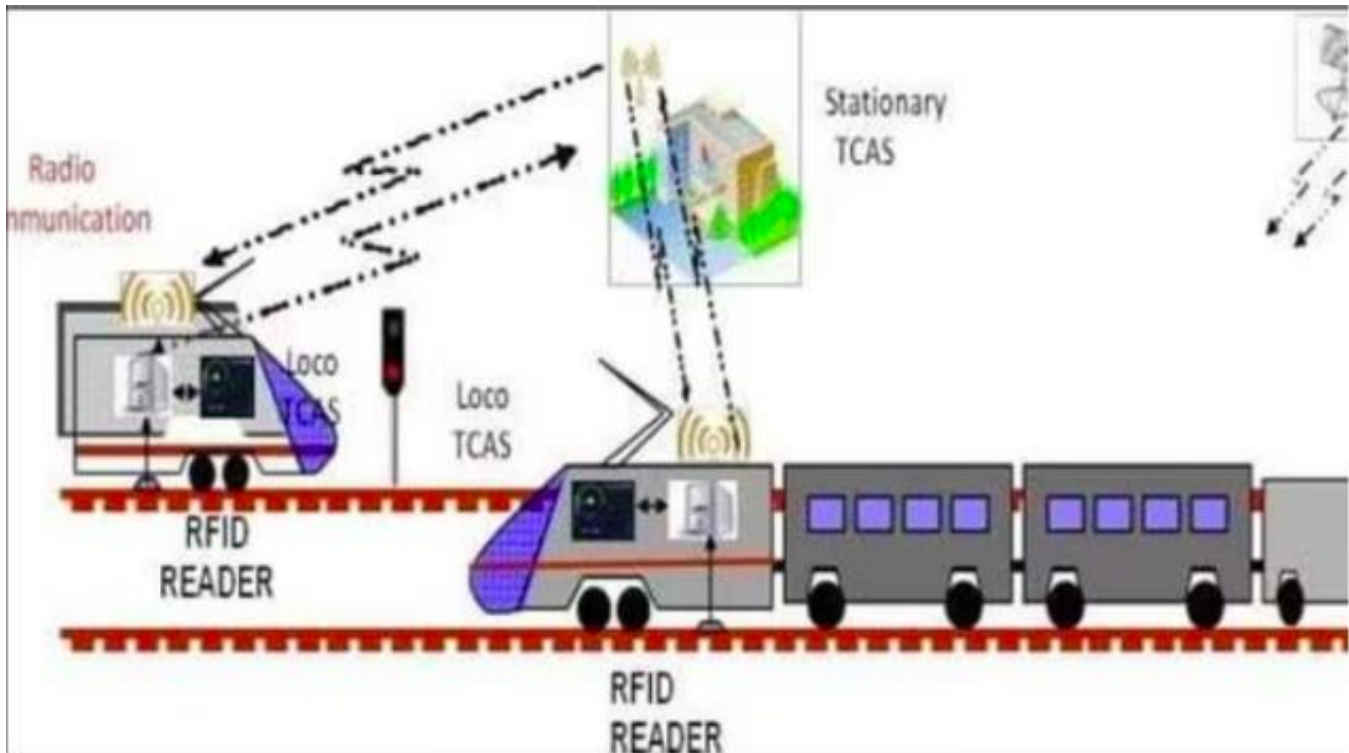
The KAVACH is an **indigenously developed Automatic Train Protection (ATP) system** developed by the Research Design and Standards Organisation (RDSO) in collaboration with the Indian industry.

- Kavach is a state-of-the-art electronic system that adheres to the highest level of safety standards called **Safety Integrity Level 4 (SIL-4)**.
- Kavach is designed to safeguard trains by preventing them from passing the Red (danger) signal and avoiding a collision.
- 'Kavach' is one of the most affordable, Safety Integrity Level 4 certified technologies, with an error probability of 1 in 10,000 years.

How does the Kavach System Work?

The Traffic Collision Avoidance System (TCAS) aids in two-way communication between the station master and the loco-pilot by using equipment on board the locomotive and transmission towers at stations equipped with Radio Frequency Identification (RFID) tags.

- The instrument panel inside the cabin notifies the loco-pilot of the signal in advance, as well as the permissible speeds to be maintained.
- If a red signal is jumped and two trains come face to face on the same line, the technology automatically takes over and applies emergency brakes.
- Furthermore, the Hooter engages automatically while approaching a level crossing, which is an invaluable tool for loco-pilots during foggy situations when vision is limited.
- During an emergency, the system also relays SoS messages. The Network Monitor System allows for centralised live monitoring of train movements.



Source: Hindustan Times

Kavach Deployment Strategy:

- The South Central Railway (SCR) Zone is a pioneer in the KAVACH - (TACS) implementation. Until March 2023, the Kavach system had been implemented over 1,465 km in the SCR limits in 77 locomotives and 135 stations.