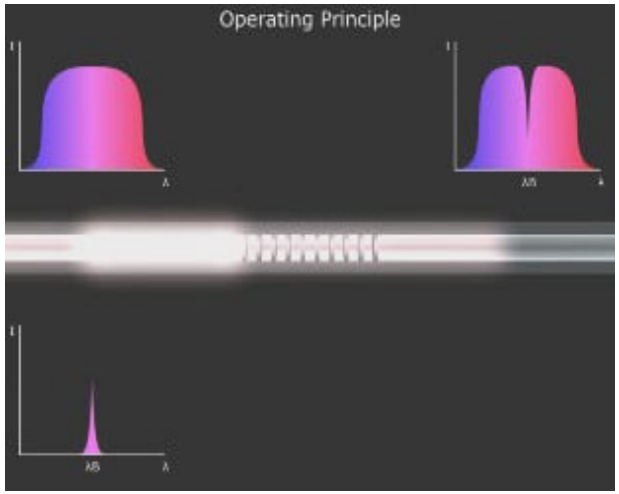
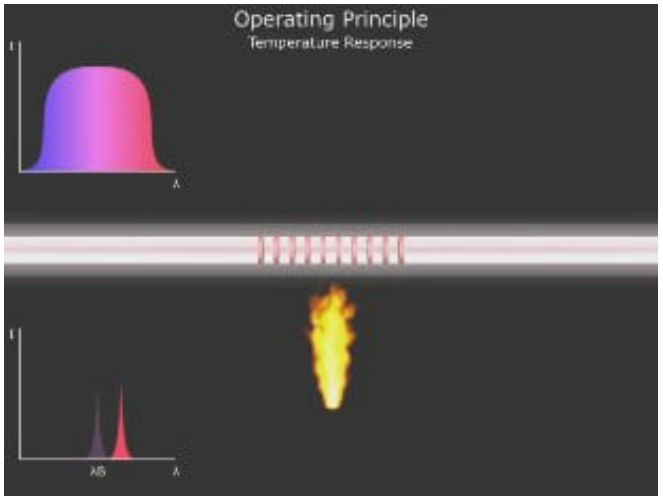
Optical Fiber Applications in Railways

Overview- Fiber Bragg Grating (FBG)

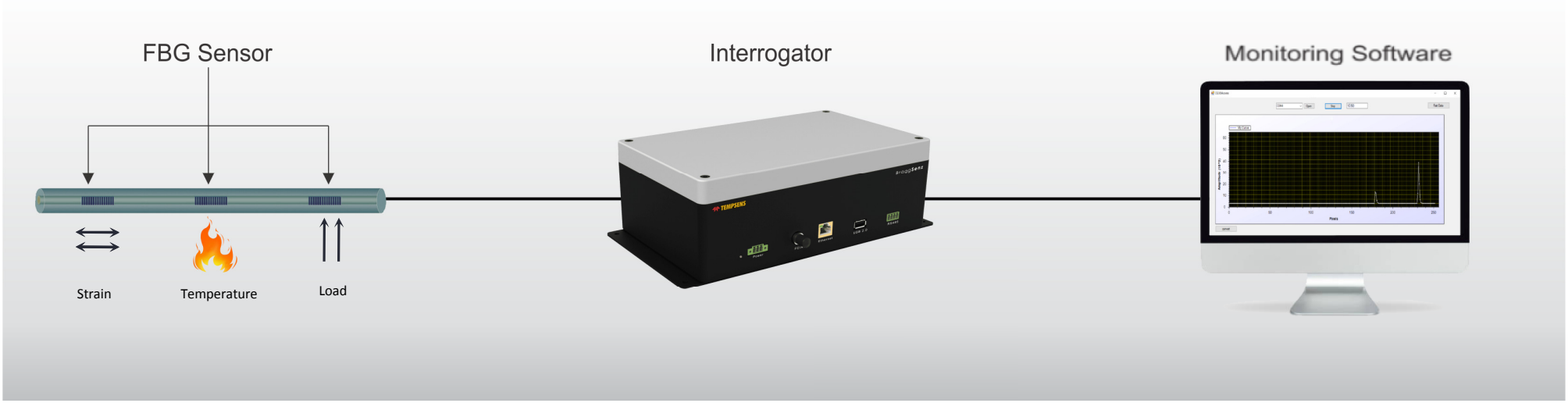
- An FBG is a type of Distributed reflector that reflects a particular wavelength of light and transmits all other .
- This is done by adding a periodic variation to the refractive index of the fiber core.





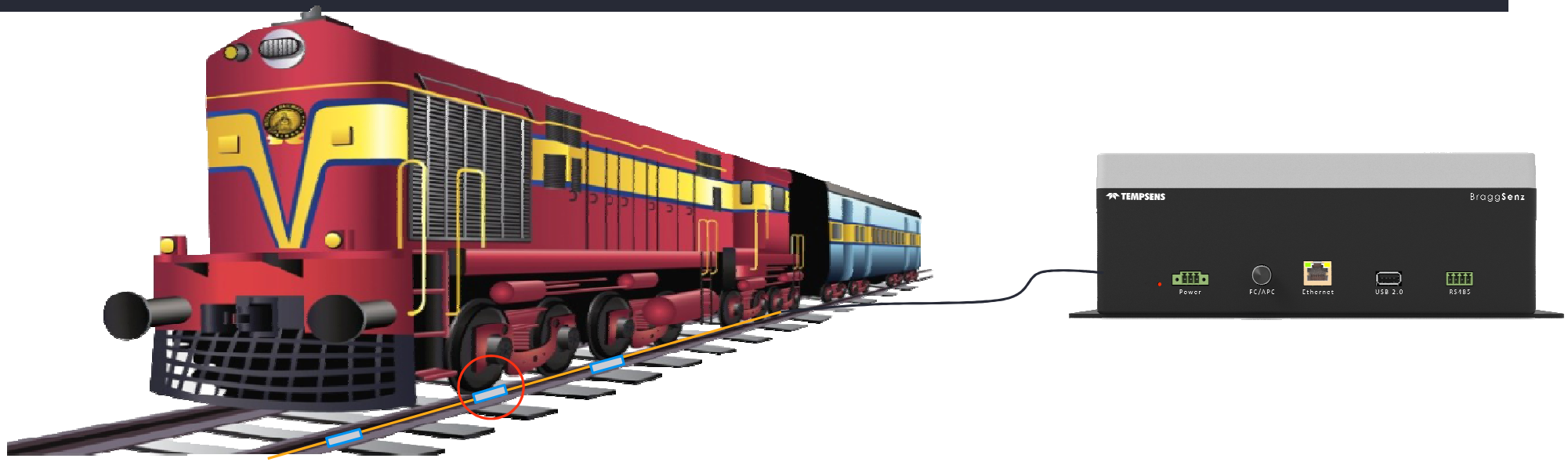
When temperature/strain around Grating changes , change in reflected wavelength is observed.

FBG System Configuration



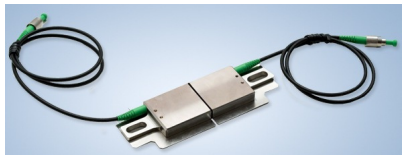
- The shift in wavelength is measured by BraggSENZ interrogator.

Applications of FBG in Railways



Temperature sensor

Strain sensor



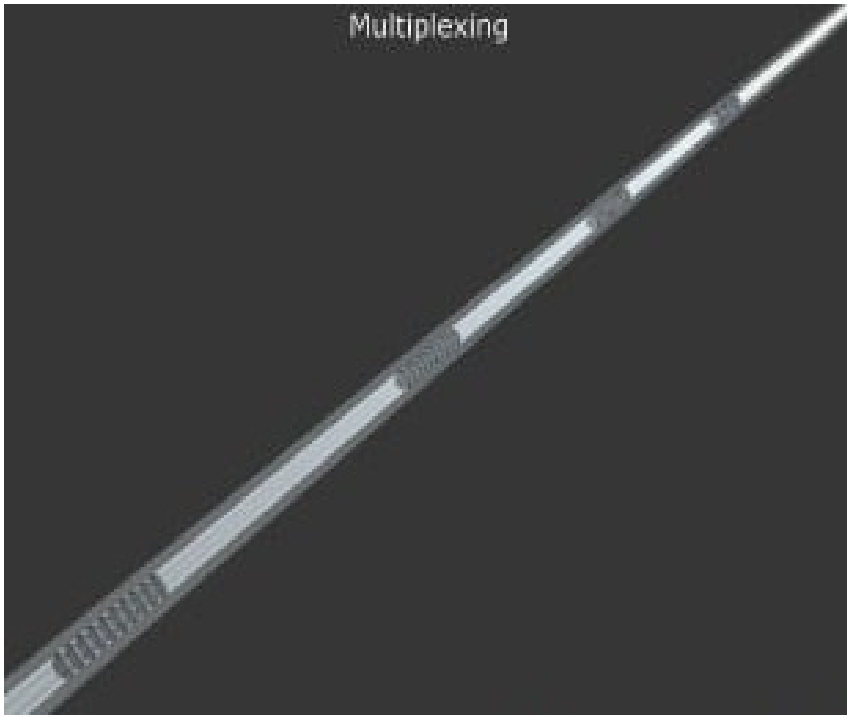
Vibration sensor

Applications of FBG in Railways

- Condition based monitoring of train.
- Track overloading and Wheel impact load sensing.
- Monitoring the type of wagon passing (loaded/unloaded, engine etc).
- Wheel, axle and track imperfection (corrosion, wear) monitoring.
- Axle counting.
- Monitoring speed, direction of train and signalling.
- Health monitoring of railway bridges.

Advantages

- One of the main advantages of this technology is its multiplexing capability. In fact, FBG vibration, strain and temperature sensors can be written in series of single optical fiber cable.
- Immunity to electromagnetic and radio frequency interference.
- Small size and Weight.
- Intrinsically safe operation.
- High sensitivity and long-term reliability.



THANK YOU