

# GPS (Global Positioning System) in Rural Development



**Session 2022-23**

For

Dr. Durgesh Dixena

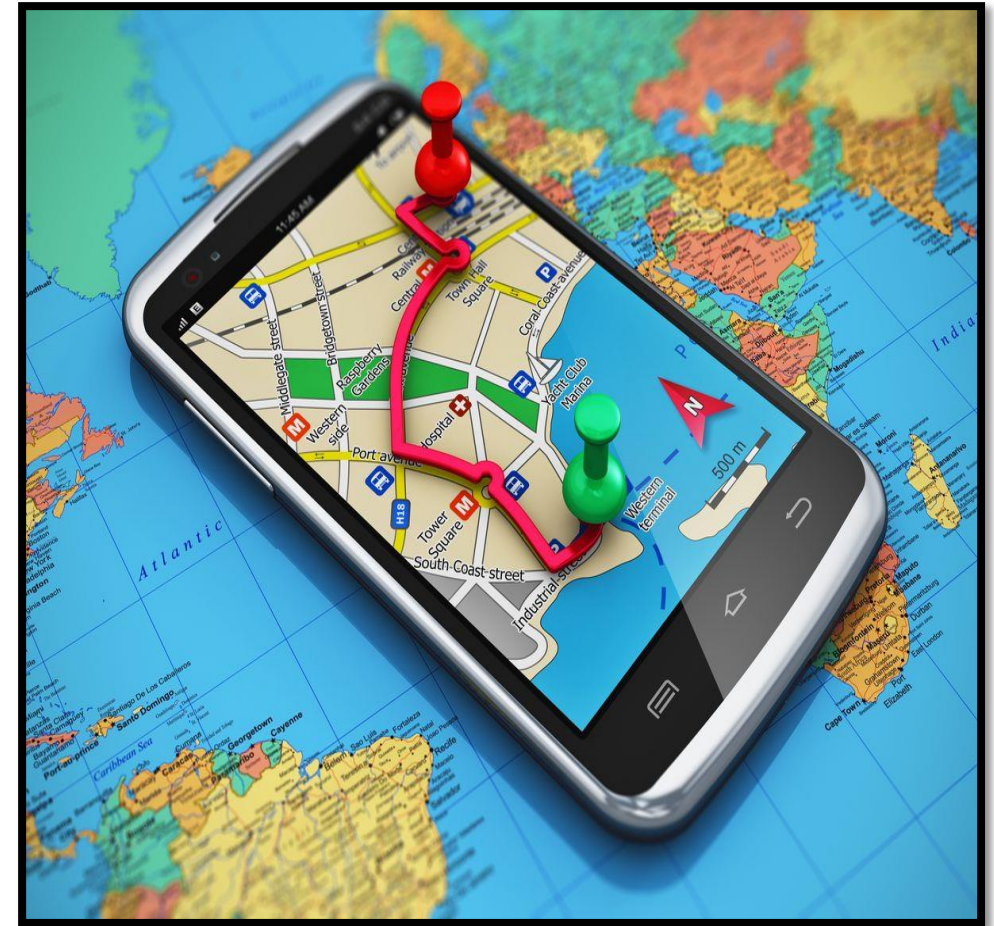
M.Sc. (Rural Technology) 2<sup>nd</sup> Semester

**School Studies of Rural Technology**

**Shaheed Mahendra Karma Vishwavidyalaya, Bastar, Dharampura-2, Jagdalpur (C.G.)**

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# Introduction

## ❑ What is GPS ?

- **GPS, which stands for Global Positioning System, is a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world.**
- **GPS is used to support a broad range of military, commercial and consumer.**
- **24 GPS satellites(21 active, 3 spare) are in orbit at 10,600 miles above the earth. The satellites are spaced so that from any point on earth, four satellites will be above the horizon.**



# Components and Segments

## □ Components of GPS

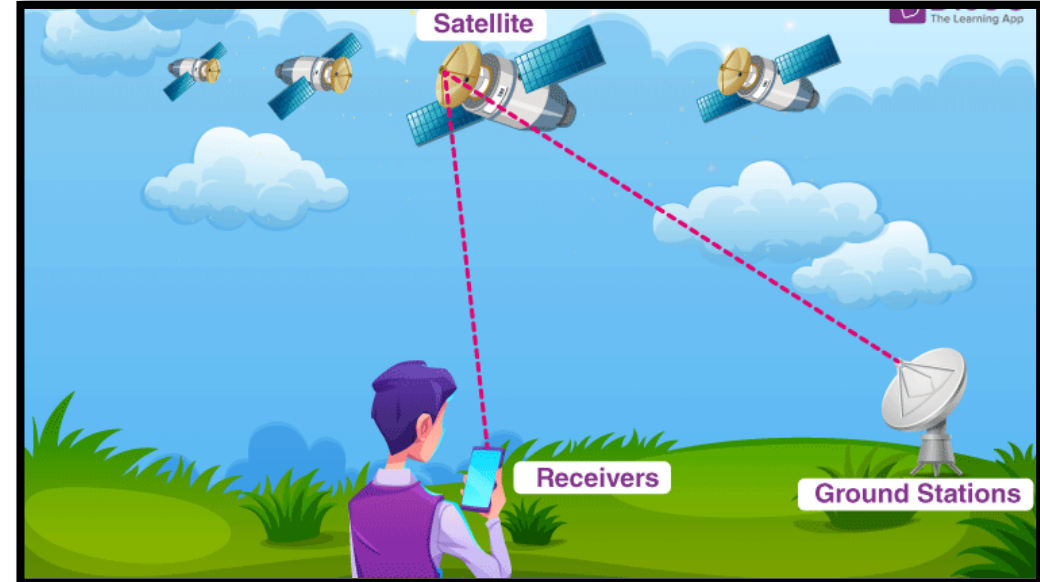
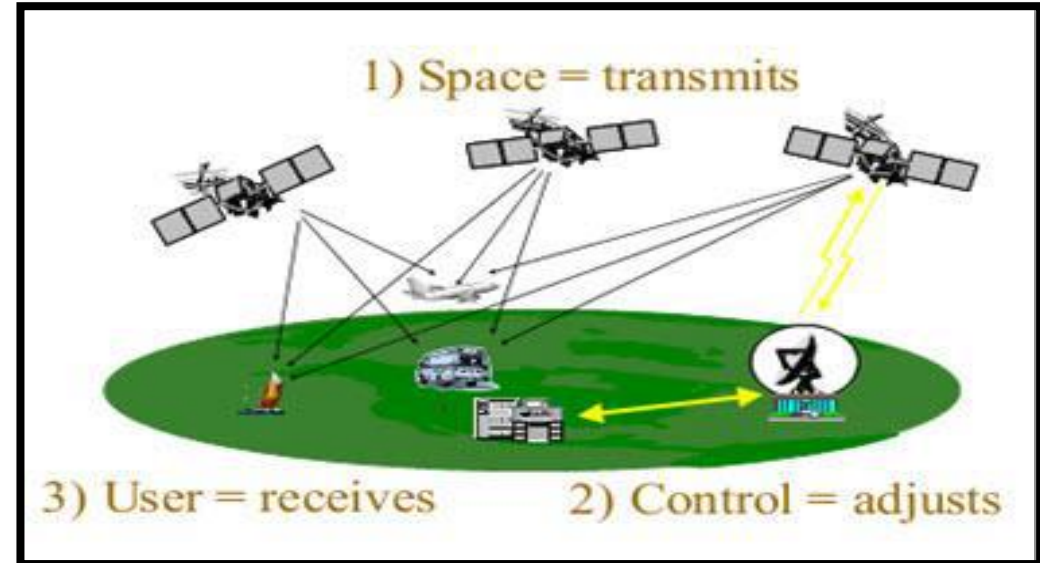
GPS is a system and it is made up of three parts:

1. Satellites
2. Ground stations
3. Receivers

## □ Segment of GPS

Here we will mostly focus on the NAVSTAR, the mostly available and used system. GPS consists of mainly three segments, these are

1. Space segment (the satellites )
2. Control segment (the ground stations)
3. User segment (user and their GPS receiver)





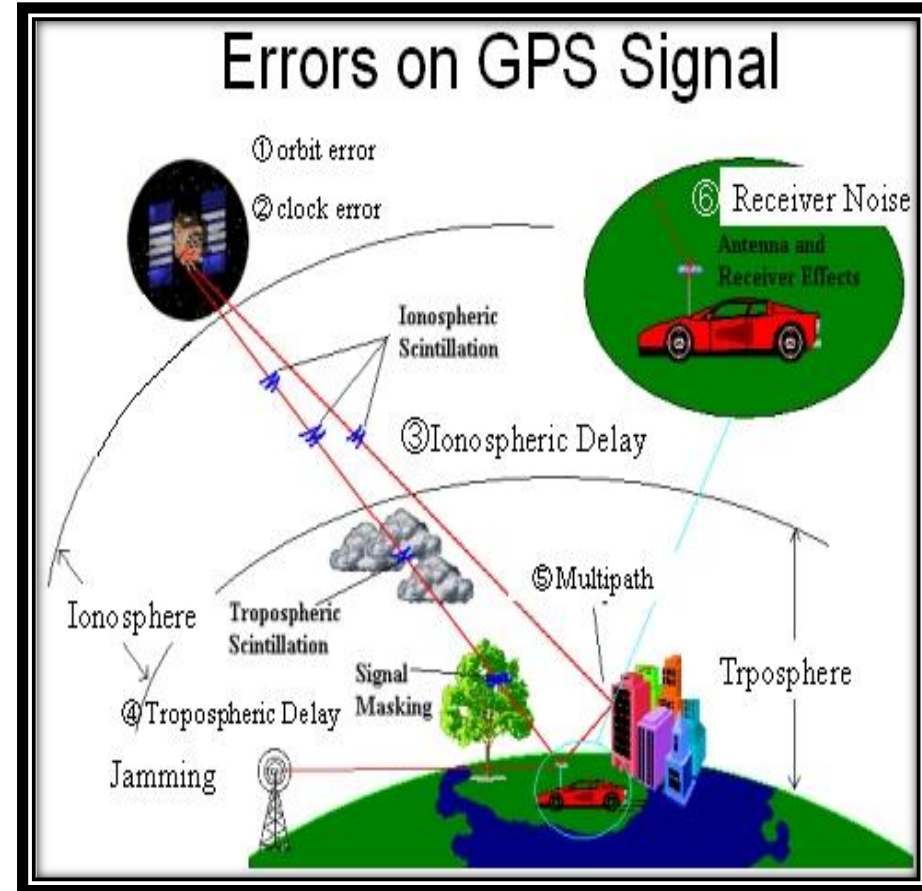
# Types of Errors in GPS

## ❑ GPS Errors

- GPS errors are a combination of noise, bias, blunders .
- GPS measurements are potentially subject to numerous sources of error in addition to clock bias.

## ❑ Noise Errors

- Noise errors are the combined effect of PRN code noise (around 1 meter) and noise within the receiver noise (around 1 meter).



To be Continued.....

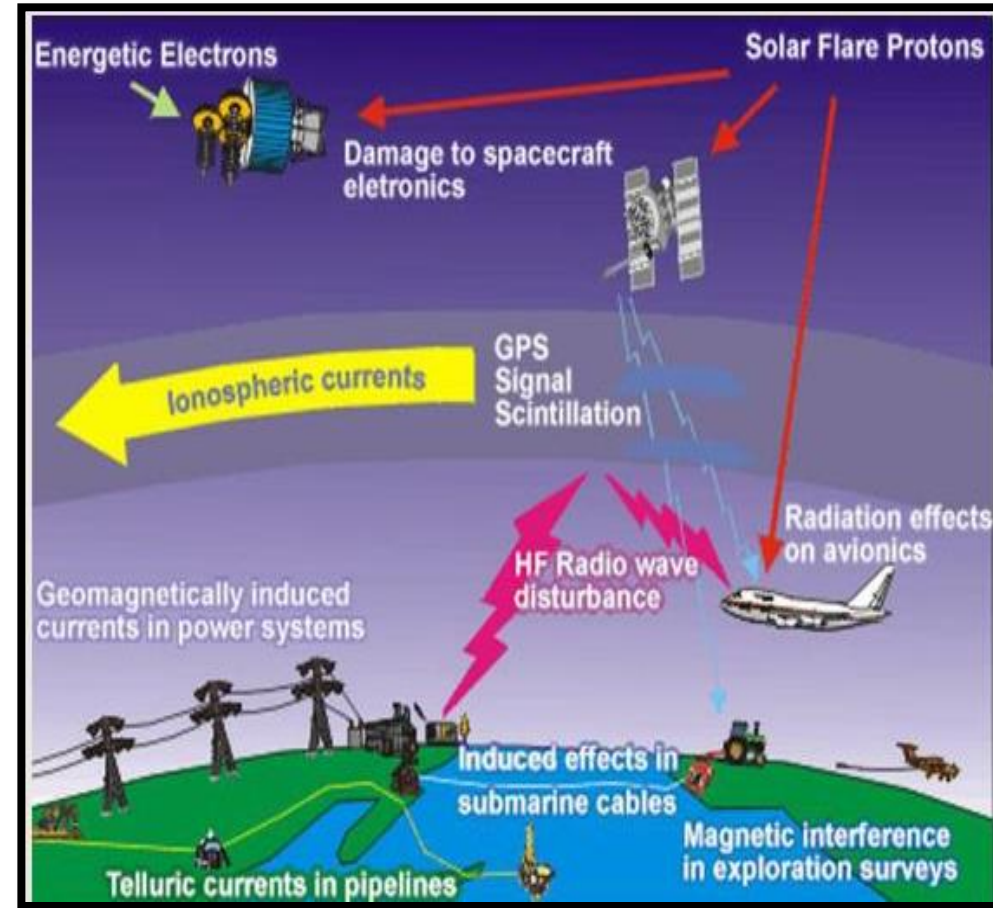
# Types of Errors in GPS

## ❑ Bias Errors

- Bias errors result from Selective Availability and other factors.
- Selective Availability (SA) is the intentional degradation of the SPS signals by a time varying bias.

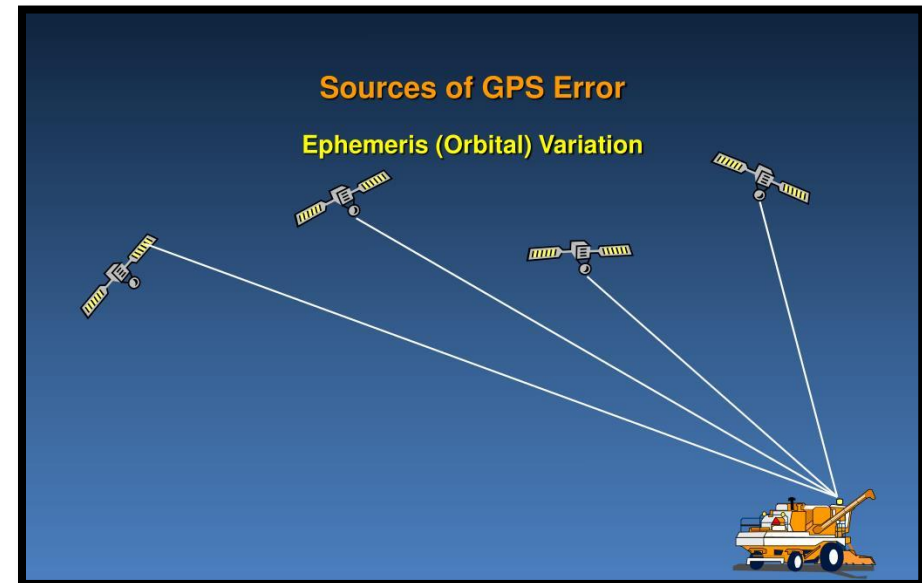
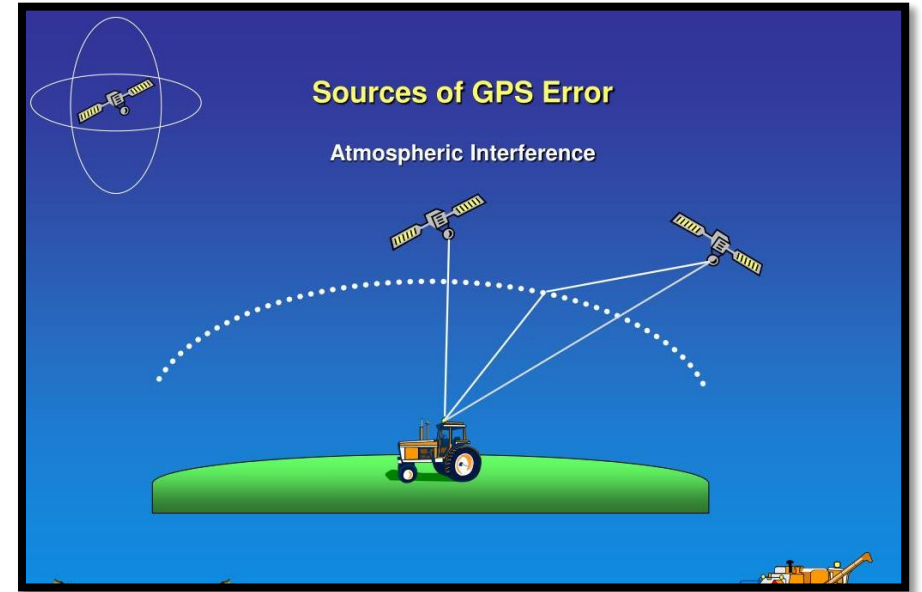
## ❑ Blunders

- Blunders can result in errors of hundreds of kilometers.
- Control segment mistakes due to computer or human error can cause errors from one meter to hundreds of kilometers.
- User mistakes, including incorrect geodetic datum selection, can cause errors from 1 to hundreds of meters.



# Sources of Errors in GPS







- Selective Availability
- Clock and Ephemeris Errors
- Ionospheric Delays
- Tropospheric Delays
- Multipath
- GPS Signal Noise
- Receiver Noise and Delays
- Receiver Oscillator Errors
- SV clock errors
- Geometric Dilution of Precision
- Poor satellite coverage



# Application of GPS

1. GPS-supported ground surveys
2. Mapping and geographic information systems (GIS)
3. Geophysics and geology
4. Archaeology
5. GPS Tracking
6. GPS Vehicle Tracking
7. Coordinated Tracking
8. Consumer GPS Tracking
9. Use of GPS to determine well location
10. Weather Prediction Improvements

## Applications of GPS tracking

<b>1 Logistics</b> Access Real-Time Location and Route History of your fleet. 	<b>2 Municipals</b> Track each and every vehicle separately on a single platform 	<b>3 Rental cars</b> Calculate the distance covered and corresponding fare accurately 
<b>4 Construction</b> Provide quick maintenance in case of any breakdown reducing the downtime 	<b>5 Drones / UAV</b> Get instant alerts anytime your device goes out of range 	<b>6 Delivery boys</b> Reports on the basis of criteria such as delivery time, stoppages made etc 

To be Continued.....



# Application of GPS

11. Photographic Geocoding

12. Social Networking

13. Altitude Information

14. Application to Water Resources

15. Application to Agriculture

16. Mapping yields (GPS + combine yield monitor)

17. Variable rate planting (GPS + variable rate planting system)

18. Variable rate lime and fertilizer application (GPS + variable rate controller)

19. Field mapping for records and insurance purposes (GPS + mapping software)

20. Parallel swathing (GPS + navigation tool).

21. Others

## Applications:

- Military
- Navigation
- Surveying
- Visually Impaired
- Geocaching
- Airplanes
- Time

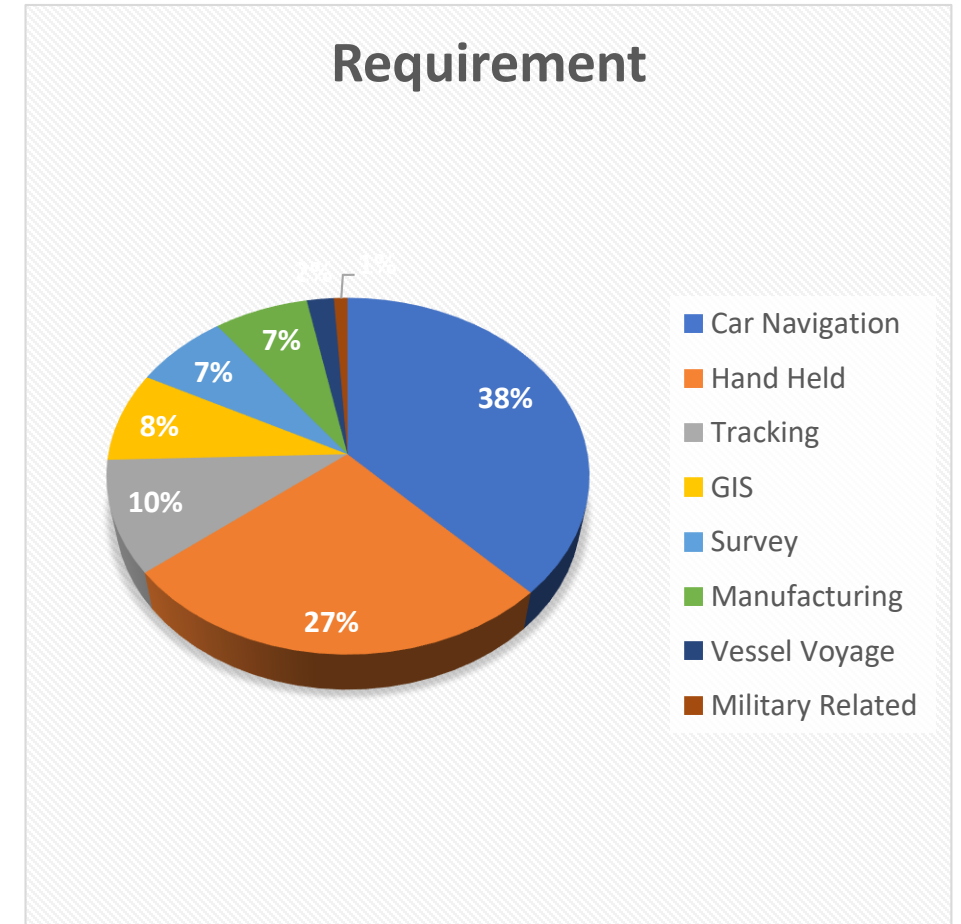


# Requirement of GPS

A research published states that the percentage of uses for each several requirement is as follows.

- **Car navigation 38%**
- **Hand held 26%**
- **Tracking 10%**
- **GIS 8%**
- **Survey 7%**
- **Manufacturing 7%**
- **Vessel Voyage 2%**
- **Military Related 1%**

United States and European countries show a rapid growth in using GPS for the car navigations and the number of GPS equipped mobile phone usage. Those facts prove that the Global Positioning System helps many people in many other ways.




# **Use of GPS/GIS for Project Rural Develeopment**

The Ministry of Rural Development is utilizing the Geographic Information System (GIS) for improvement in planning and implementation of projects.

- 1. Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)**
- 2. Pradhan Mantri Gram Sadak Yojana (PMGSY).**
- 3. Online Geo-spatial maps is available -[https://bhuvanapp2.nrsc.gov.in/mgnrega/mgnrega\\_phase2.php](https://bhuvanapp2.nrsc.gov.in/mgnrega/mgnrega_phase2.php)**
- 4. Pradhan Mantri Awaas Yojana-Gramin**
- 5. Shyama Prasad Mukherji Rurban Mission**
- 6. District Rural Road Plan (DRRP).**
- 7. National Rural Infrastructure Development Agency (NRIDA)**



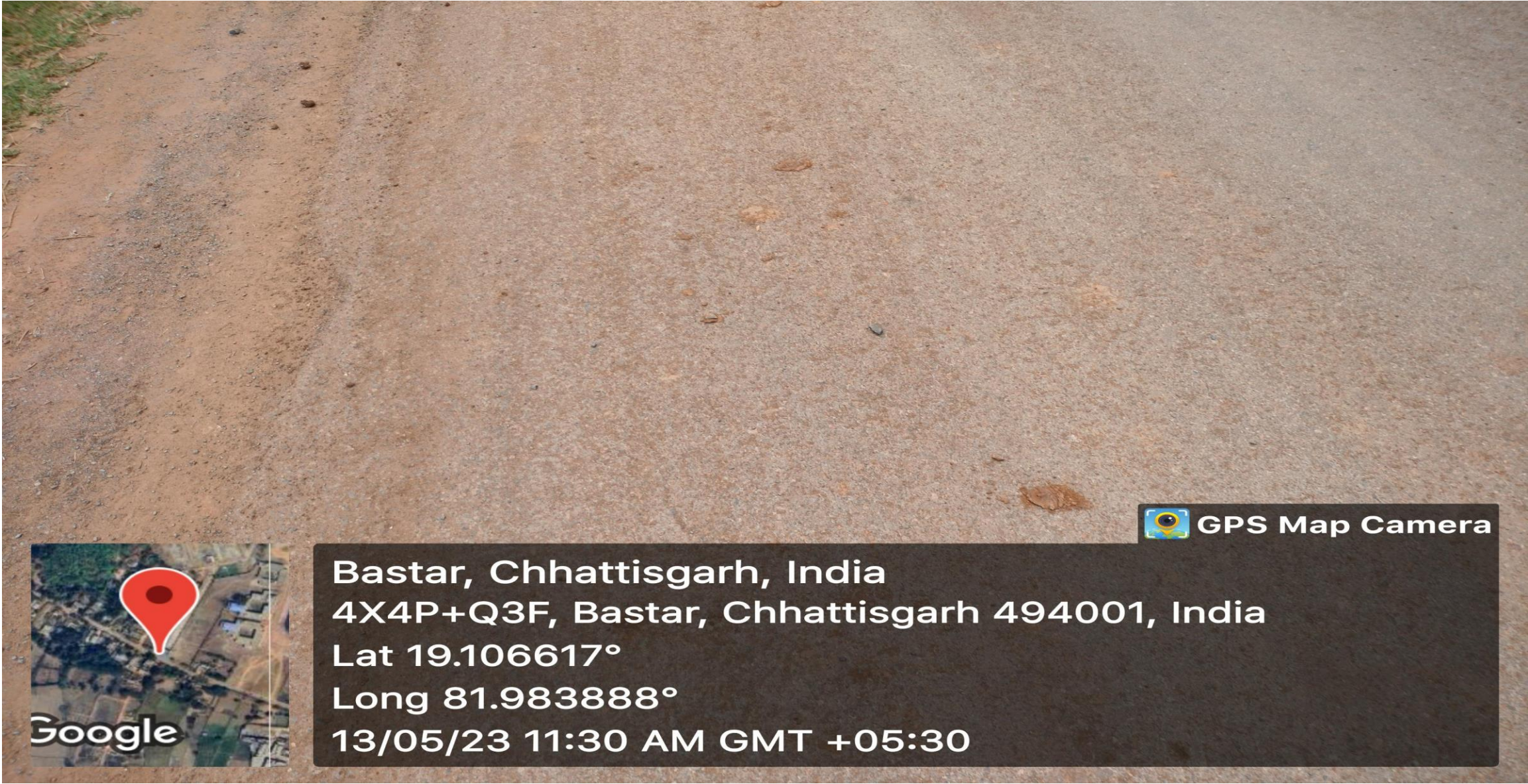


 GPS Map Camera

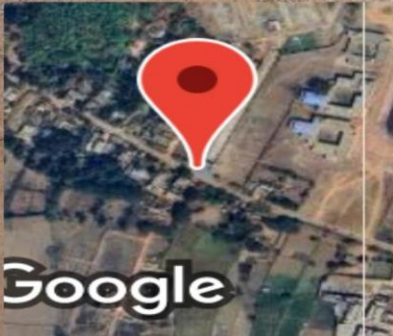


Bastar, Chhattisgarh, India  
4X4P+Q3F, Bastar, Chhattisgarh 494001, India  
Lat 19.107156°  
Long 81.985405°  
13/05/23 11:33 AM GMT +05:30





**GPS Map Camera**



**Bastar, Chhattisgarh, India**  
**4X4P+Q3F, Bastar, Chhattisgarh 494001, India**  
**Lat 19.106617°**  
**Long 81.983888°**  
**13/05/23 11:30 AM GMT +05:30**



# Conclusion

In conclusion, the uses of GPS technology for rural development are many and varied, and it has the potential to contribute significantly to the economic, social, and environmental development of rural areas.



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Thank you