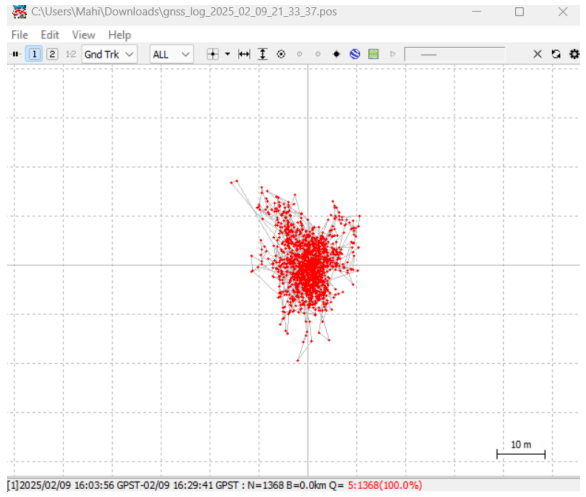
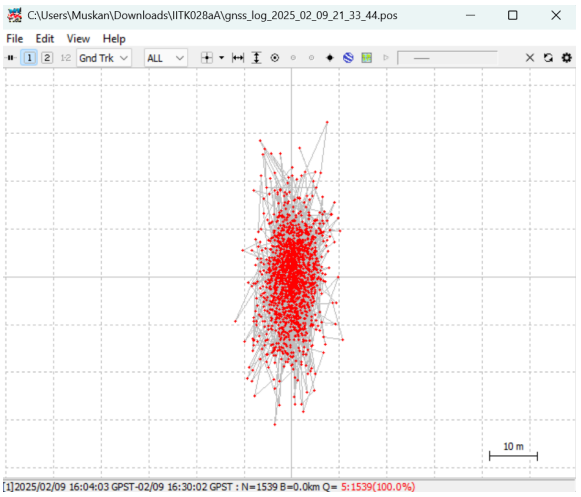
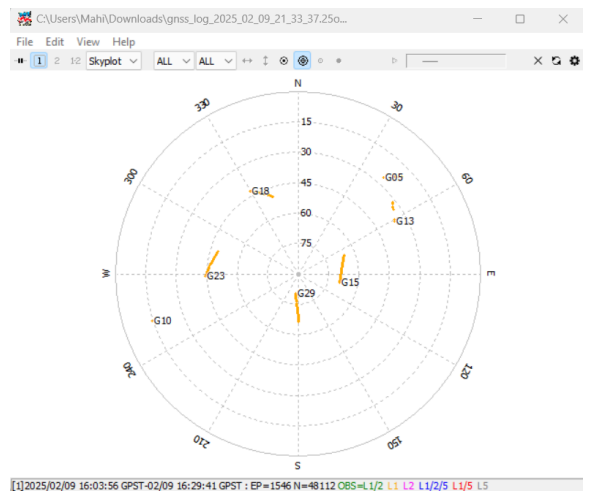
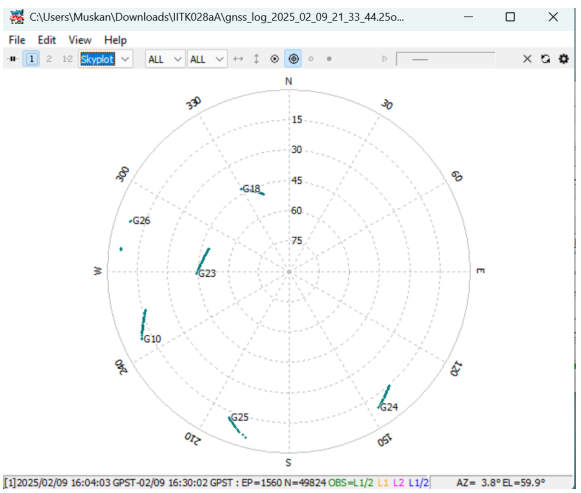
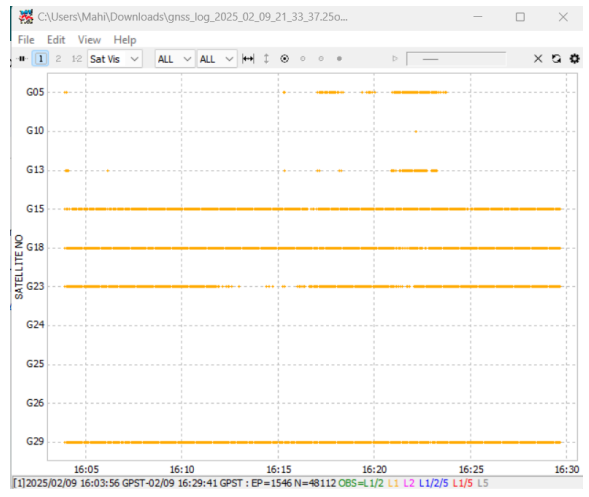
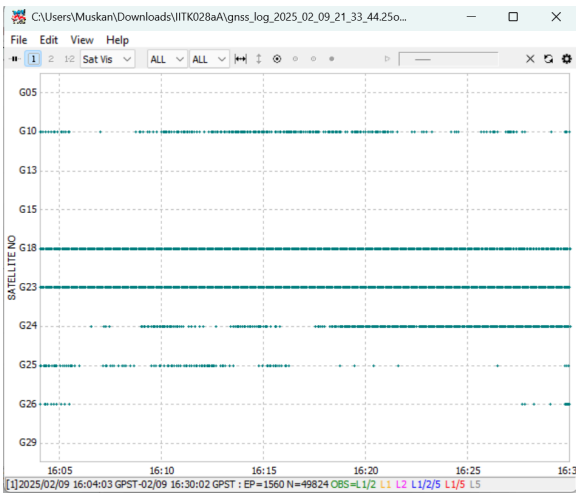
Analysing the accuracy of data:

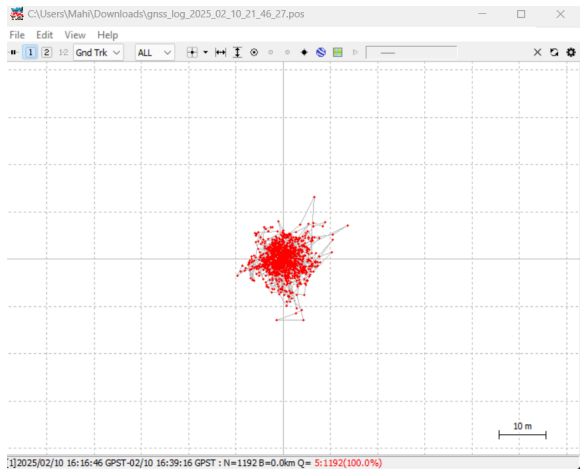
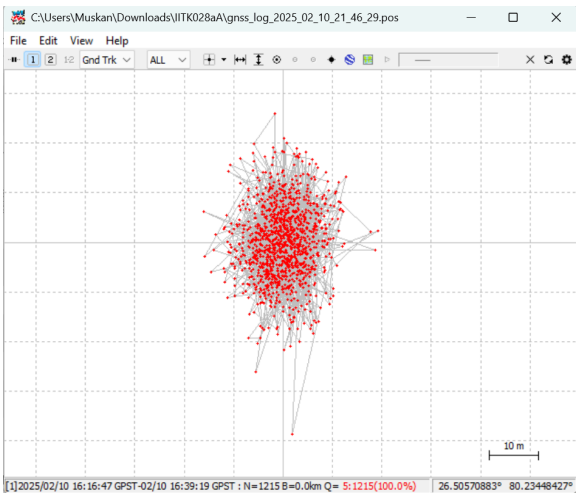
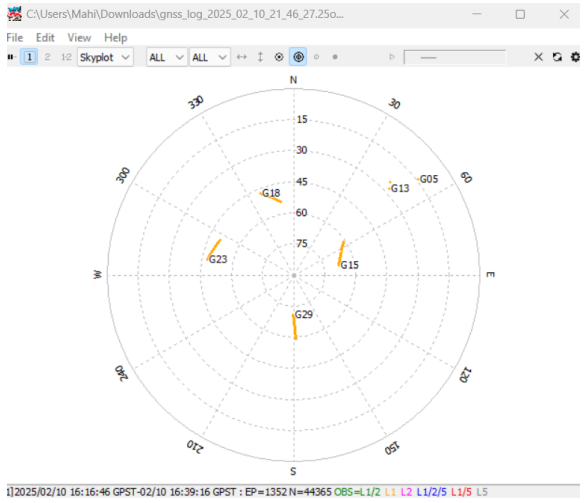
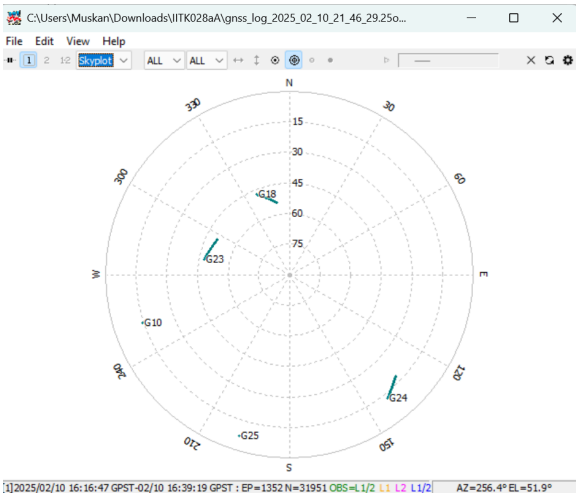
In this task Muskan and I collected observation data from GNSS logger app and processed it on RTKLIB to compare the accuracy of two different phone hardware. We collected data on three different days(9th,10th,13th feb) on the same location and at approximately the same time of day. The two devices used are named as follows:
Mahi's phone - REDMI12
Muskan's phone - Samsung S23 Ultra

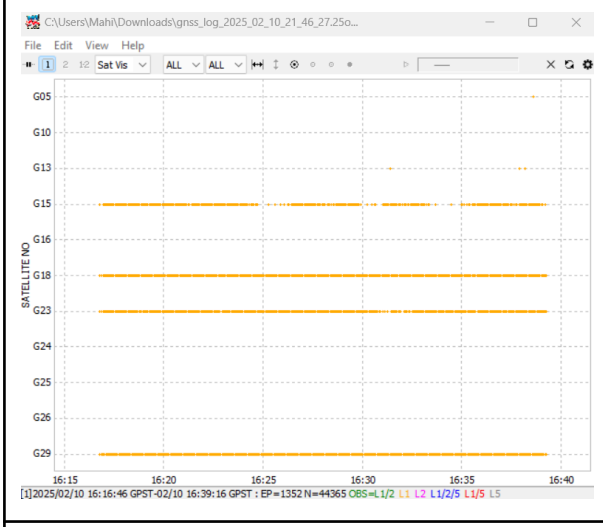
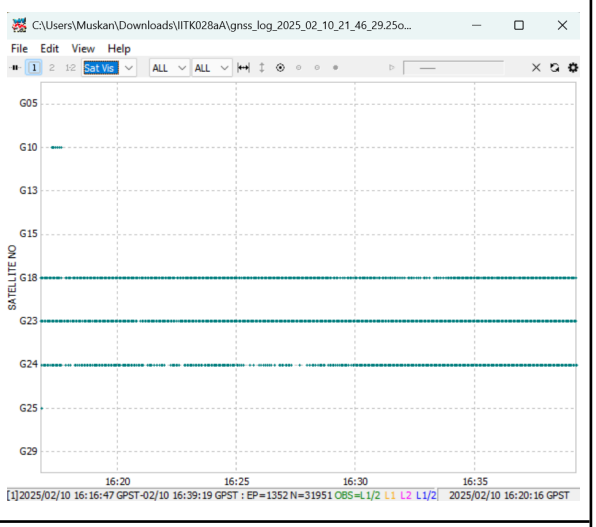
1. Data of 09/02/2025

REDMI12	Samsung S23 Ultra
	
Observation: The points are more concentrated and consistent . **Analysis:**Less variation in the position estimate.	**Observation:** The points are more elongated and spread out. **Analysis:**Higher variation in position estimate.

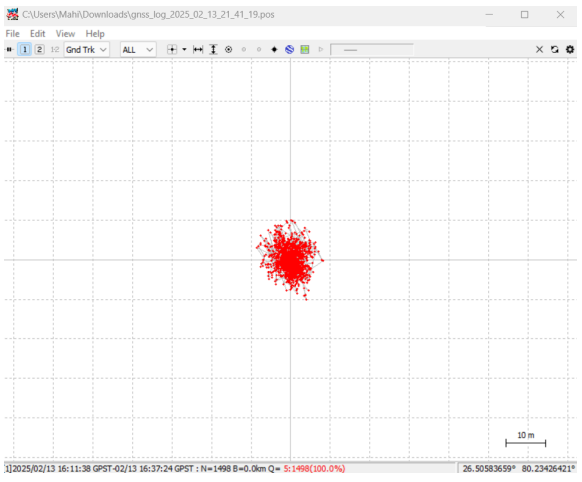
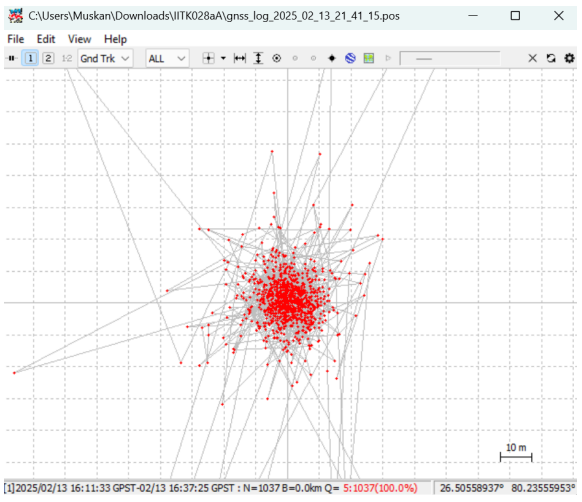
	
Observation: The number of satellites detecting this phone are 7 in number (G5, G10,G15,G13,G18,G23,G29) and the satellites which are missing with respect to this device and visible in the other are (G24 , G25, G26). **Analysis:** Both phones have a difference in hardware wherein the chipset sensitivity varies . This phone is more sensitive to weak signals.	**Observation:** The number of satellites detected are 6 (G10,G18,,G23,G24,G25,G26).Some satellites are missing from here that are visible in the other device (G5,G13,G15,G29). **Analysis:** The device uses only certain frequency signals for satellite positioning and could not receive signals from other satellites due to different hardware and chipset configuration.
	
Observation: There are more gaps visible in satellite tracking . **Analysis:** The discontinuous lines indicate that this phone is not able to detect some satellite signals .	**Observation:** There are less gaps visible in satellite tracking **Analysis:** Even though the number of satellites detected from this phone are less as compared to the other , the lines are more continuous thereby indicating higher detection of satellite signals.

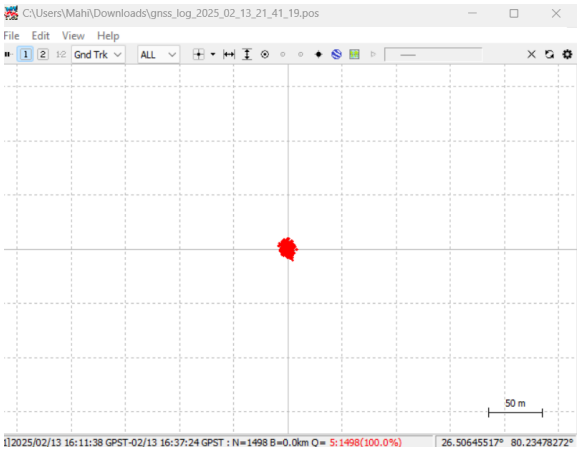
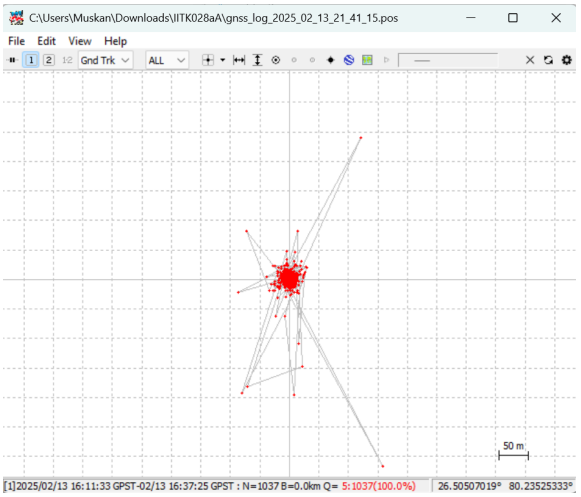
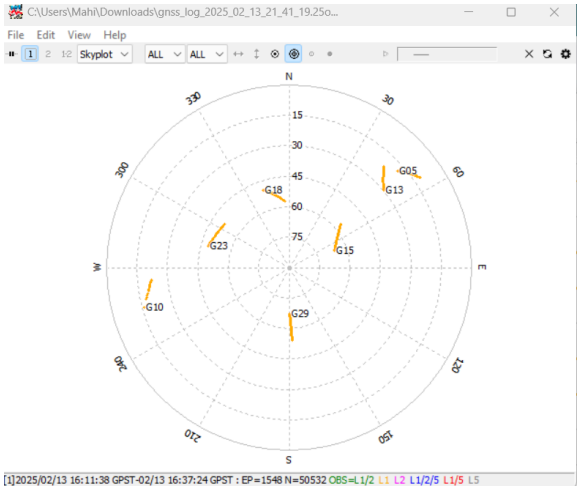
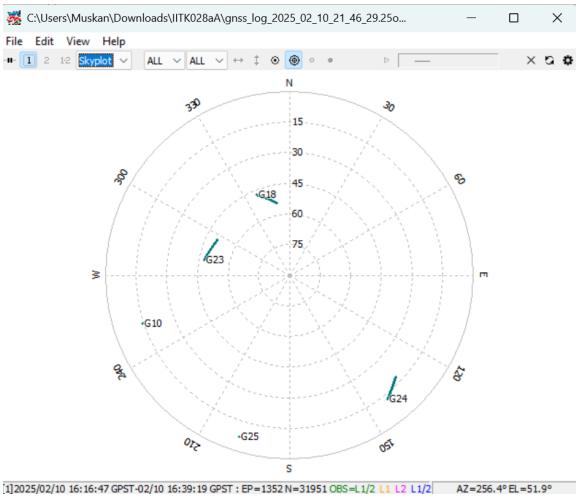
2. Data of 10/02/2025

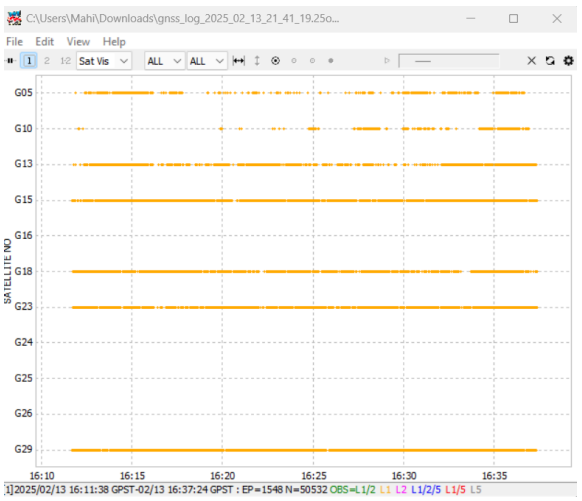
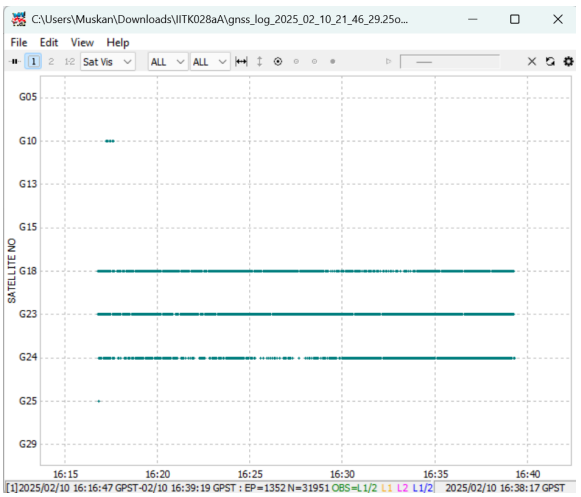
REDMI 12	Samsung S23 Ultra
	
Observation: Shows a denser and more compact cluster of points. **Analysis:** Appears to have higher accuracy since the points are more concentrated.	**Observation:** Shows a wider spread of points. **Analysis:** Has a larger spread, indicating more variability in position readings.
	
Observation: The number of satellites detecting this phone are 6 in number (G5, G15,G13,G18,G23,G29) and the satellites which are missing with respect to this device and visible in the other are (G10,G24,G25). **Analysis:** Both phones have a difference in hardware wherein the chipset sensitivity varies . This phone is more sensitive to weak signals.	**Observation:**The number of satellites detected are 5 (G10,G18,,G23,G24,G25).Some satellites are missing from here that are visible in the other device (G5,G13,G15,G29) **Analysis:** The device uses only certain frequency signals for satellite positioning and could not receive signals from other satellites due to different hardware and chipset configuration.

	
Observation: Tracks more number of satellites. **Analysis:** Though it tracks more satellites, two signals appear less continuous with gaps while the rest of the signals are continuous.	**Observation:** Tracks less number of satellites. **Analysis:** Though it tracks less number of satellites, the signals appear more continuous , shows a stronger signal.

3. Data of 13/02/2025

REDMI 12	Samsung S23 Ultra
	
Observation: The points are tightly clustered **Analysis:** This indicates higher position stability and lower deviation from actual position.	**Observation:** The points are highly scattered. **Analysis:** This shows us that there is high deviation from actual position.

	
Observation: When we use a 50 m scale , the points are extremely concentrated at one place . **Analysis:** Very less variation in position estimate	**Observation:** In comparison to the other phone , the points are more spread apart. **Analysis:** There is high variation in position estimate.
	
Observation: The number of satellites detecting this phone are 7 in number (G05, G15,G13,G18,G23,G29) and the satellites which are missing with respect to this device and visible in the other are (G10,G24,G25). **Analysis:** Both phones have a difference in hardware wherein the chipset sensitivity varies . This phone is more sensitive to weak signals.	**Observation:** The number of satellites shown are 5 in number(G10,G18,G23,G24,G25) and the satellites missing from here that are shown in other device are (G05,G13,G15,G29) **Analysis:** This device tracks a fewer number of satellites as compared to the other device due to difference in chipset configuration it tracks only few satellites.

	
Observation: Tracks more number of satellites. **Analysis:** Less stable signals.	**Observation:** Tracks less number of satellites. **Analysis:** More consistent signals.

Conclusion:

Skyplot Analysis:

- The number of tracked satellites varied between the two devices namely Redmi12 and Samsung galaxy S23 Ultra.
- Some satellites appeared in one device but not in the other, despite the same location and time.
- Redmi showed more satellites in some cases but with weaker or intermittent signals.
- Samsung showed fewer satellites but with more stable signals.

Position Accuracy (Scatter Plot Analysis):

- The scatter plot of Redmi showed a more compact distribution, indicating less variation in tracked positions.

- The scatter plot of Samsung had a wider spread, indicating higher variation in position estimates.

Satellite Visibility (SatVis Analysis):

- Redmi's SatVis plot showed tracking of more satellites but with some discontinuity in signal reception.

- Samsung’s SatVis plot showed fewer satellites, but the signal reception was more consistent.

General Reasons for differences in the Result and Observations:

- **GNSS Chipset and Hardware** – Different devices use different GNSS chipsets, affecting signal reception, processing power, and accuracy. A high-end chipset provides better tracking and stability**.**

- **Environmental Factors –** Obstructions like buildings, trees, and weather conditions can block or weaken GNSS signals, leading to variations in readings.