

51st IAA SYMPOSIUM ON THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI) –  
 The Next Steps (A4)  
 SETI 1: SETI Science and Technology (1)

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SETI INDIA: A SEARCH FOR TECHNO-SIGNATURES FROM EXTRATERRESTRIAL LIFE USING  
 UGMRT.

**Abstract**

The discovery of the ubiquity of habitable extrasolar planets, combined with revolutionary advances in instrumentation and observational capabilities, has ushered in a renaissance in the search for extraterrestrial intelligence (SETI). The Breakthrough Listen (BL) program is a US \$100M effort of 10 years to conduct the most sensitive, comprehensive, and intensive search for advanced life on other worlds ever performed. Despite the large scale radio SETI activities at numerous observing facilities, there exists a dearth of continuous frequency coverage between 300 MHz and 1 GHz. Upgraded Giant Metrewave Radio Telescope's (uGMRT) operation capability at these frequencies makes it a desired and complimentary instrument with ongoing SETI activities. The GMRT also provides unique opportunities to capture phased array beam voltages parallel with interferometric imaging visibilities. We present our ongoing efforts in SETI, which is of the first kind in India, to capture the raw stream of data products from the uGMRT and conduct searches for novel signals likely to be produced by the activities of advanced ETIs. These signals include; (1) continuous-wave narrowband signal with spectral occupancy of  $< 1$  Hz, (2) broadband transient signals with artificial dispersion, and (3) signals with embedded wide-band modulations. We will also discuss some of the initial results obtained from the analysis done on the phased array spectral voltage (PASV) data from uGMRT using our software pipeline. To analyse the performance of the pipeline, we also developed strategies to inject artificially made narrowband and broadband signals directly into the raw stream of voltages. Furthermore, we discuss how we are leveraging the usage of modern-day graphical processing units (GPUs) and artificial intelligence for these searches. We further demonstrate that long baselines of GMRT provide band-limited spectral imaging and temporal window imaging capabilities which are helpful to scrutinise the extraterrestrial origin of putative signals from ETI.