

Portable Bathymetry Profiler System

Introduction

Bathymetry, measurement of water depth, is the vital parameter for wider range of applications such as inland water body storage capacity estimation, sedimentation studies in dams and reservoirs, monitoring & effective management of demand-supply in irrigation projects and hydro power stations. The depth estimations with remote sensing technique either by satellite or airborne sensors (aircrafts/UAVs) need in-situ validation to evaluate the efficacy of the methods/models used. Therefore the performance of in-situ bathymetry system is critical for validation of derived bathymetry estimations by space-borne and airborne sensors. Autonomous Surface Vehicles (ASV) and Unmanned Aerial Vehicle (UAV) borne bathymetry systems are current trends for bathymetric applications whereas UAV based bathymetry Lidar provides limited depth (< 50 meters) subjected to water quality. The bathy system compactness is the critical requirement for ASV and UAV based operations.

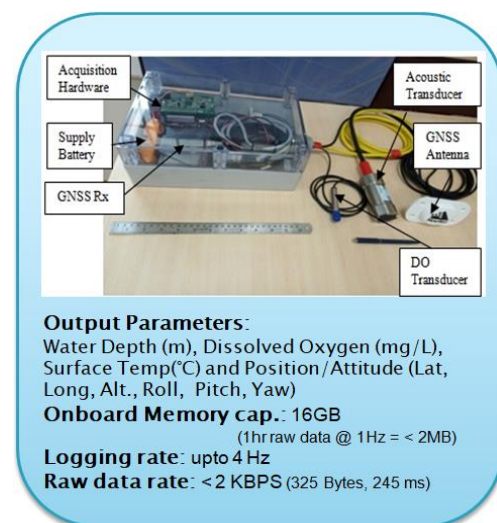
In addition to water depth, different applications require distinct sensors configuration or subtle changes in the available bathymetry system of the user but limited/no scope for hardware customization is available in commercial bathymetry systems. To address the requirement of customization, multi-parameter and multi-platform operability, NRSC has developed a portable immersion type, multi-parameter bathymetry profiler system with multiplatform operability for wide range of water resources & hydrology applications. The system was developed using commercially available off-the-shelf (COTS) components and its works on echo sounding principle to measure water depth.

Salient features –

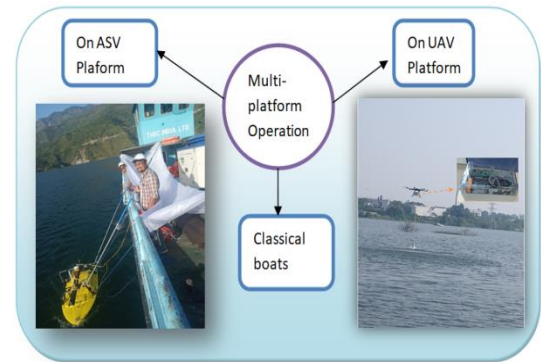
- Multi parameter bathymetry system with customization to address specific requirement of water resources applications.
- As a compact & water proofed system(IP86), it can easily be installed on ASV and UAV platforms.
- Portable system with low-SWaP (Size 11.8x9.4x4.7 inches, **Weight** < 4.5 kg and **Power** typical 5 W)
- User friendly out data format - coma separated values (.csv) which is easier to import into a open source GIS softwares like QGIS etc. for bathymetry DEM/contour map generation or to access in a storage database to enables user for further analysis of measurements.
- Cost effective system compare to similar kind of imported system.

Description -

This bathymetry system (Shown in fig.1) is compact multi-parameter system with capability to measure water Depths up to 100 meters, Surface Dissolved Oxygen (DO) & water Surface Temperature (ST), geo-locations in synchronized manner. The raw data stored in onboard memory card and Java based software utility provides output data in user friendly file format (.cvs). It also has provision to add other water quality sensors (up to 4) like turbidity, pH etc. to its hardware for addressing customized requirements of water resource (like aquaculture studies) applications. Further it can be potentially used as a standalone water quality assessment system for water resource applications in addition to in-situ validation system.



Due to compact size & waterproof packaging the developed system is suitable for installations on remotely operated boat (ASV) & UAV platforms which results potential saving in logistic efforts and operational time/cost. The present system configuration provides measurements using single frequency acoustic transducer; which limits its usage in direct sediment estimation where dual frequency transducers are preferred. However the subtle changes in system configuration/replacement of transducer can be easily implemented to address the dual frequency application requirements.



Potential Applications-

- A validation system for satellite remote sensing derived bathymetry as well as airborne (Aerial/UAV) estimated bathymetry.
- A standalone water quality assessment system for multi-parameter measurements (Depth, DO, ST along with geo-location) in water resource applications.
- A good choice to cater specific applications requirements where system customization is the need.

Technology Transfer-

NRSC/ISRO, offers to transfer this technology of the Bathymetry system developed by NRSC to industries in India with adequate experience and facilities. Enterprises interested in obtaining knowhow may write to Director, NRSC stating the end use of the technology with details of their present activities & infrastructure.