DIBYENDU PAL

Male – 41 Years (7.01.1978)

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Key Skills

System Engineering, Hardware Backbone Designing of Robotic / Underwater Robotic Systems, Process Automation and Control design, Electronic-Electrical System Interfacing, Testing of Aero-systems Valves, Instrument Driver Design and Data Acquisition system Development, Process Control Engineering, Software development in LabView /C /C++ , MatLAB Simulation, Micro-controller programming .

Education

- B.Tech (Electronics & Comm. Engg.) in 2002 from Kalyani Govt. Engg. College under University of Kalyani (71.69%).
- 10+2: W.B.C.H.S.E. in 1996 from Bidhan Chandra Institution, Durgapur (67.9%)
- 10: WB. Board in 1994 from R.E. College Model School, Durgapur (74.22%)

Work Experience

Employment Details:

Grade / Post	From	To	Estt./Lab./Instt.
Senior Scientist	26.08.2011	Continuing	CMERI
Scientist	26.08.2008	25.08.2011	CMERI
Junior Scientist	26.08.2004	25.08.2008	CMERI
Project Assistant	28.01.2004	25.08.2004	CMERI
Graduate Apprentice	25.05.2003	27.08.2004	CMERI

R&D Project Work :

Sl.No	Title of Project	Project Category	Participating Agencies	Your Role as defined
1.	Indigenous development of LRUs suitable for small aircraft **(MLP 223312)** *(Ongoing)*	CSIR NCP Project	CSIR-NAL	Project Member
2.	Development of Carbon-Graphite Piston Ring and Solenoid Valve suitable for high temperature aircraft LRUs **(MLP 222612)** *(Ongoing)*	CSIR FTT Project	CSIR-NAL	Project Member
3.	Research and Development on Autonomous UnderWater Robotics **(UnWaR) (ESC-0113)** *(Completed)*	12th Five Year Network Project	CSIR-CEERI, CSIR-NIO, CSIR-CSIO, CSIR-CRRI	Project Member / Activity Leader
4.	Development Of Enhanced Remotely Operated Vehicle for 500m depth **(ROV-500) (GAP-030612)** *(Completed)*	Sponsored (by Ministry of Earth Sciences)	NIOT, Chennai	Project Leader / Co-PI
5.	Design, Development, Integration and Implementation of High Power Wireless Control Interface and Camera for Mobile Robotic System **(GAP-152912)** *(Completed)*	Sponsored Project (GAP)	IGCAR Kalpakkam	Project Member
6.	Studies and Experimentation with advanced communication methodologies and software architectures for underwater robots **(OLP-152412)** *(Completed)*	Other Lab Project (OLP)	N.A.	Project Member/ Activity Leader
7.	Development of Autonomous Underwater Vehicle **(AUV-150) (GAP-030512)** *(Completed)*	Sponsored (by Ministry of Earth Sciences)	IIT, Khraragpur	Project Leader / Co-PI
8.	Capability building on design and development of Autonomous mobile robot **(AMR)** *(Completed)*	Other Lab Project (OLP)	N.A.	Project Member
9.	Development of Intelligent Robotic systems **(IRS)** *(Completed)*	CSIR Network Project	CSIR-CSIO,	Project Member

Major Activities:

- Taken lead role in System Engineering and System Integration related responsibilities of ROV-500, AUV-500 and AUV-150 prototypes with respect to hardware and software architecture
- Design and development of Autonomous Mission Control for AUV navigation
- Designed electrical and electronic hardware architecture of onboard as well as on-ship parts of ROV-500 final Prototype as individual activity and developed it as team
- Designed Electronic and Electrical Hardware System architecture including interfacing, safety, power budgeting, switching and data communication aspects of for both AUV prototypes for 500m & 500m depth as individual activity and developed it as team activity
- Design and development of complete network based software architecture of ROV-500 including GUI-based host console program for joystick based operator control, display and logging of sensor-data/signal -video and subsea resident program for the real-time target of ROV with adequate synchronization measures as individual activity
- Designed PID-based basic motion control algorithms for AUVs and ROV
- Instrument Driver Development for various sensors mainly underwater sensors (Depth Sensor, Altimeter, Motion Reference Unit, Doppler Velocity Log, Forward Looking Sonar, Acoustic Positioning System) and instruments (Thrusters etc.) using LABVIEW or VC++
- Design and development of two versions of lab-scale Autonomous Surface Vehicle prototypes for shallow water bathymetric survey as a spin-off. 1st version is developed to prove concept of unmanned bathymetric survey in shallow water and filed for a patent. 2nd version is developed for higher payload capacity and field demonstrations to upgrade the TRL level of the technology. Some of the basic motion control algorithms of AUV-500 are tested at these prototypes.
- Carried out a number of sheltered water and Sea-Trials for AUV and ROV
- Design & Development of PID-Based Pneumatic pressure controller, Development of LabView-based Software Console for Airworthy Valve Testing
- Manual/Automated Trajectory based pneumatic pressure point generation to be applied at PRSOV inlet, PRSOV outlet pressure measurement, data acquisition-logging, online input /output pressure data Graph Generation for PRSOV etc as individual activity

- Design & Development of Interfacing & Data Acquisition schemes of Ultra Sonic Range-Finders (URF) and range finder array firing circuitry for Mobile Robots & Development of Critical obstacle detection algorithm using URF array

Patents

Sl No.	Title	Country	Filed on (Date)	Names of other inventors
1.	Standalone Multi Channel-Speed & Direction Controller System for Underwater Thrusters	India	CMERI Ref. No.: CSIR-CMERI/IPMG /Patent/ 2017-18, Dated 18-May-2017 CSIR Ref. No.: Ref. No. 0127NF2017	**Dibyendu Pal**, Dheeraj Kumar Singhal, Jyotirmoy Karmakar
2.	A method and device for autonomous bathymetry and survey of flow parameters in shallow and inland waters and a method thereof (Application No.: 1447/DEL/2015)	India	Filing of Application: 22/05/2015(Provisional) 10/05/2016(Complete) Publication Date: 25/11/2016	Das Subhra Kanti, **Dibyendu Pal**, Kumar Virendra, Nandy Sambhunath, Shome Shankar Nath

Copyrights

- Filed for Copyright registration, Navigation Algorithm and Software for Indoor Mobile Robot on 2005
- Filed for Copyright registration, **Copyright No. 041CR2013, dated 15-01-2014**, entitled **"Drawings for Autonomous Underwater Vehicle operational up to 150 m (AUV150 v1.0)"**
- Filed for Copyright registration, **Copyright No. 042CR2013, dated 15-01-2014**, entitled **"Software designed for Autonomous underwater vehicle operational up to 150m"** (AUV-150 Project)
- Filed for Copyright registration, Ref. CSIR-CMERI/IPMG/Copyright /2014/13, dated 27-03-2015, entitled **"An Augmented Hardware-In-Loop Simulation Software"**

Publication

Contribution to Books:

Sl.No	Editors	Title of the chapter	Year of Pubn	Title of Book	Country	Edition No.	Publisher
1.	P. Vadakkepat, Jong-Hwan Kim, N. Jesse, A. Al Mamun, J. Anderson, I. Verner, D. Ahlgren	Control Architecture for AUV-150: A Systems Approach	2010	Trends in Intelligent Robotics (CCIS)		CCIS 103	Springer
2.	P. Vadakkepat, Jong-Hwan Kim, N. Jesse, A. Al Mamun, J. Anderson, I. Verner, D. Ahlgren	Autonomous Underwater Vehicle for 150m Depth-Development Phases and Hurdles Faced	2010	Trends in Intelligent Robotics (CCIS)		CCIS 103	Springer

Papers published in Journals and Conference Proceedings :

1. **Pal, D**., Chatterjee, A. and Rakshit, A., 2018. Robust-stable quadratic-optimal fuzzy-PDC controllers for systems with parametric uncertainties: A PSO based approach. Engineering Applications of Artificial Intelligence, 70, pp.38-51.

2. Das, S.K., **Pal, D**., Kumar, V., Nandy, S., Banerjee, K. and Mazumdar, C., 2015. Stochastic characterization of a MEMs based inertial navigation sensor using interval methods. International Journal of Image, Graphics and Signal Processing, 7(7), p.24.

3. Das, S.K., Banerjee, S., **Pal, D**., Nandy, S., Shome, S.N. and Mukherjee, S., 2015. Automatic target detection of sonar images using multi-modal threshold and connected component theory.

4. Das, S.K., **Pal, D.**, Nandy, S., Shome, S.N. and Banerjee, S., 2014. Underwater terrain mapping with a 5-DOF AUV.

5. Das, S.K. and **Pal, D**., 2013. Formulation of FISPLAN: A fuzzy logic based reactive planner for AUVs towards situation aware control. International Journal of Intelligent Systems and Applications, 5(9), p.47.

6. Shome, S.N., Nandy, S., Das, S.K., **Pal, D**. and Kumar, V., 2013. An approach towards the design and development of a flexible 5dof AUV.

7. Shome, S.N., Nandy, S., **Pal, D**., Das, S.K., Vadali, S.R.K., Basu, J. and Ghosh, S., 2012. Development of modular shallow water AUV: Issues & trial results. Journal of The Institution of Engineers (India): Series C, 93(3), pp.217-228.

8. Das, S.K., Shome, S.N., Nandy, S. and **Pal, D**., 2010. Modeling a hybrid reactive-deliberative architecture towards realizing overall dynamic behavior of an AUV. Procedia Computer Science, 1(1), pp.259-268.

9. S. K. Das, **D. Pal**, A. Saha, and S. N. Shome, 2008. Design of a naïve sub-sea Communication Protocol for Data Transmission over an Acoustic Channel. In the 5th International Conference on Communication Systems and Computer Networks (WCSET 2008)

10. Shome, S.N., Nandy, S., Das, S.K., Biswas, D.K. and **Pal, D**., 2008, January. AUV for shallow water applications-some design aspects. In the Eighteenth International Offshore and Polar Engineering Conference. International Society of Offshore and Polar Engineers.

11. G. Purkayastha, S. Nandy, **D. Pal**, D. Biswas, S. N. Shome, 2007. An Approach To Power System Design of A Rov. In the International Conference on Modeling and Simulation.

12. **D. Pal**, G. Purakayastha, A.C. Pankaj, D.K. Biswas, S.N. Shome,2005. Simulation of Dynamics and Control of a Remotely Operated Vehicle (ROV). In the National Conference on Industrial Problems Related to Machines and Mechanics.

13. D. Banerjee, G.Purakayastha, S. Dutta, S.N. Shome, **D. Pal**, 2004. Simulation of FLC-based Autonomous Robot. In the National Conference on Advance Manufacturing and Robotics.

14. G. Purakayastha, V. Kumar, S. Dutta, S. Murlidhar, D. Dutta, R. Padhi, **D. Pal**, S.N. Shome, 2004. Conceptual Design of ROV MK-III. In the National Conference on Advance Manufacturing and Robotics.