

Conceptual View Of Designing a Smart Intelligent Connecting Link (Bridge) Between 2 Islands Over a Water Surface

¹Leena Jeyakumar, ¹Prerana Aithal, ¹Vismitha R., ¹Pradhan Aithal,
²Dr. Pavithra G., ³Dr. T.C.Manjunath*

¹First Year (Second Sem) ECE Students, Dept. of Electronics & Communication Engg.,
Dayananda Sagar College of Engineering, Bangalore, Karnataka
²Associate Professor, Dept. of Electronics & Communication Engg.,
Dayananda Sagar College of Engineering, Bangalore, Karnataka
³Professor & Head, Dept. of Electronics & Communication Engg.,
Dayananda Sagar College of Engineering, Bangalore, Karnataka

Abstract

In this paper, a conceptual view of designing a smart intelligent connecting link (bridge) between 2 islands over a water surface is presented. This paper provides a concise overview of the historical evolution of bridges, emphasizing their critical role in a nation's transportation infrastructure. Bridges are essential but costly to construct and upkeep. As a result, careful maintenance is imperative, and sensors play a vital role in this regard. The concept revolves around maintaining bridge integrity by controlling various parameters through effective data analysis, monitoring, and proper functioning. This project is primarily dedicated to the monitoring and assessment of bridge conditions using a range of sensors. The continuous advancement in sensor technology has led to the development of automated real-time bridge health monitoring systems. The work carried out is the second semester mini-project by the students of Electronics & Communication Engineering under the guidance of the faculties.

Introduction

A 'smart bridge' is one that can detect critical environmental or structural changes and respond automatically. Bridges are vital components of contemporary transportation networks, facilitating the seamless movement of vehicles, pedestrians, and goods over water bodies and challenging terrains. To ensure their safety and longevity, it is essential to address potential structural issues. Recent technological advancements have given rise to 'smart bridge monitoring systems,' offering innovative solutions. These systems utilize diverse sensors, data communication technologies, and microcontrollers like Arduino to continuously collect and analyze data. Arduino, as an open-source electronics platform, provides a cost-effective and adaptable means to create advanced monitoring systems for various applications, including bridge monitoring.

Floods result in significant loss of both life and property across many nations. However, in developing countries, the lack of advanced technology exacerbates these losses. Bridges, integral to modern infrastructure, enhance the aesthetic and functional aspects of roadways. Yet, bridge failures pose a substantial challenge, often leading to catastrophic consequences, including loss of life and disruptions in commerce. This project's objective is to monitor flood conditions and, in case of danger, raise an alarm through a buzzer sound [10].



Fig. 1 : A typical bridge flooded with water

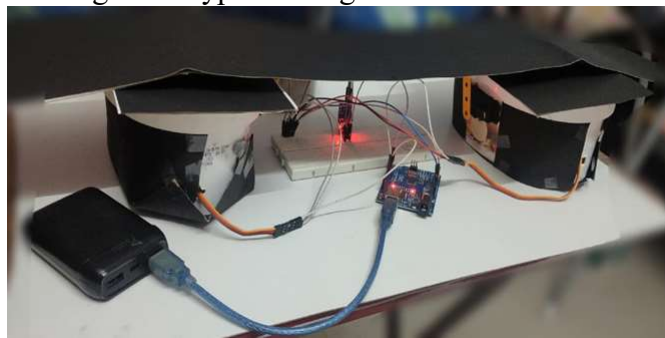


Fig. 2 : Experimental results obtained for the smart intelligent bridge

Conclusions

We've designed an Arduino-based automated river bridge control system for seamlessly opening and closing river bridges. This automated approach significantly reduces the need for manual labor. The primary objective of this project is to minimize structural damage and protect lives and property. The operational principle of the Bridge Monitoring system involves displaying data on an LCD when signs of bridge instability emerge. This system holds the potential to avert major disasters in the future and, ultimately, save numerous lives. In conclusion, the implementation of an automatic height-adjusting bridge using Arduino, servo motors, and moisture sensors presents a promising solution to prevent accidents and enhance safety during bridge crossings, particularly in times of heavy rainfall or flooding

References

- 1.Pratik Kumar Singh, Prakhar Tibrewal, P.J. Mohammed Shoaib, Naveen, Padmavathi M., Dr. T.C.Manjunath, "A Raspberry Pi-based Private Cloud System for Remote Data Access", International Journal of Innovative Research in Technology, IJIRT, An International Open Access, Peer-reviewed, Refereed Journal, Impact Factor 7.376, UGC approved journal no. 47859, ISSN: 2349-6002, Unique Paper ID: 160208, Volume 9, Issue 12, pp. 1274 – 1280, May 2023.
- 2.Manoj Kumar J., Arpitha N., Darshan R., Narendra Babu C.B., Dr. Pavithra G., Dr. T.C.Manjunath, "Design & Development of A Multi-Functional Robot (MOB) For Military, Mining Applications And Disaster Rescue Operations In The Country – A Prototype", International Conference on Interdisciplinary Innovative Research and Studies (ICIIRS-2023) Jointly organized by JS University, Shikohabad and International Association of Research and Developed Organization with the collaboration of Conference World at International Centre Goa, Dona Paula, Goa, India, Paper Id 62, ISBN 978-93-91535-45-2, pp. 32-48, 1 April 2023.

3. Nandini C.R., Madhu Shree K., Kumari Ayushi, Arpitha H.K., Jyothi Gutti, Keerthana M., Dr. Pavithra G., Dr. T.C. Manjunath, “A case study on circle detection & edge detection in gray scale images using digital image processing technique”, International Conference on Interdisciplinary Innovative Research and Studies (ICIIRS-2023) Jointly organized by JS University, Shikohabad and International Association of Research and Developed Organization with the collaboration of Conference World at International Centre Goa, Dona Paula, Goa, India, Paper Id 61, ISBN 978-93-91535-45-2, pp. 26-31, 1 April 2023.
4. Niveditha K.M., Shrushti Pattar, Dr. Sindhushree M., Dr. Pavithra G, Dr. T.C. Manjunath, “Novel sensor based multi-layered mask design for usage by the human beings during the pandemic times”, International Conference on Interdisciplinary Innovative Research and Studies (ICIIRS-2023) Jointly organized by JS University, Shikohabad and International Association of Research and Developed Organization with the collaboration of Conference World at International Centre Goa, Dona Paula, Goa, India, Paper Id 59, ISBN 978-93-91535-45-2, pp. 16-25, 1 April 2023.
5. Manoj Kumar J., Arpitha N., Darshan R., Narendra Babu C.B., Dr. Pavithra G., Dr. T.C. Manjunath, “Design & Development of A Multi-Functional Robot (MOB) For Military, Mining Applications And Disaster Rescue Operations In The Country – A Prototype”, Journal of Semiconductor Optoelectronics, Scopus Indexed Journal, SCI Q4, Vol. 41, No. 12, ISSN:1001-5868, pp. 1404-1419, Dec. 2022.
6. Nandini C.R., Madhu Shree K., Kumari Ayushi, Arpitha H.K., Jyothi Gutti, Keerthana M., Dr. Pavithra G., Dr. T.C. Manjunath, “A case study on circle detection & edge detection in gray scale images using digital image processing technique”, Journal of Semiconductor Optoelectronics, Scopus Indexed Journal, SCI Q4, Vol. 41, No. 12, ISSN:1001-5868, pp. 1398-1403, Dec. 2022.
7. Niveditha K.M., Shrushti Pattar, Dr. Sindhushree M., Dr. Pavithra G, Dr. T.C. Manjunath, “Novel sensor based multi-layered mask design for usage by the human beings during the pandemic times”, Journal of Semiconductor Optoelectronics, Scopus Indexed Journal, SCI Q4, Vol. 41, No. 12, ISSN:1001-5868, pp. 1388-1397, Dec. 2022.
8. Pratik Kumar Singh, P.J. Mohammed Shoaib, Prakhar Tibrewal, Naveen, Padmavathy M., Dr. T.C. Manjunath, “Recent advances in the development of data access system using remote means with raspberry pi & cloud computing”, International Conference on Advances in Engineering and Technology (ICAET-2023)”, Organized by RSP Conference Hub, Coimbatore, Tamil Nādu, India, RSP Conference Hub, Coimbatore, Tamil Nādu, India, Paper ID : 2305060, 27-28 May 2023.
9. Nikhil Bhutra, Gaurav Singh, Madhur Mehta, Ohshin Bhat, Padmavathi M, Dr. T.C. Manjunath, “Establishment of Secure Network using Reinforcement Learning”, International Conference on Advances in Engineering and Technology (ICAET-2023)”, Organized by RSP Conference Hub, Coimbatore, Tamil Nādu, India, RSP Conference Hub, Coimbatore, Tamil Nādu, India, Paper ID : 2305061, 27-28 May 2023.
10. Pratik Kumar Singh, Prakhar Tibrewal, P.J. Mohammed Shoaib, Naveen, Padmavathi M., Dr. T.C. Manjunath, “A Raspberry Pi-based Private Cloud System for Remote Data Access”, International Journal of Innovative Research in Technology, IJIRT, An International Open Access, Peer-reviewed, Refereed Journal, Impact Factor 7.376, UGC approved journal no. 47859, ISSN: 2349-6002, Unique Paper ID: 160208, Volume 9, Issue 12, pp. 1274 – 1280, May 2023.
11. Satvik M. Kusagur, Dr. Arun Kumar G., Dr. T.C. Manjunath, “Modelling & Control of Multivariable Smart Structures Using Output Feedback”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13658-13665, 2023, doi: 10.48047/ecb/2023.12.si4.1241

12. Rajashekher Koyyeda, Dr. T.C. Manjunath, “Designing an efficient standalone hybrid system incorporating PV, wind, and fuel cell technologies while considering partial shading conditions in PV and enhancing transient stability”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13647-13657, 2023, doi: 10.48047/ecb/2023.12.si4.1240
13. Dr. Prakash Kuravatti, Dr. Naveen S.M., Dr. P. Aruna, Dr. Archana H.R., Dr. Surendra H.H., Dr. Jyothi A.P., Dr. C.M. Joseph, Dr. Pavithra G., Dr. Sindhu Sree M., “Design & development of a nano antenna using chemical decomposition methods in IoT based nano-technology systems for energy harvesting for telecommunication sectors with AI-ML approach”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13638-13646, 2023
14. Aishwarya A., Avantika P., Indhudhara G.I. Kavya U., Dr. Sindhu Sree M., Dr. Pavithra G., Dr. T.C.Manjunath, “REFES - Robot Engineering Based Fire Evacuation System”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13630-13637, 2023
15. Charan Reddy N., Gopinath C., Jayashree K., Revati Hiremath, Dr. Pavithra G., Dr. Sindhu Sree M., Dr. T.C.Manjunath, “The AQUABOT : human body detection underwater, water quality monitoring & marine boundary surveillance using concepts of artificial intelligence”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13621-13629, 2023
16. Lohit Nimbagal, Rahul M., Sneha N. Teggi, Sushmitha M.R., Dr. Pavithra G., Dr. Sindhu Sree M., Dr. T.C.Manjunath, “Design & development of a lunar rover (chandrayan type) for Indian Space applications”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13614-13620, 2023
17. J. Pavan Raju, Amrutha Bhat, Sindhu S., Sushmitha A.C., Dr. Sindhu Shree M., Dr. Pavithra G., Dr. T.C.Manjunath, “Conceptual development of nano route based synthetic RBC using chemical composition concepts”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13607-13613, 2023
18. Kavyanjali R, Mo Imran, Nalliboyina Yuva Raja Phani Kumar, Maria Dayana L.N., Dr. Pavithra G., Dr. Sindhu Sree M., Dr. T.C.Manjunath, “Design and implementation of smart prosthetic hand using Artificial Intelligence”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13598-13606, 2023
19. Joseph Walter A., Akshay D. Akamanchi, C. Karthik, Mangala Shashank, Dr. Pavithra G., Dr. T.C.Manjunath, “Design and development of terrain globetrotter BoT for different types of engg. Applications”, Scopus Indexed Journal Article, SCImago Journal & Country Rank - Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Vol. 12, Special Issue 4, pp. 13591-13597, 2023
20. Bindu K.R., Ashwini M., Divya K.K., Aishwarya C., Dr. Sindhu Sree M., Dr. Pavithra G., Dr. T.C. Manjunath, “Design & development of intelligent ambulance concept – AI and human interface technology”, Scopus Indexed Journal Article, SCImago Journal & Country Rank -



Quartile 3 (Q3), SJR 2022 Rating 0.25, Journal of European Chemical Bulletin, Section A-Research paper, e-ISSN 2063-5346, H-Index 11, Received: 10.05.2023, Revised: 29.05.2023, Accepted: 09.06.2023, Vol. 12, Special Issue 9, pp. 177-188, 2023.