International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.7 November - December – 2023
DOI:10.46647/ijetms.2023.v07i06.012 ISSN: 2581-4621

A Speech Cum Audio Controlled Robotic System Development For Generic Purposes

[1]S.G. Swathi, [1]Aliya Bhandari, [1]Srushti M. Bapparad, [1]Kavya A., [2]Dr. Pavithra G., [3]Dr. T.C.Manjunath*

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

Abstract
In this paper, the project titled "Voice-Controlled Bluetooth-Controlled Obstacle-Avoiding Robot" outlines a robotic system designed for control via both voice commands and Bluetooth communication. This robot is not only capable of obstacle detection, enabling it to navigate and circumvent barriers, but it also responds to voice instructions, offering users an interactive mode of control. Additionally, the Bluetooth feature facilitates remote operation through devices like smartphones. In essence, this project amalgamates voice recognition technology, wireless communication, and obstacle avoidance algorithms to create a versatile and engaging robotic platform. The work carried out is the second semester mini-project by the students of Electronics & Communication Engineering under the guidance of the faculties.

Introduction

The creation of a voice-controlled humanoid robot represents a complex project where various components seamlessly integrate. At its core, this endeavor involves constructing a physical humanoid robot equipped with advanced hardware and software capabilities. On the hardware front, this encompasses the design and assembly of the robot, including the incorporation of servos, sensors, microphones, and speakers. These integral components enable the robot to move, perceive its surroundings, process spoken commands, and respond through speech.

Creating a voice-controlled humanoid robot is a multifaceted venture that harmonizes the realms of robotics, artificial intelligence, and human-computer interaction. Its applications are diverse, ranging from aiding individuals with various tasks to delivering information and entertainment. This field is in a state of perpetual evolution, perpetually advancing through ongoing research and technological breakthroughs.

Literature review

In a world increasingly driven by automation and smart technology, the development of speech-controlled and audio-responsive robotic systems represents a groundbreaking frontier in robotics and artificial intelligence. This project aims to explore and advance the creation of a versatile and adaptive speech cum audio-controlled robotic system, designed for generic purposes. Such a system holds immense promise in a wide range of applications, from home automation and healthcare to industrial operations and beyond. This comprehensive two-page introduction provides an overview of the project, its significance, objectives, scope, and the multidisciplinary nature of this pioneering endeavor.

DOI:10.46647/ijetms.2023.v07i06.012 ISSN: 2581-4621

The Significance of Speech Cum Audio Control in Robotics

The fusion of speech and audio control with robotics presents a monumental shift in human-robot interaction. It is a technological leap that promises more intuitive, flexible, and user-friendly engagement with machines. As voice recognition and audio processing technology continue to advance, the opportunities for applying these capabilities to robotics are virtually boundless. The project's significance lies in its potential to democratize access to and utilization of robotic systems for a broader audience, transcending the barriers of traditional control methods and making robotics more accessible and adaptable in various settings.

Project Objectives

The primary objectives of this project are two-fold, viz. [17]-[20],

Robotic System Development: The core mission is to design and construct a state-of-the-art robotic system with hardware and software components capable of understanding and responding to human speech and audio commands. This entails integrating microphones, speakers, processors, and an array of sensors to create a sophisticated robotic platform.

Speech and Audio Control: In parallel, the project aims to develop advanced speech recognition and audio processing algorithms. These algorithms should enable the robot to comprehend spoken instructions and sound cues and translate them into meaningful actions, thus facilitating robust human-robot communication.

Scope of the Project Work

The scope of this project is extensive and multifaceted [13]-[16]

Hardware Development: The creation of a physical robotic system that encompasses mechanics, electronics, and sensors for movement, perception, and communication.

Software Development: The design and implementation of complex software algorithms for speech recognition, audio processing, and artificial intelligence to enable the robot to interpret and act upon audio inputs.

Integration: The seamless integration of hardware and software components to create a holistic robotic system capable of audio-driven interaction.

Adaptability and Versatility: The project endeavors to create a robotic system that can be adapted for diverse generic purposes. Whether it's assisting individuals with daily tasks, serving as a communication medium, providing entertainment, or aiding in industrial processes, this robotic system aims to be versatile in its applications.

Interdisciplinary Collaboration

The development of a speech cum audio-controlled robotic system is inherently interdisciplinary, drawing upon elements of robotics, computer science, artificial intelligence, signal processing, and human-computer interaction. The project thus necessitates collaboration among experts in these fields, fostering an environment where innovation and cross-disciplinary insights can flourish [9]-[12].

Potential Applications and Ongoing Advancements

The applications for a speech cum audio-controlled robotic system are broad and ever-evolving. These robots can be deployed in healthcare settings to assist individuals with disabilities or the elderly. In home automation, they can control appliances, provide information, and enhance security. In industrial scenarios, they can automate repetitive tasks and improve safety. As the project progresses, ongoing research and technological advancements will likely expand the capabilities and applications of such systems, pushing the boundaries of what is currently possible [5]-[8].

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 6 Volume No.7 November - December – 2023
DOI:10.46647/ijetms.2023.v07i06.012 ISSN: 2581-4621

Conclusions

In conclusion, the project on speech cum audio-controlled robotic system development for generic purposes is poised to redefine how humans interact with and utilize robotic technology. By harnessing the power of voice recognition and audio processing, this project aims to create a transformative tool with a diverse range of applications. It represents a promising leap forward in the domain of robotics and human-robot interaction, promising to make the benefits of advanced robotics accessible to a wider audience while continually pushing the boundaries of technological possibility [1]-[4].

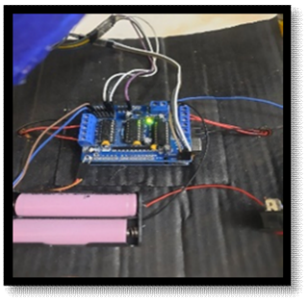

Fig. 1 : Hardware connections done

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, 202
[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,

DOI:10.46647/ijetms.2023.v07i06.012 ISSN: 2581-4621

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.