



Robotic Control Using an Android Application

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ABSTRACT

The goal of this study is to develop an Android app that can be used to wirelessly operate the robot. The most widely utilized operating system for smart devices nowadays is Android. Due to its clever and user-friendly touch interface, Android-based smart gadgets are increasingly growing in popularity these days. Additionally, the hardware technology used in smartphones is always evolving and getting better. As a result, we can conclude that leveraging the robust and versatile Android smart phone platform to manage robotic or other systems would be extremely beneficial for industrial applications. The wheeled robot is used in this paper will be able to connect with an Android smart phone using HC05 Bluetooth module. The closed loop system is implemented in the robot using PID (proportional, integrated, derivative) controller will provide us the constant feedback of the current status of performance of the robot. By using that feedback from the PID system errors in the system will be reduced and consistency of the performance of the system will be maintained

INTRODUCTION

used in this paper will be able to connect with an Android smart phone using HC05 Bluetooth module. The closed loop system is implemented in the robot using PID (proportional, integrated, derivative) controller will provide us the constant feedback of the current status of performance of the robot. By using that feedback from the PID system errors in the system will be reduced and consistency of the performance of the system will be maintained. Robots are intelligent electromechanical devices that may be created and programmed to carry out a variety of jobs in factories, assembly lines, logistics centers, and the healthcare sector. Robots are able to carry out their given jobs with extreme accuracy and precision. When compared to people, they execute with more accuracy, speed, and rigour. The application of artificial intelligence algorithms has led to the advancement of robotic systems today. Robotic systems have advanced to the point where they can make certain judgements on their own with the aid of artificial intelligence. Therefore, they get along perception that value of life and property might be lost unexpectedly by fire, robbery, force, etc., without a previous warning or information, according to. Over decades, security systems have used in this paper will be able to connect with an Android smart phones using HC05 Bluetooth module. The closed loop system is implemented in the robot using PID (proportional, integrated, derivative) controller will provide us the constant feedback of the current status of performance of the robot. By using that feedback from the PID system errors in the system will be reduced and consistency of the performance of the system will be maintained.

Significant improvements have been made in believability and scalability. In this approach, robotic systems are improving every day and will soon be capable of intelligently carrying out human beings' daily tasks. In this article, we outline the architecture that an Android app would use to drive a wheeled robot. Bluetooth will be used to create a connection between the robot and the smartphone. Using the HC05 Bluetooth module, this Android application should be able to operate the wheeled robot. Data will be received by the robot from the Android mobile. The Bluetooth module will initially receive this data before sending it over UART to the ATmega-16 microcontroller. used in this paper will be able to connect with an Android smart phones using HC05 Bluetooth module. The closed loop system is implemented in the robot using PID (proportional, integrated, derivative) controller will provide us the constant feedback of the current status of performance of the robot. By using that feedback from the PID system errors in the system will be reduced and consistency of the performance of the system will be maintained.

We will be able to operate the robot in two different ways. The basic mode is the first mode. In this mode, the user inputs data using buttons that are given on the screen. 7 buttons will be present. Four of these seven buttons will be used to control the robot's direction. The robot may be moved in four directions using these four direction buttons: forward, backward, left, and right. Acceleration and braking will both be controlled by two buttons. There will be a help button that can be used to assist new users who are using the programme for the first time.

Related Work

Numerous studies have been conducted to create robotic systems that can be controlled by an Android handset. Application domains taken into account for these studies include different. As a result, academics have suggested new architectures for robotic systems and Android applications.

A mobile robot controlled by an android has been constructed by Jorge Kazakovs Winter [2]. The goal of his project was to construct the robot and its communication system using a low cost, open-source approach. Wireless Internet data transfer between a smart phone and robot was also a goal. Through

the use of parametric modelling software, he created the robotic structure using 3D design techniques. This design can be loaded into a 3D printer, which will layer-by-layer produce the robotic parts, allowing the robot to be simply put together. In this robot, he employed an Arduino microcontroller and Wi-Fi connection.

M. Selvam has put out a design for a robotic surveillance system that is attached to a wireless camera. In order to connect his robot and smartphone, he employed Bluetooth technology. For remote surveillance, he has employed a wireless night vision camera. Through an RF transmission, the TV unit receives the video that the camera has recorded. For the robotic system, he used an 8051 microcontroller.

A Bluetooth technology design has been put out by Vito M. Guard [1]. Robot powered by a microcontroller using an Android app. His work's major goal is to demonstrate that a single Android application is capable of interacting with a variety of electrical components that are often used in the hobby and armature robotics fields. He has created a Bluetooth technology-based communication protocol for android smartphones and robotic platforms. He created a robotic system using the Activity Bot Robot Kit from Parallax, a Propeller microcontroller board with 8 separate 32-bit processors, and a Parallax RN-42 Bluetooth technology adaptor.

Android driven robotic architecture for item selection and retention has been developed by Ranjith Kumar Goud and Santhosh Kumar [3]. The primary goal of their effort was to develop a pick and retain robot that can be used to diffuse bombs while remaining safe. Two motors for the robotic hand and two motors for the wheels were utilised to regulate the movement. They employed a Bluetooth module for communication, an LPC2148 microcontroller for remote surveillance, and a wireless camera. They created this idea with both its industrial and military uses in mind.

The submission. Bluetooth technology will be used to communicate human commands to the robot. Robot will take in the orders, process them, and carry out the tasks as instructed. Robotic systems will be able to communicate with smart phones via feedback or notifications to inform users of the system's present state.

Robotic system 2, or sub-system 2, is essentially a wheeled robot. This robot's ATmega-16 microprocessor manages the whole system. It has an HC-05 Bluetooth module that connects to a smartphone and gives the microcontroller data. After processing the data, the robot will carry out the commands. Two DC motors on the robot's back wheels are used to move it. These motors are driven by motor driver L298. For the robot's smooth and accurate movement, quadrature encoders are employed. The robotic subsystem controls the system's output using a PID equation.

Technical Specification of Robotic Component:

A) ATmega16

The 8-bit AVR microcontroller ATmega16 is utilised in low level applications. It features 16 kb of flash memory that is programmable. The analogue to digital conversion is done using a 10-bit ADC channel. In this study, encoder pulse counting and polling are accomplished using its three external interrupt handling capacity. Additionally, it features four PWM channels, two of which are 8 bit and two of which are 16 bit. Each of the four I/O ports on the ATmega16 is eight bits wide.

DC Motor

One kind of rotary actuator with many applications in industry is the DC motor. The RPM and torque (kg/cm) of a DC motor are used to identify it. A motor with a speed of 300 RPM and a torque of 3 kg/cm is employed for the robotic system. Direct current powers DC motors.

Rotary Quadrature Encoder

For accurate and fluid robot movement, encoders are employed in robotic applications. Encoder specifications are based on output pulses per revolution (PPR). In general, there are two sorts of encoders: absolute and incremental. Quadrature incremental encoders, which offer several benefits over other types of encoders, are employed for the robotic system.

Motor Driver

A motor driver is used to amplify a microcontroller signal and provide output to a motor. Between a microcontroller and a dc motor, it often serves as a power bridge. Dual H Bridge motor driver L298. For power control, the microcontroller's PWM pin is linked to two enable pins. This runs at up to 46 volts and provides output current of up to 4A.

HC05 Bluetooth module

An output from a microcontroller is amplified by a motor driver and sent to a motor. It often acts as a power bridge between a microcontroller and a dc motor. Driver for a dual H bridge L298. The PWM pin of the microcontroller is connected to two enable pins to regulate power. This has an operating voltage range of 46 volts and can deliver output current of up to 4A.

Significance of Pid

PID controllers are extremely popular and widely utilised in businesses throughout the world. Proportional, integral, and derivative controllers are the three components of a PID controller. The system can employ one or more controller combinations depending on the requirements. Robots use sensor feedback to determine how close they are to their destination using robotic systems, and they subsequently modify the system's output to get there.

Conclusion

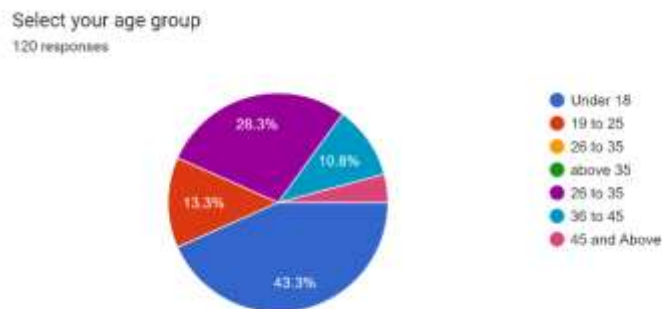
In order to create a robotic system that can be operated very quickly and be utilised in many aspects of everyday life, we provide the design architecture as our conclusion to this article. The primary goal of this study is to provide robotic architecture that can be controlled by Bluetooth technology on a smart phone. This research proposes an extremely scalable robotic system design. The hardware performance may be improved, and additional functions can be added, to further enhance this system. Additional features like Wi-Fi connectivity, robotic arms, cameras, and various sorts of sensors may be added to the system to improve its potential.

Acknowledgement

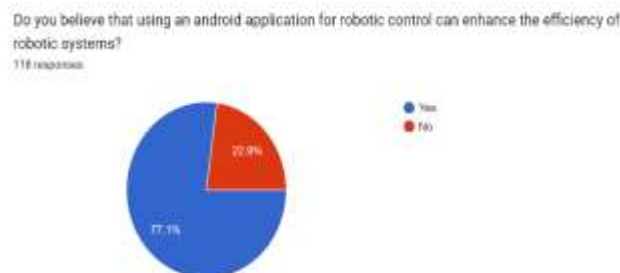
Presenting our work on "Robotic Control Using an Android Application" gives us tremendous joy. We did our best to include all the necessary information on the subject. The effective completion of this article was the result of the team's whole cooperation and committed efforts. Anita Shinde helped us prepare this article, and we would like to thank her sincerely for her guidance. We were able to improve this work thanks to her comments and ideas. We are grateful to her for her insightful recommendations and ongoing research on the subject. We also like to express our gratitude to our friends for reading the article, pointing out the errors, and offering helpful suggestions.

Figures and survey result

1 Select your age group



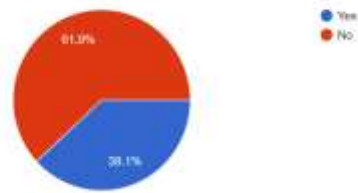
2 Do you believe that using an android application for robotic control can enhance the efficiency of robotic systems?



Have you ever used an android application for controlling a robot?

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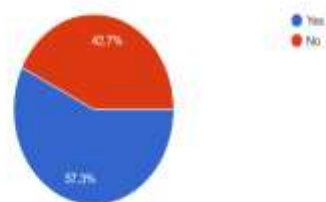
138 responses



Do you think that using an android application for robotic control can reduce the risk of human error?

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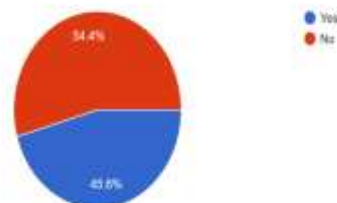
117 responses



Do you believe that an android application can simplify the process of robotic control?

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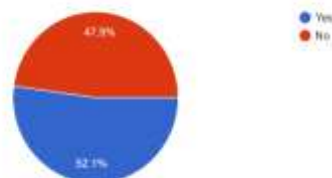
114 responses



Have you ever encountered any difficulty in using an android application for controlling a robot?

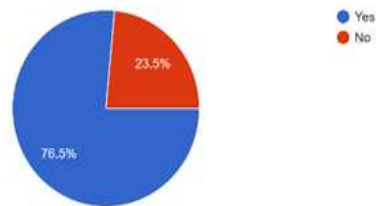
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117 responses



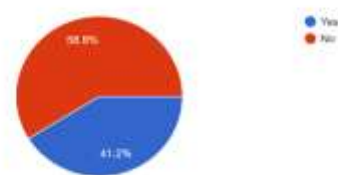
Do you believe that using an android application for robotic control can increase the safety of robotic systems?

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17 responses



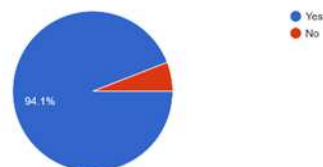
Have you ever experienced any delay or lag while using an android application for controlling a robot?

Have you ever experienced any delay or lag while using an android application for controlling a robot?
17 responses



Do you think that an android application can make robotic control more user-friendly?

Do you think that an android application can make robotic control more user-friendly?
17 responses



Reference

1. Vito M. Guardi's Design of an Android Bluetooth App for a Microcontroller-Powered Robot(May 2014)
2. The Android-Controlled Mobile Robot by Jorge Kazacos Winter was released in July 2013.
3. robot for picking up and holding items that runs on Android Ranjith Kumar Goud and B. Santhosh Kumar (Oct 2014)
4. employing a smart phone for robotic control in surveillance applications Selvam, M. (IJRET 2014)Selvam, M., (IJRET 2014