

IMPLEMENTING ROBOT USING ANDROID PLATFORM TO PERFORM DIFFERENT KIND OF ACTIVITIES TO REDUCE HUMAN EFFORTS

Masera Sayyed¹, Pritam Bhamre², Sejal Kadve³

^{1,2,3}U.G. Student, Department of Computer Engineering,

Sandip Institute of Engineering & Management, Nashik Savitribai Phule ,University of Pune, (India)

ABSTRACT

This research combines the capabilities of robots with the Android mobile phone platform via Bluetooth connection offered by Android mobile phones using arduino microcontroller. This provides an interactive system by which disabled people can control an assistant robot with simple touches on user friendly interface, within the range of Bluetooth signals to get objects from the surrounding area. The user will be able to control the movement of the robot and perform actions of catching different kinds of objects.

I. INTRODUCTION

Robots are smart machines that can be programmed and used in many areas such as industry, manufacturing, production lines or health, etc. These robots perform hard, dangerous and accurate work to facilitate our life and to increase the production because they can work 24 hours without rest, and can do works like human but more precisely and less time. Assistive mobile robots that perform different kinds of work over everyday activities in many areas such as industry, manufacturing, production lines, or health, etc. are very commonly used to improve our life. The idea of this research is to exploit robotics usage on healthcare field to help mobility disabled people. A smart phone is a mobile phone built on a mobile computing platform, with more advanced computing ability and connectivity than a feature phone.

Smart phones are a more affordable and efficient hand held devices which can be used to support collaborative activities in a community. It is a result of a huge advancement in mobile phones technology. This research combines the capabilities of robots (using 3 Lego MINDSTORMS kits to construct a prototype) with the Android mobile phone platform via Bluetooth connection offered by Android mobile phones and Lego NXT 'Brick'. This provides an interactive system by which disabled people can control an assistant robot with simple touches on user friendly interface, within the range of Bluetooth signals (10 meters) to get objects from the surrounding area.. We aim to develop a mobile phone application to control a robot regardless of its capabilities (e.g. robot with wheels and arm). As a proof of concept we built a robot model using Lego MINDSTORMS in order to test our proposed robot controller. The developed Android mobile application can run on any Bluetooth enabled android device which operates on API level 10 and more.

This research combines the capabilities of robots via Bluetooth connection offered by android mobile phones. This provides an interactive system by which helps to reduce human efforts by an assistant robot with simple touches on user friendly interface, within the range of Bluetooth signal to get objects. The user will be able to control the movement of the robot an perform action with help of robot.

II. RELATED WORK

2.1 Arduino

Arduino is a single-board microcontroller, intended to make the application of interactive objects or environments more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR micro controller, or a 32-bit Atmel ARM. Pre-programmed into the on-board microcontroller chip is a boot loader that allows uploading programs into the microcontroller memory without needing a chip (device) programmer.

III. BLUETOOTH

Bluetooth is a wireless communications protocol running at 2.4 GHz, with client server architecture, suitable for forming personal area networks. It is designed for low power devices such as mobile phones. Bluetooth now comes as standard on the majority of mobile phones, and desktop computers. It can be easily with a module to allow Bluetooth communication. Bluetooth is the only appropriate communications protocol for this system because supports only Bluetooth wireless communication. We use Bluetooth to connect and send direct commands from the mobile phone to control the robot.

IV. ANDROID OS

Android is an operating system based on the Linux kernel, and designed primarily for touch screen mobile devices such as smart phones and tablet computers. Initially developed by Android, Inc., which Google backed financially and later bought in 2005, Android was unveiled in 2007 along with the founding of the Open Handset Alliance: a consortium of hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices. The first publicly available smart phone running Android, the HTC Dream, was released on October 22, 2008. The user interface of Android is based on direct manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects. Internal hardware such as accelerometers, gyroscopes and proximity sensors are used by some applications to respond to additional user actions, for example adjusting the screen from portrait to landscape depending on how the device is oriented. Android allows users to customize their home screens with shortcuts to applications and widgets, which allow users to display live content, such as emails and weather information, directly on the home screen. Applications can further send notifications to the user to inform them of relevant information, such as new emails and text messages. Android's source code is released by Google under the Apache License; this permissive licensing allows the software to be freely modified and distributed by device manufacturers, wireless carriers and enthusiast developers. Most Android devices ship with a combination of open source and proprietary software. As of July 2013, Android has the largest number of applications ("apps"), available for download in Google Play store which has had over 1 million apps published, and over 50 billion downloads. A developer survey conducted in April-May 2013 found that Android is the most used platform among developers: it is used by 71% of the mobile developers population. Android is popular with technology companies who require a ready-made, low-cost and customizable operating system for high tech devices. Despite being primarily designed for phones and tablets, it also has been used in televisions, games consoles, digital cameras and other electronics. Android's open nature has encouraged a large community of developers and enthusiasts to use the open-source code as a foundation for community-driven projects, which

add new features for advanced users or bring Android to devices which were officially released running other operating systems.

V. ATMEGA8

Memory:

It has 8 Kb of Flash program memory (10,000 Write/Erase cycles durability), 512 Bytes of EEPROM (100,000 Write/Erase Cycles). 1Kbyte Internal SRAM I/O Ports: I/ line can be obtained from three ports; namely Port B, Port C and Port D.

Interrupts:

Two External Interrupt source, located at port D. 19 different interrupt vectors supporting 19 events generated by internal peripherals.

Timer/Counter:

Three Internal Timers are available, two 8 bit, one 16 bit, offering various operating modes and supporting internal or external clocking.

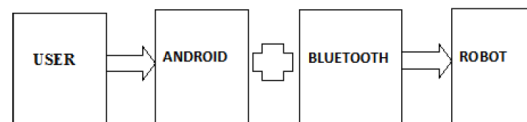
Analog Comparator:

A comparator module is integrated in the IC that provides comparison facility between two voltages connected to the two inputs of the Analog comparator via External pins attached to the micro controller.

Analog to Digital Converter:

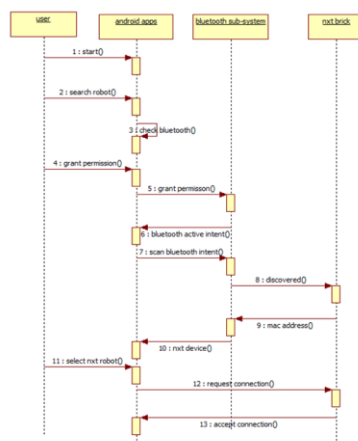
In built analog to digital converter can convert an analog input signal into digital data of 10bit resolution. For most of the low end application, this much resolution is enough.

VI. ARCHITECTURE

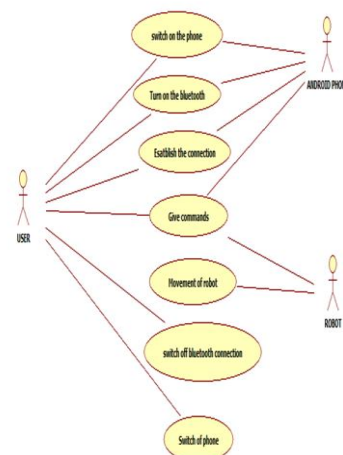


VII. UML DIAGRAM

1 Sequence Diagram



2 Use-case Diagram



VIII. SYSTEM REQUIREMENT

ID	DESCRIPTION
Requirement 1	The System shall run on any Bluetooth enabled android device that operates on API level 10 or more
Requirement 2	The System shall store the MAC address and robot configuration for the current connected robot
Requirement 3	The System shall allow the user to connect and control a pre connected robot directly
Requirement 4	The System shall allow the user to start scanning for new robots and make a new connection to any found robot
Requirement 5	The System shall prevent the user to navigate from the main interface to the robot controlling interfaces if the Bluetooth is not enabled
Requirement 6	The System shall allow the user to control the power of the robot motors
Requirement 7	The System shall provide a list of common objects that the user may frequently need that will set the catching speed to the appropriate value for the selected object.

IX. CONCLUSION

In this project, we achieved control both wireless communication between the mobile robot android GUI application. The main tasks of this project make surveillance robot which can be control by emerging android technology. It gives versatile operation of robot controller which need not modify the hardware. This system can further be developed by enhancing the performance and by adding more features. Further development of this system depends on the application we are using an area of work.

REFERENCES

- [1]. Using A Mobile Phone TO Control Movable Lego Robot Supported By Simple Robotic Arm Zaid El Omari, Samer khamiseh,
- [2]. Iyad Abu Doush, Eslam Al Maghayreh Yarmouk University ,May 8, 2013
- [3]. S. Goebel, et al., "Using the Android Platform to control Robots," in Proceedings of 2nd International Conference on Robotics in Education (RiE 2011), 2011, pp. INNOC - Austrian Society for Innovative Computer Sciences_142.
- [4]. M. Barak and Y. Zadok, _Robotics projects and learning concepts in science, technology and problem solving,_ Int. J. Technol. Design Educ. vol. 19, no. 3, pp. 289_307, Aug. 2009.
- [5]. A. García-Cerezo, A. Mandow, J. L. Martínez, J. Gómez-de-Gabriel, J. Morales, A. Cruz, A. Reina, and J. Serón, _Development of ALACRANE:
- [6]. A mobile robotic assistance for exploration and rescue missions,_ in Proc. IEEE SSRR2007, Rome, Italy, 2007, pp. 1_6.6