Analyzing Wireless Control for Industrial Automation Robots Using Android Mobile

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Abstract—Automation industry uses Industrial Robots for most of the automation systems. Research on these industrial robots were made to make them more user friendly. During past decade, different methods had been initiated to teach and control robots more easily and effectively. Despite of these developments, the Teach Pendant Robots are not yet replaced even in big robotic companies. There are several reasons for this. One major reason is that, the new innovation doesn’t make significance difference in the previous system and that the overall cost of the system is still the same. This paper focuses on the said problem and provides a solution that might cause a tremendous difference in the present system. The Solution to the said problem is an Android mobile. The research paper exploits the capabilities of an Android mobile, which can design a highly efficient and friendly industrial robots.

I. INTRODUCTION

Robots are major part of any industry. The world is focusing on robotics. Robotics was once a separate field & now the area of research interest is focused on robotics. Almost all human based works are being replaced by the robots[1][2]. Industrial robots plays a major role in influencing this interest to a great extent. In the last decade, new methods were proposed to control these robots. Wireless Control was the main objective in most of the proposals. Control using Accelerometer Sensors seemed favorable in most of them. Few of them used mobile phones to control these robots remotely. Despite of these proposals, many industries are still using the same teach pendant control[2]. The research paper analyzes the reasons for industries for adopting wireless control for robots and gives new suggestion on what can bring about a change in the present system[2][3].

II. OVERVIEW OF PREVIOUS WORKS

The overview of work related to robotic arm control carried out previously are grouped under different categories stated below:
1) Which uses mobiles phones and Networks to control remotely.
2) Which uses image processing which captures hand motion for robot controlling
3) Which uses accelerometers or gyros with microcontrollers as wearable gestures
4) Which uses teach pendant & industrial robot with controller

From the above diagrams, the following observations can be made:
1) All the systems requires a PC or a Laptop for processing sensor signals.
2) Only the sensing mechanism changes but at the receiver end, they all have the same components.
The above methods are costly as all methods involve a PC or a Laptop. A major change could be brought by eliminating a PC or a Laptop from the above system and instead use an Android Mobile.

III. PURPOSE OF USING ANDROID PHONE:
The PC or the Laptop are primarily used for the data acquisition and calculation purposes. Android phones are handy, acquisition and calculation can be done more easily. Also, accelerometers and gyro are present in the recent Android phones, therefore there is no requirement of a separate sensing unit. Hence the mechanism of sensing and acquisition/calculation is performed with a standalone device eliminating the requirement for a separate system. Another reason for using Android mobile is that, the required Android App can be developed and altered easily as desired, since Android is an open source platform.

The proposed system consists of two units:
1) An Android Mobile Phone
2) An Industrial Robot with Controller.

An application for Android phone is developed which acquires the values from accelerometer and gyro of the mobile phone and transmit it over Bluetooth channel. X-axis and Y-axis values are acquired from accelerometer and readings of Z-axis are acquired from the gyroscope. On receiving end, a Microcontroller along with a Bluetooth module is present. The values of accelerometer and gyroscope are received using Bluetooth module and sent to the Microcontroller serially. The data is analyzed and is used to control the servos.

IV. SIMULATION:
The operations in the proposed system is shown in sequence above. Blender is used for simulating. The 3D model of 3 DOF robotic arm is shown below.

Figure 5

A python plug-in named Pyserial can be used to receive the data serially from any serial device and also to transmit serial data. Blender is built on Python, so serial data from Bluetooth can be easily manipulated using python codes. Simulation can be done using “Sensoduino” which is already available on android app which transmit accelerometer and gyro readings via Bluetooth from the mobile phone. A view of the APP is shown below.

Figure 7
The readings shall be in the range of 1-10. The readings for each axis will be different. The readings can be calibrated & than provided to servos of the robotic arm on Blender.

V. CONCLUSION:
Android is a very rapidly growing industry & this change in technology & adopting android to operate robot shall bring a tremendous change in the use of Industrial Robots.

VI. FUTURE WORK:
Android is an open platform software & an attempt could be made to develop a software which can operate any industrial robot globally with just a touch from any android smart phone.

VII. REFERENCES:


3) Hsien-I Lin * and Yu-Hsiang Lin “A Novel Teaching System for Industrial Robots”Sensors 2014, 14, SSN 1424-822


