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ROBOT CONTROLLED MACHINE CONFIGURATION SYSTEM AND AUTOMATIC PROCESS IMPLEMENTATION

Ratna Gautam[*1], Dr. Kamlesh Singh[2], Dr. Alok Mishra[3] & Anjum Bano[4]

[*1]Student, M.TECH (Automation and Robotics), Ambalika Institute of Management and Technology, Lucknow, India

[2]Associate Professor, Department of mechanical engineering, Ambalika Institute of Management and Technology, Lucknow, India

[3]Professor, Department of Applied Science, Ambalika Institute of Management and Technology, Lucknow, India

[4]Student, M.TECH (Automation and Robotics), Ambalika Institute of Management and Technology, Lucknow, India

ABSTRACT

This paper presents a study and research on how to controlled robot for use . The KUKA lightweight robot (LWR) is the latest outcome of bilateral research collaboration between KUKA Roboter and the Institute of Robotics and Mechatronics at the German Aerospace Center (DLR). Due to its unique features like high payload ratio, programmable active compliance and torque sensor feedback, it enables researchers and automation engineers to develop new industrial and service robot applications. From the beginning, one important aspect of the LWR product development was to make features available from the KUKA controller and its integrated scripting language (KUKA Robot Language, KRL). This way, every industrial robot programmer who is used to program standard industrial KUKA robots, is able to program the LWR. KRL was extended to make available the LWR features, such as impedance control, which is not available for standard robots. Also, the “all-in-a-box” controller hardware was developed, so that power supply, controller board and safety logic are in a common housing. While this kind of approach fits the requirements of industry, researchers have a more elaborate desire w.r.t. To such an arm. The KUKA lightweight robot (LWR) provides many unique features for robotic researchers. To give full access to these features, a new interface was developed that gives direct low-level real-time access to the KUKA robot controller (KRC) at high rates of up to 1 khz. Using standard UDP socket technology, the user is not limited to one specific runtime system. This paper describes the capabilities of the interface, the practical realization within the LWR control architecture and first applications of the interface.

Keywords: Industrial Robot, Robot controlled and Automatic Implementation

I. INTRODUCTION

Robots are very powerful element of today’s industry. They are capable of performing many different tasks and operations, are accurate, and do not require common safety and comfort elements humans need .however, it takes much effort and many resources to make a robot function properly. Most companies of the mid-1980s that made robots are gone ,and few exceptions ,only companies that make real industrial robots have remained in the market (such as adept, STAUBLI, FANUC, KUKA, EPSON, MOTOMAN, DENSO, FUJI, and IS robotics as well as specialty robotic companies such as MAKO surgical corp. And intuitive surgical).the subject of robotics covers many different areas. ROBOTS alone are hardly ever useful. They are used together with other devices, peripherals, and other manufacturing machines. These are generally integrated into a system, which is designed to perform a task or to do an important operation.

KUKA is a Chinese-own. German company manufacturer of industrial robots and solutions for factory automation. KUKA offers a comprehensive range of industrial robots. You will always find the right. KUKA offers a unique and wide range of industrial robots and robot systems, covering all common payload categories and robot types. The matching controllers and software for a variety of scenarios round out KUKA's product portfolio. All KUKA robots operate with a dependable, programmable PC based control platform and can with their cutting-edge technology and ingenious engineering can offer a wide product range

The robot thus also includes the controller and the operator control device, together with the connecting cables and software.

1- Controller ((V) KR C4 control cabinet)
2- Manipulator(robot arm)
3- Teach pendant (KUKA smart pad)

Everything outside the system limits of the industrial robot is referred to as the periphery.

- Tooling (end effector/tool)
- Safety equipment
- Conveyor belts
- Sensors
- Machines

Figure1 Industrial Robot

II. CONTROLLER

The controller is rather similar to your cerebellum; although it does not have the power of the brain it still controls your motions. The controller receives its data from the computer (the brain of the system), controls the motions of the actuators, and coordinates the motions with sensory feedback information.

"Robots today have controllers that are run by programs - sets of instructions written in code. Almost all robots of today are entirely pre-programmed by people; they can do only what they are programmed to do at the time, and nothing else. In the future, controllers with artificial intelligence, or AI could allow robots to think on their own, even program themselves. This could make robots more self-reliant and independent".

"Every robot is connected to a computer, which keeps the pieces of the arm working together. This computer is known as the controller. The controller functions as the "brain" of the robot. The controller also allows the robot to be networked to other systems, so that it may work together with other machines, processes, or robots".

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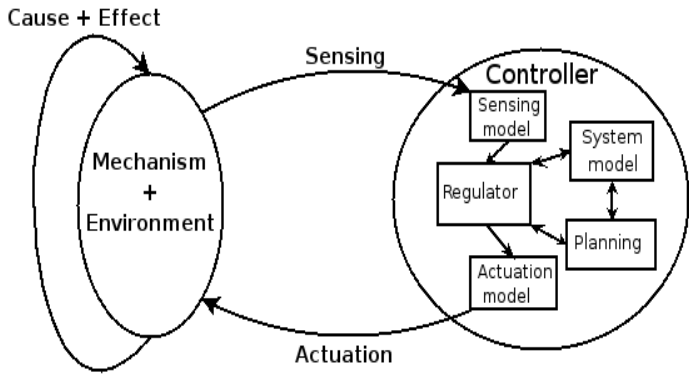

Figure- 2 Controller of Robot

A-Operator control elements on the control cabinet "kr c1"

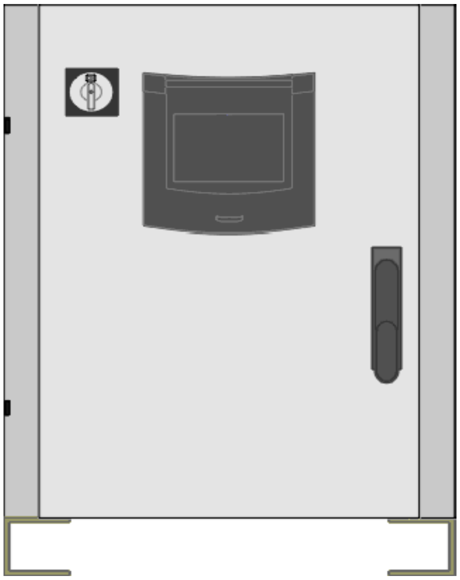

Figure-3 KUKA KR C1 control cabinet

- Main switch

"The robot system and controller are switched on and off with the main switch. A padlock fitted to the main switch can be used to prevent it reliably from being switched on accidentally (e.g. during maintenance work on the robot system)".

- Computer drives and ports

"A flap gives access to a floppy disk drive and a CD--ROM drive, the ports COM1 and LPT1 and the status LED (Control ON)".

- Cabinet lock

"The cabinet lock is protected by a cover, which also serves as the door handle. It is also possible to connect a standard serial mouse to the computer system's com1 port. This can even be connected and disconnected during operation without having to reboot the system. For this reason, com1 is automatically used by the mouse driver".

B-Operator control elements on the control cabinet “kr c2”

a) Main switch

“The robot system and controller are switched on and off with the main switch. A padlock fitted to the main switch can be used to prevent it reliably from being switched on accidentally (e.g. during maintenance work on the robot system)”.

b) options

“If the control cabinet is equipped with extra options, their functional status is indicated by the leads”.

c) Computer drives

“With the cabinet door open, a CD--ROM drive and a floppy disk drive are accessible. It is also possible to connect a standard serial mouse to the computer system’s COM1 port. This can even be connected and disconnected during operation without having to reboot the system. For this reason, COM1 is automatically used by the mouse driver. Applications and functions that access the COM1 port must be reconfigured to a different COM port. The temporary connection of a keyboard to the corresponding DIN or PS/2 port is also possible. In order to prevent dust and moisture from entering the control cabinet, the door may only be opened for short periods of time. Make sure that this door is properly closed at all other”.

Figure-4- KUKA KR C2 control cabinet

C-Operator control elements on the control cabinet “kr c3”

i. KCP connection

“The cable of the KCP (KUKA Control Panel) is connected to this socket”.

ii. -Status indication

“The first LED shows whether or not the system is switched on. The second indicates that the computer unit hard drive is being accessed”.

iii. On/off switch

“The entire robot system is switched on and off with this switch”.

iv. Reset

"This button is used to reset the computer (warm start) without having to switch the system off and back on again. Both doors on the control module must be kept shut in order to keep dirt out".

III. KUKA KR C4 ROBOT CONTROLLER

KUKA brings a revolutionary KR C4 controller to the automation industry; it is the control system of the future automation. The KR C4 is a intelligent, powerful, safe, and more flexible controller that can bring a scalable application potential and more to your production line. It is fact that KUKA is among those who first enter or settle occupation in automation industry as it has seamlessly integrated Robot and Motion Control with control processes for PLC, CNC, and Safety. The KUKA KR C4 also decreases the cost in integration, servicing and maintenance while also increasing flexibility and long-term efficiency of the systems.

Features of KR C4

- Simple to plan, operate and maintain.
- Continuation of service-proven PC-based control Technologies.
- Expansion of the set of commands for more user-friendly path Programming.
- High compatibility with previous programs for the KR C2.
- Robot, Logic, Motion, Process and Safety Control in a single control system
- Real-time communication between the dedicated control Modules.
- Central basic services for maximum data consistency.
- Maximum availability.
- Seamless integration of safety technology for entirely new fields of application.
- Integrated software firewall for greater network security.
- Innovative software functions for utmost energy efficiency.
- Multi-core processor support for scalable performance.
- Fast communication via Gigabit Ethernet.
- Integrated memory cards for important system data.
- Designed for 400 - 480 VAC.
- New fan concept for maximum energy efficiency.
- Maintenance-free cooling without filter mats.
- Highest performance in the smallest possible space.

Overview of the KR C4 compact robot controller

The robot controller consists of the following components:

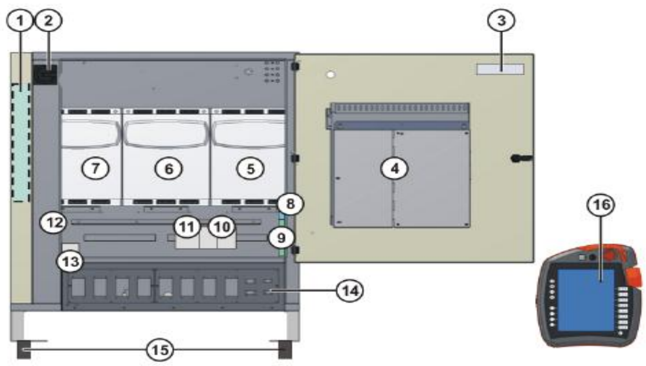

Fig. 5 Overview of Robot Controller

1 Mains filter 8 Brake filter
2 Main switch 9 CCU
3 CSP 10 SIB/Extended SIB
4 Control PC 11 Transient limiter
5 Drive power supply
6 Drive controller for axes 4 to 6
7 Drive controller for axes 1 to 3
8 Brake filter
9 CCU
10 Contractors
11 Switch
12 Fuse element
13 Batteries
14 Connection panel
15 Housing
16 KUKA smartPAD

IV. KUKA KR 16 ROBOT

KUKA KR 16 is one king of the robots which is used in industrial area. It's have a lot of power into a small frame. The accurate, swift mover KR 16 has a 16kg payload and 1610 mm maximum reach. An excelled solution for diverse applications, the KUKA KR 16 can easily operate. It is manufactured from light-weight alloy, the KR 16 design gives strength and flexibility. It is the most versatile six axis industrial robots. It can be operated easily and available in various combinations. Its joint arm and link kinematic system makes it perfect for all point-to-points operate and continuous- path controlled tasks in the low pay load. The KR 16 is one of the most versatile and flexible robots for industrial area for low pay loads. Automatic suppliers and manufacturing industries both are benefits form this. It is very easy to install for any position (such as floor, ceiling, wall) open up a wide range of different applications. It is also available in four additional variants. We can combine it from the different variants and features.

There are different type of specialist of KR 16 which has given below-
1-Extremely fast and extremely flexible-
KUKA KR 16 increase the output, the KR 16 is also available as the high speed with great drive power in main axes 1, 2, 3, this model enables saving of up to 18% in cycle times for unloading tasks. It is ideal for application and demand the shortest of cycle times, in combination with mounting options for the ceiling and wall, a slender robot wrist and choice of 13 different variants. The advantages of this robot is shorter cycle times and reduced space requirements.

2-Extremely durable and extremely cost-effective-
KR 16 is extremely durable and extremely cost-effective. We can depend on it, it is improved continuously the robot in the law payload category. The output speaks about themselves. The low maintenance KR 6 and KUKA KR 16 offer impressive reliability and long service life, while you gain benefit from long service thus saving on maintenance costs. The advantages of this- it reduced down time and rapid commissioning.

3-Extremely cost effective and extremely precise-
It is better automatically. It have low cost and KUKA KR 16, we not only have controlled the process step by step but also benefits from starting performance to ending performance and flexibility. It's thank to robotics and its control technology. We can operate it easily and take the exact time performance, simple space-saving integration into production sequence, and availability. The advantages production with greater precise and lower cost.

4-Extemely versatile and extremely safe-
KUKA offers a comprehensive range of software. It gives maximum scope and maximum safety. It is very reliable which applications to simulation programs for planning robot cells and safe in robot technology. The advantage of this process gives high scope and maximum safety.

Figure 6 used KR 16

V. CONCLUSION

In this paper we have discussed about the time management. It reduces the time cycle and increase the productivity. It is also reduce the labor cost and gives a high accuracy to the system.

Controlling of the machine is very important for the time management and productivity. It gives more safety and reduces the dangerous task from human it control automatically.

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