

COLLABORATIVE ROBOTIC ARC WELDING USING MOTOSIM

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Abstract-In the recent decades, robotics applications in industry has shown incredible growth to the bright future. Development of robotic in arc welding technology has widely diversified in terms of design and modelling, control system and sensing ability. Results show that developments in robotics application are affected by a lot of factors such as speed, flexibility, mobility, compactness, navigation, localization, and mobile platform. With the development of welding automation, multi-robot collaborative welding has become a research hotspot in the field of welding robots.

This algorithm is based on two or more robots which are used to weld a particular object simultaneously. Many diversified applications are possible to program using Moto Sim EG. The key aspect about robot simulation is the usage and programming of robots becomes easy and can be carried out with required precision and accuracy.

Moto Sim EG (Enhanced Graphics) is designed for accurate off-line programming of complex systems. With the virtual robot controller function, simulation software can be used for: optimizing robot and equipment placement, Reach modelling, Accurate cycle calculations, Automatic path generation, Collision detection, System configuration, Condition file editing, Functional Safety Unit (FSU) configuration, Remote access to real robot controller.

Keywords-robotics, welding, motorman, arc welding, robot welding, automatic welding.

I. INTRODUCTION

Robot is machine that looks like human beings. That has been programmed to do something. The word Robot comes from the Slavic word robot (meaning forced laborer). The robot was developed in 1960's. Robots are made of metals and mixer of other elements. Robots just do command and what humans say. Thirty years ago robots were something in a science fiction movie. But today robotics is used in many areas. And it is very important to the future of mankind. The robotic technologies are improve to helping national defense, health care, manufacturing, homeland security, education, consumer goods and many different sectors. Already doctors are using robotics in special surgeries. Robots are important because it performs tasks that dangerous and impossible for human also to do.

The definition of arc welding is a welding process which is used for welding the metals with the help of electricity to generate sufficient heat for softening the metal, as well as when the softened metal is cooled then the metals will be welded. This kind of welding uses power supply to make an arc among a metal stick & the base material to soften the metals at the end of the contact.

These welders can utilize either DC otherwise AC, & electrodes like consumable otherwise non consumable. Generally, the welding location can be defended with some kind of shielding gas, slag, otherwise, vapor. This welding process could be manual, fully or semi-automated.

This paper is organized in following sections. After this introduction, in Section II Related work discussed of the paper, Section III consists of components required of this project, IV about Implementation of the project explained, as well as the proposed method. Finally, Sections V,VI,VII,VIII ,and IX are Advantages, Applications, Conclusion, Future Scope and References of the project.

II. RELATED WORK

A. AXIS

Axis are used for movement indication, one use for a line, two for a plane and three for a point at anywhere in space. Roll pitch and yaw control are the main factors of a robotic arm axis, use for full control. Before 1987 robots robotic arms are working. In 2-axis and 3-axis. But now there in 4-axis, in 5-axis, in 6-axis and in multi-axis robotic arms are available.

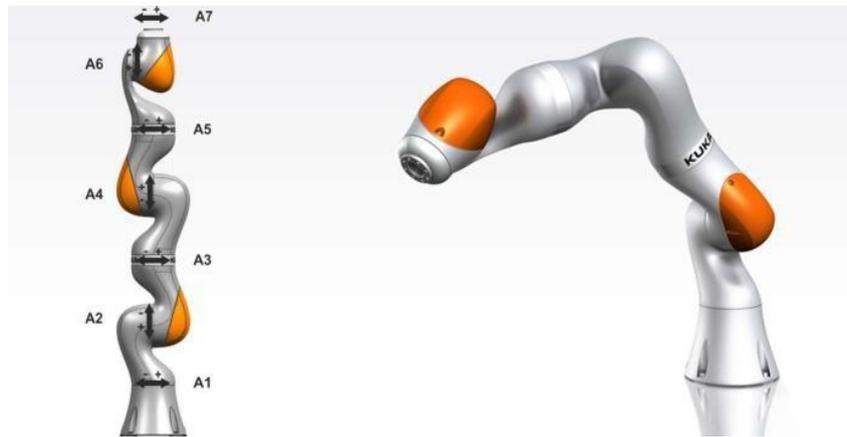


Fig.1: A KUKA 7-degree-of-freedom arm

B. DEGREE OF FREEDOM

Robotic arm control all points (directionally) using their degrees of freedom. A human arm control by seven degrees of freedom, articulated arms typically have up to six degree of freedom. A robotic arm is made by using different solid part, join by n number of joint connected, each joints having one degree of freedom if there n number of the joint then arm have n degree of freedom (DOFs).

C. PAYLOAD

A payload is a simply the weight that arm can be able to carry and movement possible with weight. It also includes weight of the entire arm with tools and dependent on a use of an arm in industries robotic arm use for heavy works so it should be high in industry arm and for normal use payload is 1 to 10kg. range. Some tools are used for proper weight calculation. The robotic arm have maximum payload 500gm.,the arm able up to maximum payload 7kg. industries arm having more payload than others.

III. COMPONENTS USED

1. Manipulator
2. Controller
3. Teach Pendent
4. End Effector
5. Welding Components

IV. IMPLEMENTATION OF PROJECT

The main aim of the project is Using robots in industrial welding operations is common but far from being a streamlined technological process. The problems are with the robots, still in their early design stages and difficult to use and program by regular operators; the welding process, which is complex and not really well known and the human-machine interfaces, which are unnatural and not really working.

So, in order to minimize these risks, a well enhanced and efficient software which goes by the name Motoman EG (Enhanced Graphics) is introduced where in the designing process and the user interface are much easy to start with. The software uses the one of a kind UWI (Universal Weldcom Interface) which makes the welding applications more and more precise and accurate.

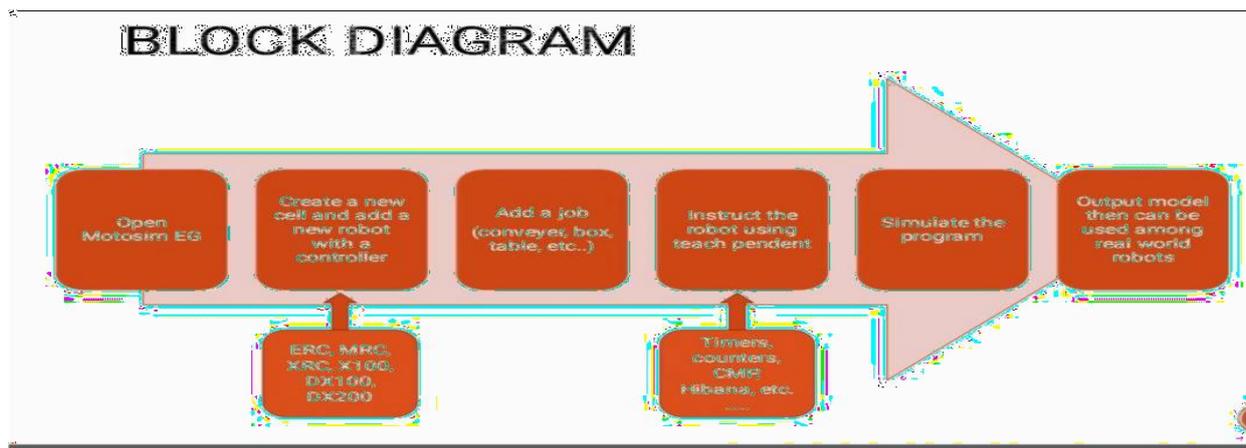


Figure 1: Proposed block diagram

A. WORKING

This chapter describes the procedures from cell construction to job creation. An arc welding application is used as an example to illustrate the creation of workpieces for fillet- welding and a welding torch for tool, and then to teach a welding path.

The following sections aim to create a robot, a workpiece and a stand like the ones prepared in "Arc_samp_NX" sample cell shown in the figure below.

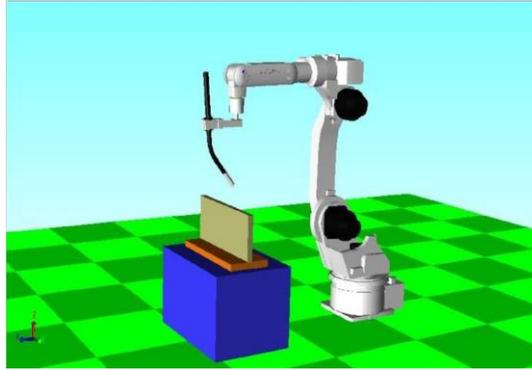


Fig.3.3: creating a robot, a work piece of sample cell

V. ADVANTAGES

- Safety is the most obvious advantage of utilizing robotics in heavy machinery that runs at hot temperature, sharp objects.
- Speed: robots don't get distracted or need to take breaks.
- Robots will always deliver quality. Since they're programmed for precise repetitive motion, they're less likely to make mistakes.
- Robots don't take jobs away. They merely change the jobs that exist. Robots need people for monitoring and supervision. The more robots we need, the more people we'll need to build those robots
- The robots in industries has increased their flexibility with being capable of performing a variety of tasks and applications.

VI. APPLICATIONS

- Large scale access to virtual Robots.
- Virtual learning in safe environment.
- Multi-user access to robot exercises with limited hardware.
- Testing environment for robotic training

VII. CONCLUSION

A substantial opportunity exists in the technology of robots to relieve people from boring, Repetitive, hazardous and unpleasant works in all forms of human labour. Properly applied, robots can accomplish routine and undesirable work better than humans at a lower cost. Not only will robots improve our standards of living, it will also improve our standard of life.

VIII. FUTURE SCOPE

This application can be easily implemented under various automobile industries. The welding process, which is complex and not really well known and the human-machine interfaces, which are unnatural and not really working. So, in order to minimize these risks, a well enhanced and efficient software which goes by the name Motoman EG (Enhanced Graphics) is introduced. So, in future robots will eliminate six percent of all jobs and one-third of jobs could become automated all over world for the next 10 years.

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