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Wireless Industrial Crane

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Abstract: Here we are introducing Wireless control crane which can be used in industry to lift heavy weights. The crane is used to lift and move heavy material in industries. For efficient operation, an induction motors with VFD in industrial application. The relay logic is implemented using PLC. This method is controlled by using remote system. In this system direction of motion of crane can be remotely controlled by wireless communication.

Wireless remote consists of various switches used for movements of crane like forward-reverse, left-right, and up-down. In traditional industrial crane control system, all control devices are wired directly to each other. Here human is main to control the crane and that passes through large drawbacks such as more wiring work, difficulties in troubleshooting due to these industrial productions decreases largely.

Keywords: PLC, HMI, VFD, WiFi module.

I. INTRODUCTION

The crane has been part of working in industries. Cranes are essential for carrying heavy material and lifting tasks of all kinds. Equipped with cables, a crane can lift and lower loads well beyond the capabilities of human industrial workers.

Currently in industries to control cranes we need a control panel, by buttons we control the movements of the crane. The Wireless crane can controlled the movements of crane by using wireless keypad just by pressing the buttons on the remote with help of WiFi module. Crane Remote Control With the modern innovation in the wireless industrial systems many applications are designed to improve the safety of the operators and the increasing the productivity nowadays. Cranes are mostly used in many industries.

This is a one-man control remote system. While using the system the operator can control the crane while moving around the work area. The Electrical crane control wireless remote controllers apply the latest innovation in the modern remote control technology. So the system can be implemented in industries. Crane design has changed to meet demands of a variety of industrial needs, and modern cranes often coordinate simple systems to achieve complex the lifting tasks - sometimes in environments which would be dangerous for human workers. PLC is used in this system which controls all system. All inputs are given to PLC. Ladder programming is used for PLC. For wireless controlling industrial crane we are using motors, VFD, WiFi module. VFD (variable frequency drive) controls speed of motor. WiFi module communicates with PLC.

A. Present Technology

Nowadays the industrial cranes are controlled by remote control but only drawback is that the remote is attached to the panel board of crane so sometimes it's dangerous to handle the crane because there are more possibilities of accident on field and another point is that we have to handle the crane on site also there is another big problem in the crane available right now in industries was we can't vary the speed of crane. An operator can control crane from enclosed cab attached to crane and utilize one or two other co-workers on the ground who help to indicate position of the loading using hand signals.

B. Problem Definition

In old system remote control is wired to the crane . the worker operates the crane from cab which attach to the crane . It is very risky for the workers. It utilizes one or more co-workers to indicate the position of crane on ground by using hand signals.

It is very difficult for human workers due to the slow response of the heavy materials. So the use of old system has many disadvantages.

C. Proposed Work

Initially the idea of this project is to operate the crane with wireless remote by using PLC. The idea of project is to develop a wireless remote control cranes to reduce human effort and target energy inputs in more effective ways than in the past.

This system is totally based on PLC. There WiFi module is used for receiving the remote transmitter data such as up-down, left-right, and forward-reverse. For movements of crane three motors are used. The wireless keypad is used to operate the crane's movements. This idea of project will bring a new era in the field of industries.

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II. SYSTEM CONFIGURATION

This system is totally based on PLC. It has two inputs SMPS and Wi-Fi module .Here Wi-Fi module are used for receiving the remote transmitter data such as up-down, left-right, and forward-reverse.

There are three motors used in this system

1) Forward-Reverse
2) Left-Right
3) Main motor or hoist (ropes or pulleys motor)

The wireless keypad just by pressing the buttons on the remote with the help of Wi-Fi module (remote transmitter). The four buttons on the keyboard are used for movement of crane in left-right or up-down direction .Every key has unique control like up key is used to move the crane upward direction and down key is used to move the crane in downward direction and left or right as well.

A. PLC

Programmable logic Circuits (PLC) consists of input module, Central Processing units (CPU), and output modules. An input can be a variety of digital or analog signals from various field devices (sensors) and convert them input logic signal that can be used by the CPU. The CPU makes decisions at executes control instruction based on program instruction in memory. Output modules convert control instruction from CPU into a digital or analogue signal that can be used to control various field devices (actuators). PLC receives data from Wi-Fi module and detects which motor should be on and off. It gives commands to motor through the VFD.

B. VFD

When Variable Frequency Drives operated from a constant frequency power source (typically 60Hz), AC induction motors are fixed speed devices. A VFD controls the speed of an AC motor by varying the frequency supplied to the motor.

C. Motor

The wireless keypad just by pressing the buttons on the remote with the help of Wi-Fi module (remote transmitter). The four buttons on the keyboard are used for movement of crane in left-right or up-down direction .Every key has unique control like up key is used to move the crane up direction and down key is used to move the crane in down direction and left or right as well.

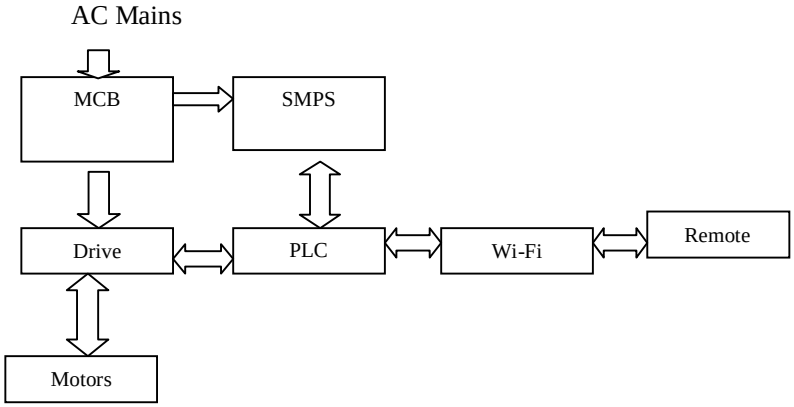
D. Wi-Fi Receiver

Wi-Fi is a high speed internet connection and network connection without use of any cable or wires. Wi-Fi receiver receives the signal from remote transmitter and send it to PLC.

E. Remote Trasmitter

The remote control is the use of light to carry signals between a remote control and the device it's directing. Infrared light is used. paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

III.BLOCK DIAGRAM



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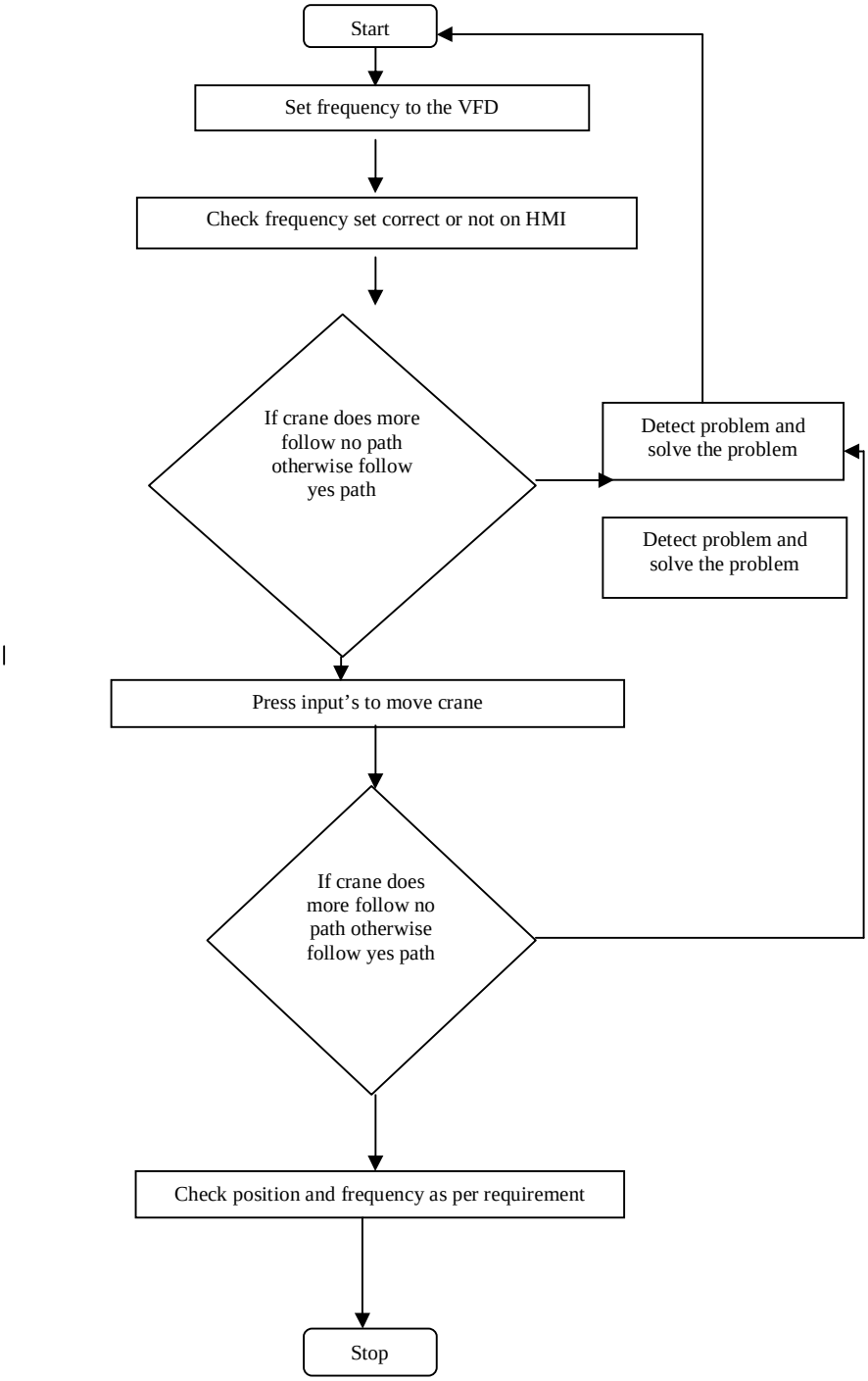
IV. ALGORITHM



V. SOFTWARE REQUIREMENTS

A. WPL Soft :- WPL Soft used for Delta PLC. Ladder programming is also used.
B. DOP Soft :- DOP Soft used for Delta HMI.
C. EPLAN P8 :- EPLAN used for designing , documenting and managing electrical engineering .

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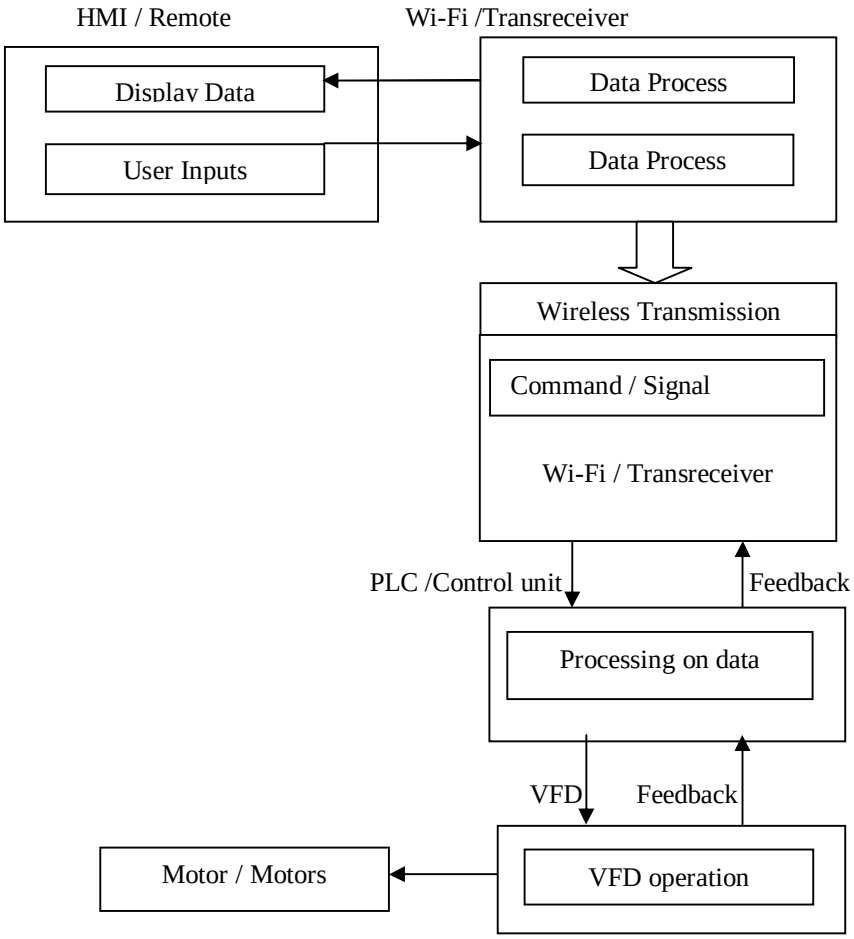
VI. SOFTWARE ARCHITECTURE



VII. CONCLUSIONS

The purpose of this system to provide great operator mobility and HMI allows operator to move the crane freely around workspace. The VFD is used to control and vary speed of crane. It improves the safety of human operator also increases productivity.

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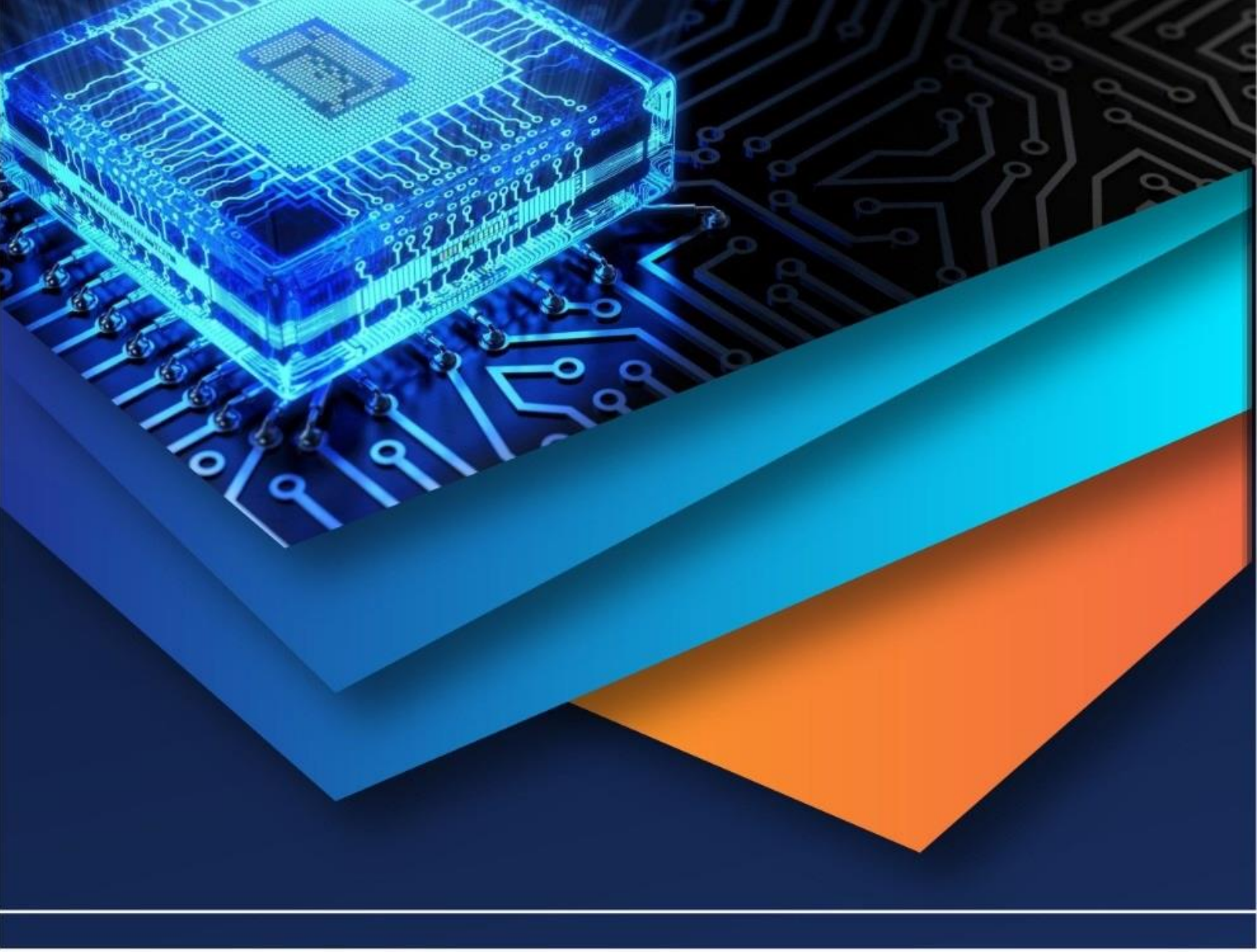

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