Wireless Remote Control for EOT Crane using AVR Micro Controller.

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***Abstract*- Industrial automations which are mostly depend upon the power systems & which requires distance controlled and regulated systems. Wireless technology which minimum cost, speed and distance will always be a point of an interest for research. So, Design and Implementation of wireless remote control for Electric Overhead Crane (EOT) is proposed. The proposed system is designed based on microcontroller ATMEGA328 processor with control switch and relay. The crane can be controlled by using wireless remote consisting two different sections namely transmitting section and receiving section here radio frequency is used as a link between RF transmitter and RF receiver. The remote control consists of various switches used for movements of the crane like forward- reverse movement, left-right movement, up-down movements which are used to control the EOT crane in automation industries. The early technology used to control the EOT crane using control pendent was an hazardous for the crane operators and the wired technology used in controlling the crane regularly caused short circuit which intern decreases the safety of the plant. In order to overcome the above mentioned unsafe condition of the automation industry the wireless remote control of EOT cranes is opted here by eliminating the wired pendant control of EOT crane.**

Keywords – Microcontroller; wireless control network.

I. INTRODUCTION

Electric Overhead Travelling Crane is widely used in various aspects of production activity, for instance, gantry crane issued in loading and unloading cargos in harbour and railway station, tower crane is used in hoisting building materials in construction site, etc. The goal of the paper is to achieve intelligent device control and secure environmental working conditions by interfacing various sensors and devices to the ATMEGA328 microcontroller for data transmission respectively. Wireless based industrial automation is a prime concern in our day-to-day life. In addition to building automation, environmental surveillance, or military operations Industrial. Automation is also expected to greatly benefit from wireless control networks (WSNs) in terms of faster installation and maintenance, cost savings, easier plant reconfiguration , interference free operation and distance communication can be achieved.

The recent developments in technology which permit the use of radio frequency (RF) technology such as Bluetooth, and radio spectrum have enabled different devices to have capabilities of communicating with each other. Radio frequency (RF) is a new technology, which has at its centre, the goal of eliminating wired communication among electronic devices. Instead of connecting with wires, every appliance has small RF transmitters/receivers. The radio frequency used (2.4GHz) is so high that the range of transmission will be small (about 100 feet).

RF controller is an emerging short-range, low-rate wireless network technology. It also presents some potentially interesting features for supporting large-scale ubiquitous computing applications, namely power-efficiency, timeliness and scalability.

In managing the move to wireless, it is clear that common wireless protocols such as RF controller, Wi-Fi and Bluetooth can be utilized on the factory floor.

The challenge is to understand how to utilize wireless solutions, developed for IT applications, as replacements for wired systems in time-critical scenarios typical of factory floor domains. To date, most wireless systems in production systems are focused on applications that require polling frequencies on the order of seconds or longer. Standardization of technology again plays an important role for globalization of these profile developments. RF controller due to its standardize

operational and network management properties will be suitable wireless interface technique and encryption properties which are again guaranteed for required communication system.

II. AVR MICROCONTROLLER

An Embedded system is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. Embedded systems are usually a part of larger, complex system. Dedicated applications, designed to execute specific activities, are implemented and embedded in systems. These embedded applications are required to collaborate with the other components of an enclosed system. Embedded application components interact mostly with the non-human external environment. They continuously collect data from sensors or other computer components and process data within real-time constraints.

Fig:AVR micro controller

In this project AVR micro controller is used. AVR(advance virtual RISC micro controller)It is a high performance ,low power CMOS 8bit flash program memory.AVR can execute 1 million intrstuction per second if cycle frequency is 1MHz..AVR micro controller has 3 types' tiny AVR micro controller, Mega micro controller and Xmega micro controller. Here we use Xmega AVR micro controller because it has extensive peripheral set with 28-100 pin package and 4-256KB program memory which is more suitable for this implementation.

III. PROPOSED WORK

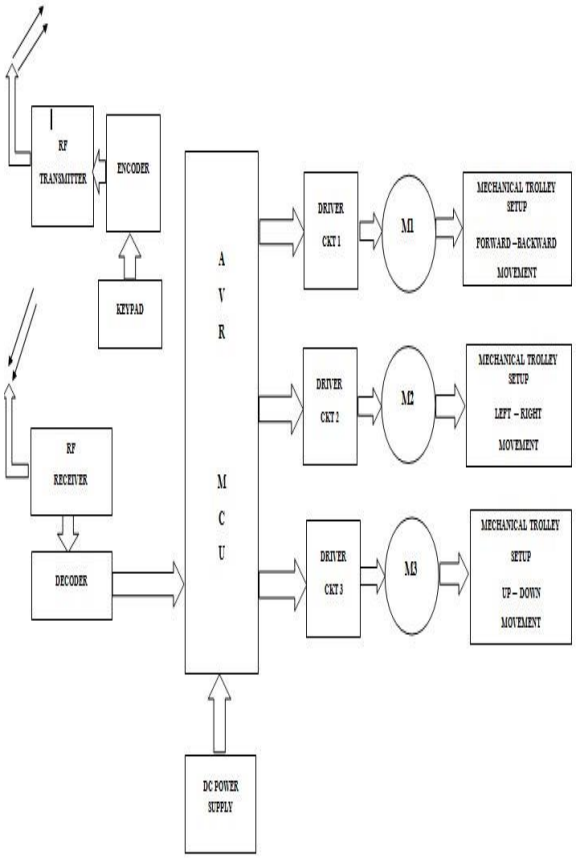


Fig :block diagram of controller mechanism.

The implemented methodology mainly has 2 segments.

Transmitter.
Receiver.

A. Transmitter:

There are 3 main parts;

Keypad:

It consist of 4 keys namely k1,k2,k3,k4,Which is used as the input for the EOT crane for desired motion.

Encoder :

The input obtained from the keypad encodes command in binary form. The command is sent via the radio waves to devices on the receiving end in order to avoid interference with other signals in the automation industries.

RF Transmitter :

The RF transmitter works with the range of 434MHz which operates approximately up to 100ft. RF remotes that sets them apart from infrared (IR) remotes is they can transmit signals up to 100 feet (30.5 meters) and can travel through walls and furniture. IR remotes, however, can only go 30 feet (9 meters) and need line of sight. Instead of sending out light signals, an RF remote transmits

radio waves that correspond to the binary command for the button you opt.

B. Receiver:

There are 2 main parts;

RF receiver:

A radio receiver on the controlled device receives the signal which is been transmitted on the other side. The receiver also operates at 434MHz.

Decoder:

It decodes the received signal and the decoded is passed on to the AVR micro controller.Control mechanism:It consists of AVR micro controller, driver circuits motors and mechanism trolley setup for the required movements and DC Power supply.

It consists of 28 pins which mainly has 3 set of ports Port B, Port C and Port D. where in Port B and Port D are digital 8-pins directional ports and Port C also consists of 8 pins where 1 is always set as reset pin and remaining 7 pins are for bidirectional analog ports. DC power supply is interfaced to the micro controller which operates at +5v.AVR micro controller is interfaced with 3 driver circuits which consists of single pole double throw switch that intern rotates 3 motors .Single pole double throw switch is selected because of the rotation of motor in clockwise and anticlockwise gives two distinct motion of the crane .The motor is interfaced with the mechanical trolley set up which provides required 6 movements of the EOT crane.

The motions are left-right movements, up-down movements and front-back movements. Addition to the 6 movements we have an emergency stop button which in emergency condition like to-fro movements of the heavy material that is lifted by the crane , over load(more than crane capacity) etc., This emergency button on its action bring the entire crane movements to halt. where by enhances the safety of the workmen and eliminates the unsafe condition of the automation industry in the dispatch area.

IV. IMPLEMENTATION

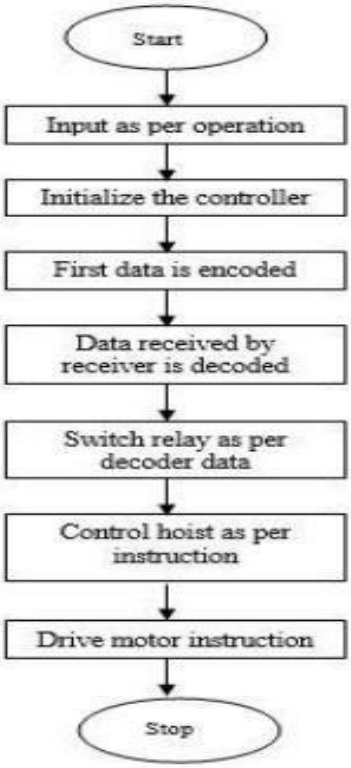
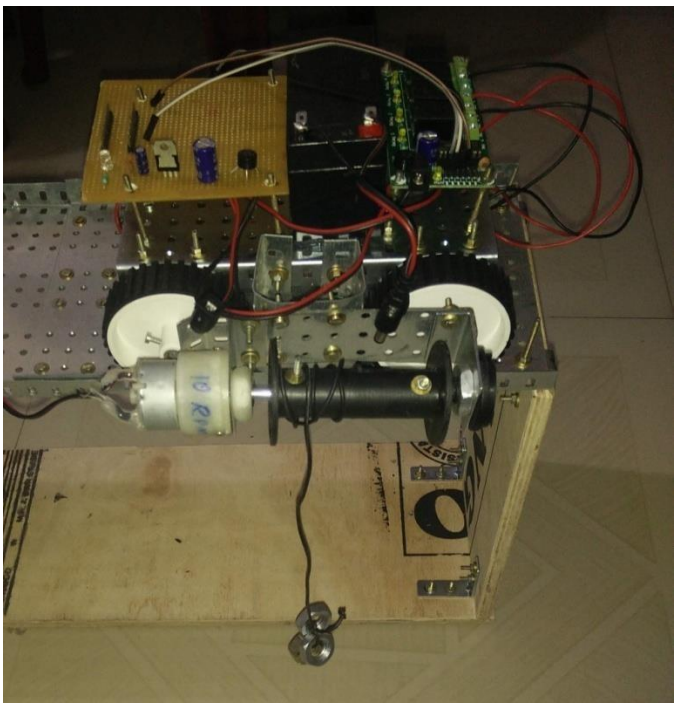
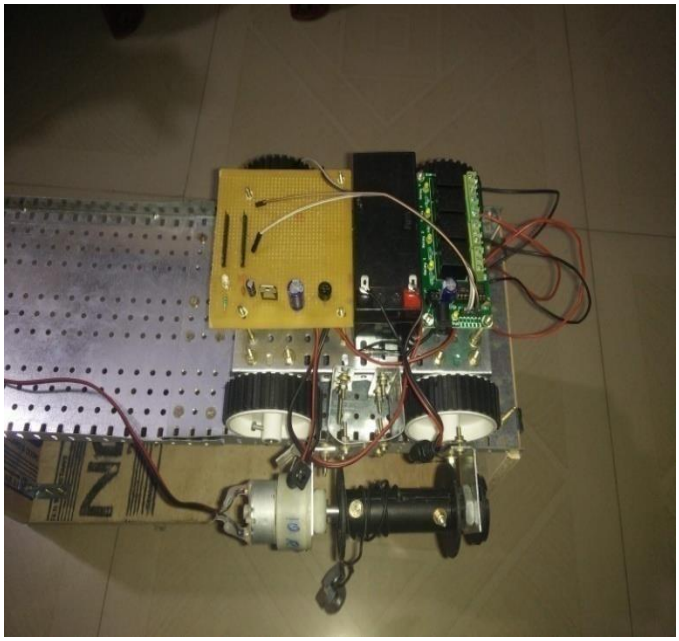


Fig: Flow diagram

V . RESULT





VI. CONCLUSION

The wired controlled EOT cranes in the automation industry caused many unsafe condition in order to eliminate unsafe condition this project proposed the wireless remote control system that has enhanced the safety of the plant, the micro controller used provides high precision control of the EOT crane and also the system is able to deal with multitask, this enhances the reliability of control systems and reduces the risks.
Thus, the system is said to be compact and reduces the cost. This design can be used widely in remote data control.

VII. FUTURE SCOPE

As Cranes are widely used in industries and at construction sites And as it is wirelessly controlled so it has a great future ahead at small scale as well as large scale level, because wireless crane is replace the part of the PLC controller by RF module. Which save the cost of PLC controller and wiring cost in less investment it can be implement . In future it can be controlled and monitored in real time through mobile and DTMF technology.

VIII. ACKNOWLEDGEMENT

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