RESEARCH ARTICLE OPEN ACCESS

Design and Fabrication of Remote Controlled Motorized Crane

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Abstract:

This system is mainly used for industrial field.lot of man power is required to transport the goods and weights from one place to the other place in industries. But if they use this crane system, only few persons are enough to do that work. What the benefit appear here means, manpower is totally reduced. It not only helps in this field, but also can use in industrial purpose for robotic based jobs. Jib crane is the type of crane, contains horizontal member called jib, movable hoist and floor mounted pillar. Jib cranes are used in industrial application and also for military application. It may be fitted to top of the floor and is used to lift the heavy loads from one location to another location.

Keywords **—The man power is required to transport the goods and weights from one place to the other place in industries.**

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I. INTRODUCTION

A crane is a lifting machine equipped with a winder, wire ropes or chains and sheaves that can be used both to lift and lower materials and to move them horizontally. It uses one or more simple machines to create mechanical advantage and thus move loads beyond the normal capability of a human. Cranes are commonly employed in the transport industry for the loading and unloading of freight; in the construction industry for the movement of materials; and in the manufacturing industry for the assembling of heavy equipment.The generally-accepted definition of a crane is a machine for lifting and moving heavy objects by means of ropes or cables suspended from a movable arm. As such, a lifting machine that does not use cables, or else provides only vertical and not horizontal movement, cannot strictly be called a 'crane'

The British scientist William Sturgeon in 1832. Following Sturgeon's work, a commutator-type direct-current electric motor made with the intention of commercial use was built by the American Thomas Davenport and patented in 1837.The modern DC motor was invented by accident in 1873, when Zénobe Gramme connected the dynamo he had invented to a second similar unit,driving it as a motor. The Gramme machine was the first electric motor that was successful in the industry.In 1888 NikolaTeslainvented the first practicable AC motor and with it the polyphase power transmission system.

Teslacontinued his work on the AC motor in the years to follow at the Westinghouse Company.The ongoing trend toward electronic control further muddles the distinction, as modern drivers have moved the commutator out of the motor shell. For this newbreed of motor, driver circuits are relied upon to generate sinusoidal AC drive currents, or some approximation.

II. LITERATURE REVIEW

The first cranes were invented by the Ancient Greeks and were powered by men or beasts-of-burden, such as donkeys. These cranes were used for the construction of tall buildings. Larger cranes were later developed, employing the use of human tread wheels, permitting the lifting of heavier weights. In the High Middle Ages, harbour cranes

were introducedtoloadandunloadshipsandassistwiththeirconstruction –some were built into stone towers for extra strength and stability.

The earliest cranes were constructed from wood, but cast iron and steel took over with the coming of the Industrial Revolution.For many centuries, power was supplied by the physical exertion of men or animals, althoughhoistsin watermills and windmills couldbedriven by the harnessed natural power. The first 'mechanical' power was provided by steam engines,

the earliest steam crane being introduced in the 18th or 19th century, with many remaining in use well into the late 20th century. Modern cranes usually use internal combustion engines or electric motors and hydraulic systems to provide a much greater lifting capability than was previously possible, although manual cranes are still utilised where

the provision of power would be uneconomic.Cranes exist in an enormous variety of forms – each tailored to a specific use. Sizes range from the smallest jib cranes, used insideworkshops, to the tallest tower cranes, used for constructing high buildings, and the largest floating cranes

This article also covers lifting machines that do not strictly fit the above definition of a crane, but are generally known as cranes, such as stacker cranes and loader cranes.There are two major considerations that are taken into account in the design of cranes. The first is that the crane must be able to lift a load of a specified weight and the second is that the crane must remain stable and not topple over when the load is lifted and moved to another location.helever. A balance crane contains a horizontal beam (the lever) pivoted about a point called the fulcrum.

The principle of the lever allows a heavy load attached to the shorter end of the beam to belifted by a smaller force applied in the opposite direction to the longer end of the beam. The ratio of the load's weight to the applied force is equal to the ratio of the lengths of the longer arm and the shorter arm, and is called the mechanical advantage.Thepulley. A jib crane contains a tilted strut (the jib) that supports a fixed pulley block. Cables are wrapped multiple times round the fixed block and round another block attached to theload. When the free end of the cable is pulled by hand or by a winding machine, the pulley system delivers a force to the load that is equal to the applied force multiplied by the number of lengths of cable passing between the two blocks. This number is the mechanical advantage.

This can be used directly to lift the load or indirectly to move the jib or beam that carries another lifting device.Cranes, like all machines, obey the principle of conservation of energy.

The hydraulic cylinder. This can be used directly to lift the load or indirectly to move the jib or beam that carries another lifting device. Cranes,like all machines, obey the principle of conservation of energy This means that the energy delivered to the load cannot exceed the energy put into the machine. For example, if a pulley system multiplies the applied force by ten, then the load moves only one tenth as far as the applied force. Since energy is proportional to force multiplied by distance, the output energy is kept roughly equal to the input energy (in practice slightly less, because some energy is lost to friction and other inefficiencies).In order for a crane to be stable, the sum of all moments about any point such as the base of the crane must equate to zero. In practice, the magnitude of load that is permitted to be lifted (called the "rated load" in the US) is some value less than the load that will cause the crane to tip.Under US standards for mobile cranes, the stability-limited rated load for a crawler crane is 75% of the tipping load. The stability-limited rated load for a mobile crane supported on outriggers is 85% of the tipping load.Standards for cranes mounted on ships or offshore platforms are somewhat stricter due to the dynamic load on the crane due to vessel motion. Additionally, the stability of the vessel or platform must be considered.

III. MATERIALS AND PARAMETERS

Design of Wireless Remote Control for Electric Overhead Travelling Crane is proposed. This system is an intelligent for control Electric

Overhead Travelling Crane using Wireless Remote. Proposed system designed based on Microcontroller arduino with RF TX/RX, Control Switch and Relays. An control system can be used for diverse industrial applications involved with a real-time wireless control.The crane can be controlled by using wireless remote consisting two different sections namely Transmitting section and Receiving section, the transmitting section consisting microcontroller (arduino) it is remote circuit and the receiving section consisting arduino microcontroller comes under crane side. The RF is used as Wireless Link between transmitter and receiver circuit.Wireless Remote consist of various switches used for various movement of crane like forward-reverse movement, left-right movement,up-down movement. When any switch is pressed from the remote side, the signals can be transmitted and received using RF using arduino thecommand are process and accordingly the receiver side relay operate and gives the movement to the crane accordingly.In this fashion, direction of motion of the crane can be remotely controlled by wireless communication.

Arduino board consists of an Atmel 8-bit AVR microcontroller with complementary components to facilitate programming and incorporation into other circuits. An important aspect of the Arduino is the standard way that connectors are exposed, allowing the CPU board to be connected to a variety of interchangeable add-on modules known as shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²Cserial bus, allowing many shields to be stacked and used in parallel.Official Arduino have used the mega AVR series of chips, specifically

the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A handful of other processors have been used by Arduino compatibles. Most boards include a 5volt linear regulator and a 16 MHz crystal oscillator (or

Although the hardware and software designs are freely available under copy left licenses, the developers have requested that the name "Arduino" be exclusive to the official product and not be used for derivative works without permission. The official policy document on the use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Several Arduino-compatible products commercially released have avoided the "Arduino" name by using "-duino" name variants.The Arduino/Genuino Uno board can be powered via the USB connection or with an external power supply. V, however, the 5V pin may

Microcontroller	ATmega328P
OperatingVoltage	5V
InputVoltage(recommended)	7-12V
InputVoltage(limit)	6-20V
DigitalI/OPins	14(ofwhich6providePWMoutput)
PWMDigitalI/O Pins	6
AnalogInput Pins	6
DCCurrentperI/OPin	20Ma
DCCurrentfor3.3V Pin	50Ma
Flash Memory	32 KB ofwhich0.5KBusedbybootloader
SRAM	2 KB(ATmega328P)
EEPROM	1 KB(ATmega328P)
lock Speed	16MHz
Length	68.6mm
Width	53.4mm
Weight	25g

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IV. MACHINE SETUP

In our project is consisting of remote controlled crane to lift theheavy loads from one location to another location. It is simple and easy to operate with the help of remote using the RFTX and RFRX. In this unit the RFTX and RFRX is the operated the crane and the crane is working in the manner of motor rotation. Here the two motor is fixed for the movement of up and down motion for the crane arrangement. And another is for the move in the direction of forward and reverse for the placing the load.It contains the screw rod with welded nut arrangement which is operated by motor. At the one end of the nut the crane hook is attached for lifting purpose.

This mechanism produces only the lateral motion with the help of screw rod and nut arrangement. When power supply is given to the motor the screw rod rotates. This rotation motion is converted into linear motion of the crane through the nut arrangement. Thus by crane hook is sliding over the screw rod.This arrangement is operated by using the remote. And the remote is operated with the help of control unit and the control unit is operated by using the small chip is called microcontroller. This is the control the whole unit of this process

FIG 1.1

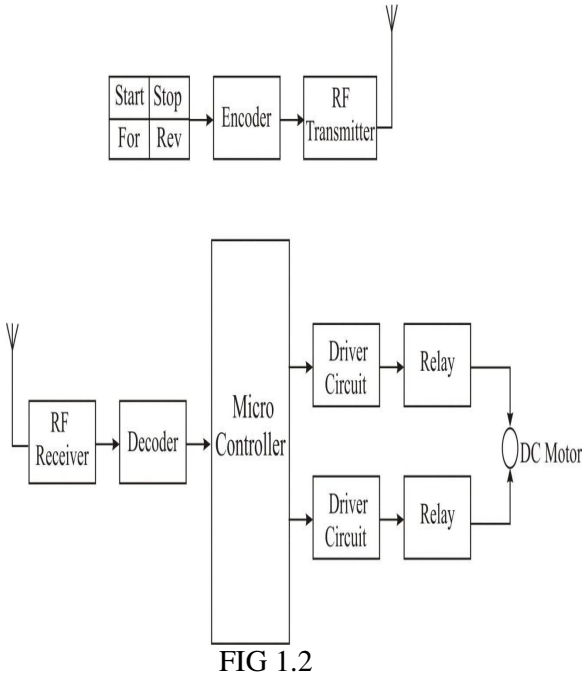

FIG 1.2

Design of Wireless Remote Control for Electric Overhead Travelling Crane is proposed. This system is an intelligent for control

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V. CONCLUSION

The project carried out by us made an impressing task in the field of small scale industries and automobile maintenance shops. It is very usefully for the workers to shift the load from the one place to another place.This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided.

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