

Smart Bridge Crane for Industrial Purpose with Pi Camera

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Abstract

Mounted high up at a gantry level, rather than ground level with whole structure moving, Overhead crane is a type of a crane which travels on a fixed rail mounted trucks. Like a small trolley the lifting gear can often move crossways along the horizontal plank. Factories and warehouse are the place where overhead crane are brought into the practise. So as we know that Overhead crane is a Wired Controlled System its intricate to manage so here in this paper we have proposed a Wireless Control System. To stabilize the position in the least possible time is the objective of this proposed idea. So basically the crane will be operated from Voice Commands by the operator so that there will be less restrictions while operating. A Pi camera has been interfaced to the Overhead Crane for the surveillance of the surrounding so that it can capture the routine and unfortunate accidents that may occur. This Paper will make the human results less and will give us the prompt result. In this paper we have proposed our idea till the simulation part where the circuit diagram and the simulation results will give us an idea how the whole system will work accordingly.

Keywords - Overhead Crane, Android app, Arduino board, Bluetooth Module

I INTRODUCTION

Overhead cranes are commonly utilized in the refinement of steel and other metals like copper and aluminium. Due to wired control crane Person should be move with the object or goods. Also it has limited range of wire so it can only move in limited area where wired can reach. Also lifting capacity is very less in remote controlled crane system. Skilled and trained worker should require because system is complicated. There is no use of any sensors and buzzers therefore any obstacle in crane system not detected. The operator has to operate the crane to its desired point by manually moving with it, hence the operator has to follow the crane on the work floor which in sometime is a great mess.

II LITERATURE SURVEY

In 1876 Sampson Moore in England planned and provided the main ever electric overhead crane, which was utilized to raise weapons at the Royal Arsenal in Woolwich, London. Since that time Alliance Machine, presently old, holds an AISE reference for probably the soonest crane in the USA market. This crane was in assistance until roughly 1980, and is currently in a gallery in Birmingham, Alabama. Throughout the long term significant advancements, for example, the Weston load brake (which is currently uncommon) and the wire rope raise (which is as yet famous), have gone back and forth. The first derrick contained segments mated together in what is presently called the developed style lift. These developed lifts are utilized for

uncompromising applications, for example, steel loop dealing with and for clients craving long life and better toughness.

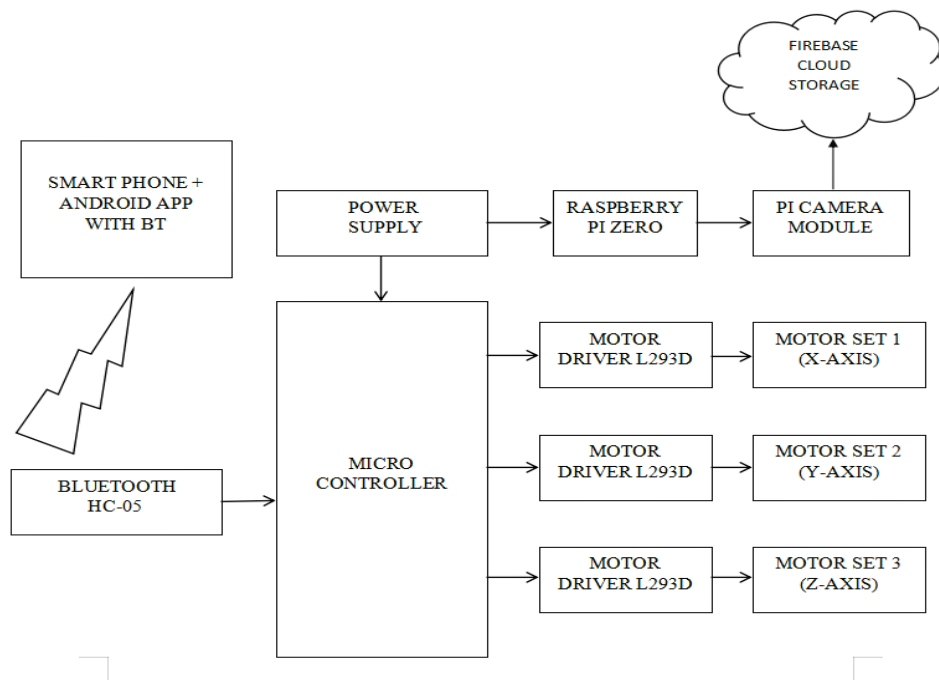
Mohamed H. Mabrouk has proposed [1] the plan and execution of a light obligation gantry crane that can be utilized to execute indoor materials taking care of activities inside little workshops. The crane plan, which incorporates the crane body structure pressure investigation just as the development of the crane streetcar instrument and versatility framework, has been talked about. Creator have additionally talked about the plan of the crane control circuit that incorporates steps like demonstrating of the unique crane conduct, the determination of a fitting control procedure, and approval of the control circuit utilizing a model of the gantry crane. All plan reports, outlines, drawings and estimation reports came about because of work introduced in this paper have been utilized by a project worker to construct the crane as per guidelines that oversee working of gantry cranes to guarantee long help life and safe activity of the crane.

Pittaya Pannil [2] have examined regulators plan strategy for controlling the heap swing of an overhead crane. By expansion of the quadratic subordinate of state factors term in the typical standard execution file for Linear Quadratic Gaussian (LQG) ideal control as an additional weighting capacity to assume the part in this errand. The outcomes uncovered that the swing of the heap can be diminished at various necessities with greatness. The most effective method to choose the reasonable loads for control is additionally proposed

III PROPOSED IDEA

In this proposed system, Arduino board and Bluetooth module control activity is utilized for execution of electric crane. Pick and discharge, all over and left or right with its postponement supporting dc voltage. These capacities of development and bearing are constrained by this control activity. A PDA application dependent on android stage with a Bluetooth network is constrained by far off and utilized as a transmission just as gathering ports with Arduino module. The likelihood to associate with the gadgets remotely by utilizing presentation of Bluetooth, this is another measurement collected by Bluetooth. Gadget information is accessed without the requirement for an actual association yet in addition to make it conceivable to handily get to the inherent UIs through compact gadgets utilizing this innovation. With the assistance of voice orders given a robot works as often as possible. The orders are given by client then a robot interface with client and every one of these things are clarified in this paper. This framework is stopped quicker. In this framework the initial segment is voice acknowledgment framework, second part is focal regulator framework and the third part is robot. These days robots are valuable has moves from ventures to the ordinary day to life. The solid interface among people and mechanical technology is needful in this situation. For homegrown just as mechanical clients it is a lot simpler in these days as a result of the utilization of voice orders to control a robot. The voice rearrangement framework gets the voice as info sign and cycles it and the framework is fundamentally an interface among man and robot then the prepared sign sent to focal regulator then it passes the sign to robot. How the entire interaction is happen is portrayed in this paper. By means of voice orders a robot can be controlled effectively by utilizing android mobile. This has been acknowledged by utilizing Bluetooth module HC-05, Arduino Uno and Android application, voice controlled robotization just as all inclusive switch. The interface of Pi camera with the framework will empower us for the surveillance of the industrial climate.

Fig 1:- Block Diagram



IV Methodology

An overhead crane, also known as a bridge crane, is a type of crane where the hook-and-line mechanism runs along a horizontal beam that it runs along two widely separated rails. Often it is in a long factory building and runs along rails along the building's two long walls. It is similar to a gantry crane. Due to wired control crane Person should be move with the object or goods. Also it has limited range of wire so it can only move in limited area where wired can reach. Also lifting capacity is very less in remote controlled crane system. As we know that Overhead Crane is used for transferring the

load from one place to another so to implement the project we have proposed the block diagram above. We need to provide the power supply to the system using a control operation based on Arduino board and Bluetooth Module for the voice commands. Also for the Monitoring Purpose Pi camera is used and a control operation Based on Raspberry Pi where the footage will be stored in the cloud. The system will be having DC motors for it to run on the platform.

V RESULTS AND DISCUSSIONS

This section shows working simulation/prototype how movement of crane will be done. Three DC motors have been connected. DC motor has inducting load; DC motor has high voltage than microcontroller so it cannot be directly connected to any microcontroller. Therefore motor driver module (L293D) is used here. Two DC motors can be connected to single motor driver module. Here, At First driver module, IN1 & IN2 are inputs of first DC motor while IN3 & IN4 are inputs of the second DC motor whereas OUT1 & OUT2 are outputs of first DC motor while OUT3 & OUT4 are outputs of the second DC motor. Similarly, At Second driver module IN1 & IN4 are inputs of third DC motor while OUT3 & OUT4 are the outputs of the third DC motor

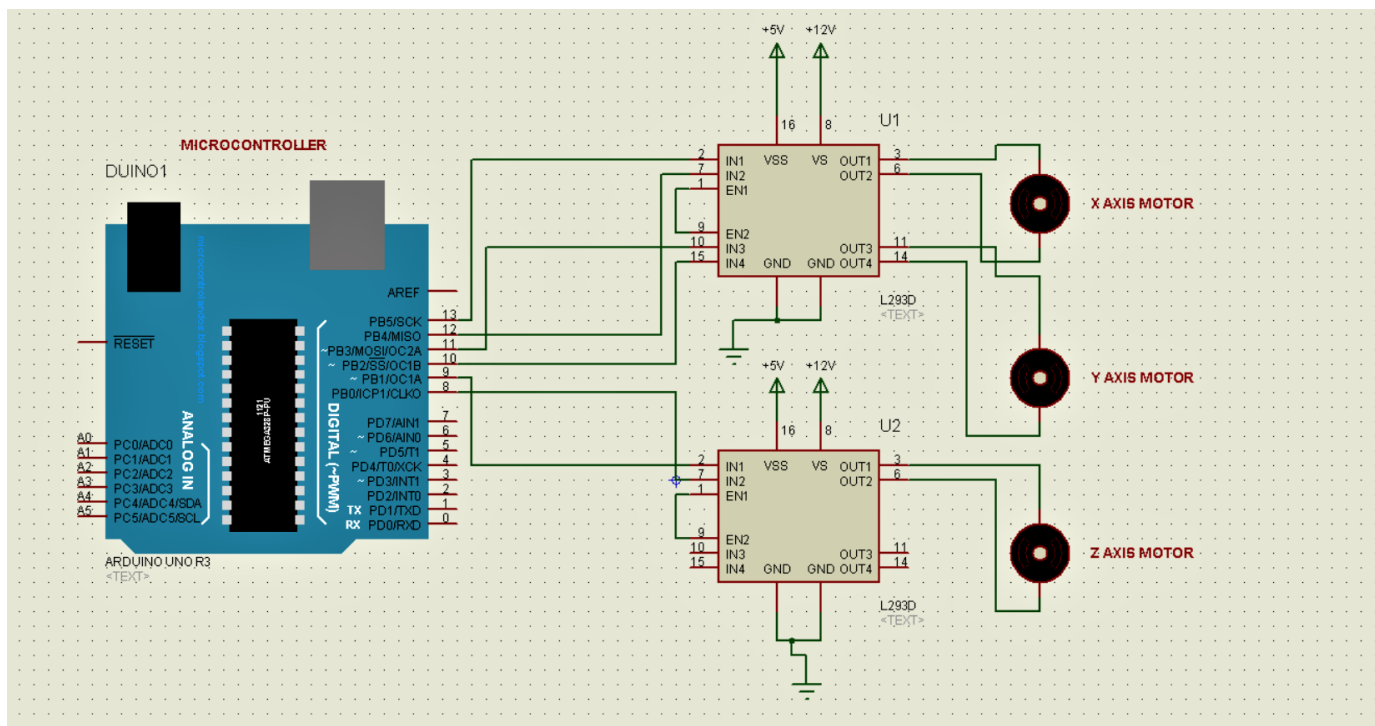


Fig 2 :- Interface of Arduino Board with DC motors

Simulation Result

Bluetooth is a serial communication. Here for now, virtual terminal is used where character is assigned as input and that character gives command to driver module to rotate the DC motor. In First Driver module, when input 1 is given to IN1 and 0 as input to IN2, the DC motor will rotate in the clockwise direction. And if 0 is given as input to IN1 and 1 as input to IN2, the DC motor will rotate in the anticlockwise direction. As shown in virtual command window in Fig. 3, command can be given for X axis the motor at axis will start rotating. In the same way the respective commands will make the motors rotate. So as our proposed system is a **Wireless Control System** it will work through a smartphone. The Crane has been interfaced with Bluetooth module so that commands can be given to the system through smartphone and the **Arduino** will process the signal and will bring the

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system into action accordingly. In this system commands can be given through Bluetooth module are “AMR” voice or “**Blucontrol**”. Pi camera is used so as to do the industrial surveillance and to record the incidents if unfortunately it occurs. Basically first command is given through smartphone from the respective application. If command is given for front movement, then the crane will take the allotted load and start moving front. If for back movement then the crane will start moving backwards .If command is Uplift, it will lift the load and on to the release command it will release the load. **Pi camera** is used to store the footage in the cloud using **Firestore Cloud** over here. In this way even unskilled workers can control the crane and make the task easy for them.

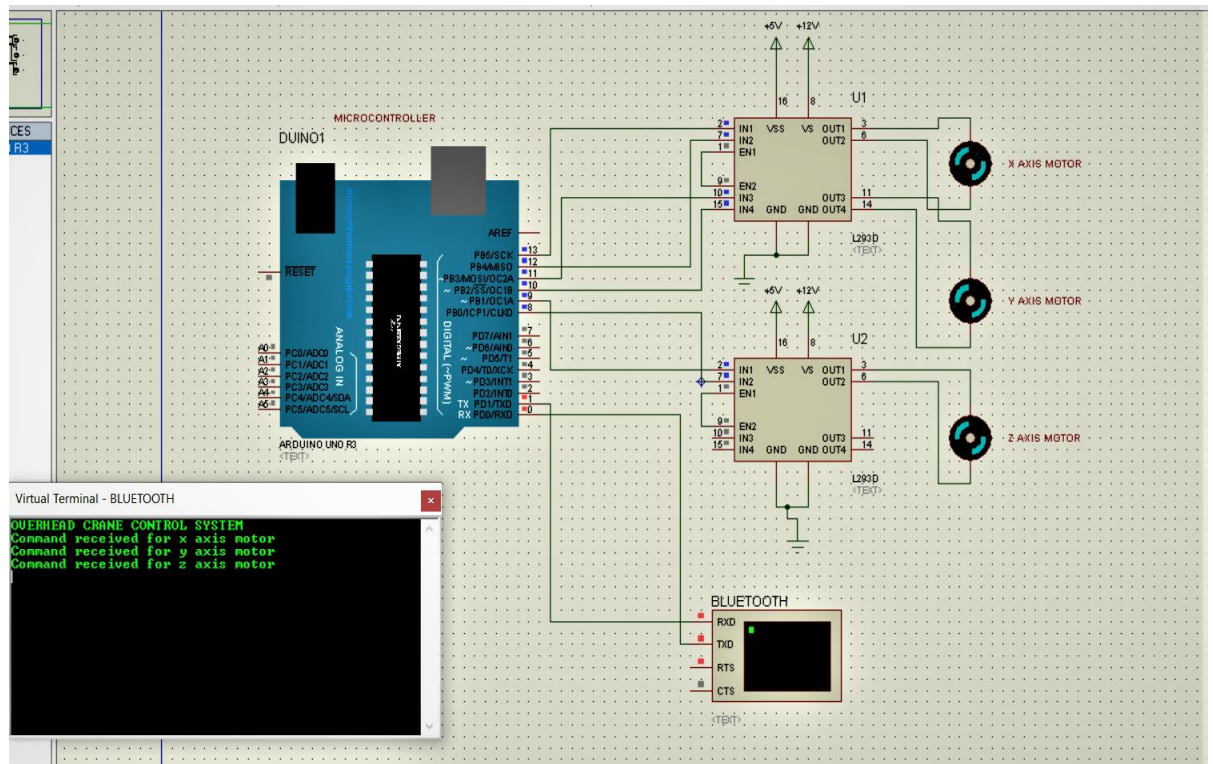


Fig 3:- Result on Proteus

VI .CONCLUSION

The detections are highly error -free and efficient due to the enhancements. Also, because of its enriched libraries Arduino which is an open source has made possible to realize the difficult tasks quite easily. The Bluetooth module is connected to a digital pin of Arduino board used to transmit the data. This setup facilitates serial communication of data wirelessly. This module acts as a mediator which receives the signal from the smart phone and send that signal to the Arduino board and Arduino board take action of that signal. The Pi camera is the game changer which is the utmost need for the industrial surveillance and will have the proof for any incident which can cause if any. So in this paper we have done the part till simulation of the proposed work which is in successful state.

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