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Mobile Operated Overhead Crane

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ABSTRACT:In older trend, several parameters in the industries are controlled by wired system but in the recent trend wired communication system is replaced by means wireless communication. An overhead crane consists of parallel runways with a travelling bridge spanning the gap. A hoist, the lifting component of a crane, travels along the bridge. If user is not available in the premises of the crane, commands can be given from any mobile in the world. In such a case one dedicated mobile has to be connected to the crane and through a call the crane can be controlled.This system consist of a mobile robot which consists of a base with four wheels, one vertical post and on the vertical post the horizontal beam is mounted. On the horizontal beam an assembly consisting of two DC motors can be moved forward and backward. Finally a pulley with one DC motor is moving up and down.

KEYWORDS: Overhead crane, DTMF decoder, AVR, Motor, L293D.

I.INTRODUCTION

The aim of the proposed system is to develop a cost effective solution that will provide controlling of industrial equipments remotely. Here, we havedesigned a system which controls the movement of crane and the commands sent to it are from mobile. At the receiving end mobile unit is used to receive or send commands. These commands are identified by microcontroller, which operates the required motor for specific operation. It includes operation such as forward, backward, right, left, clockwise, anticlockwise, up, down, etc.

To activate the mobile to accept the command unit on the system a call is to be made and as the call is answered, in response the user will press the key from the remote mobile to access control the motors and the respective actions are carried out.

II.RELATED WORK

Focusing on the used approach in the industries that uses wired technology for the crane we have come across the disadvantages of wired technology. Duringour literature survey we come across many journal papers in which cranes are operated with the help of remote controls. So we have found out about the DTMF technology which could be incorporated in system for controlling the movement of crane. The human mind always needs information of interest to control systems of their choice. In the age of electronic systems it is important to be able to control and acquire information from everywhere. Although many methods to remotely control systems have been devised, the methods have the problems such as the need for special devices and software to control the system.

Inpaper titled ”Mobile Operated Land rover Using DTMF Decoder” published in IJMER by K.Aruna,A.SriRamsagar,G.Venkateswarlu andpaper titled“Mobile Controlled Crane using DTMF Technology Via PLC System for Industrial Application & Security” published in IJCA by Sumit Kumar Sengupta, AsifIqbal , Mahesh Kumar Gupta we have come across DTMF technology.The DTMF tone is generated when the user pushes mobile phone keypad buttons. The remote control technologies have been used in the fields like factory automation, space exploration, in places where human access is difficult. As the mobile phone enables us to connect with the outside devices via mobile communication network regardless of time and space, the mobile phone is a suitable device to control domestic systems. The proposed method uses the DTMF (Dual Tone Multi Frequency) generated when a keypad button of the mobile phone is pressed by the user. The mobile phone user controls the system by sending the DTMF tone to the access point.

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III.PROPOSED SYSTEM HARDWARE

The block diagram of proposed system is shown in fig.1. Mobile unit will receive the commands from the another mobile if we have to operate the crane from remote place, and if we don't want to operate crane remotely then we will press keys on this unit and the corresponding signals will be passed on the DTMF decoder. The DTMF decoder will receive the key from the mobile unit and will decode the keys in the corresponding format of dual tone multiple frequencies. These signals are then given to the AVR microcontroller Atmega16.

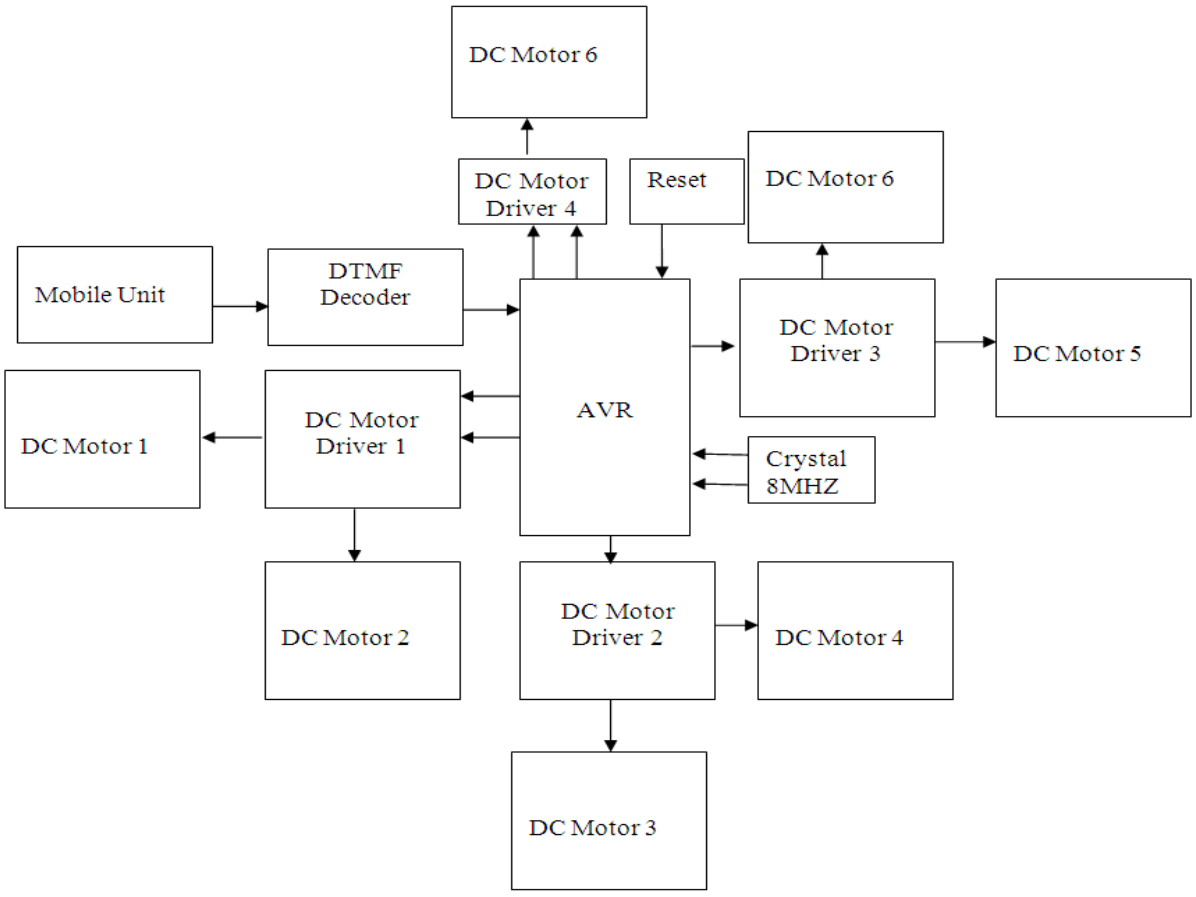

Fig.1 Block diagram of proposed system

Output of controller is given to the dc motor driver L293D. In this proposed system we are using dc motor for the movement of crane parts. Following controls can be carried out using the dc motor by the crane

1.Forward
2. Backward
3. Right
4. Left
5. Clockwise
6. Anticlockwise
7. Pulley Forward
8. Pulley Backward
9. Hook Down
10. Hook Up

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Power Supply: A device or system that supplies electrical energy to an output load or group of loads is called as power supply unit. In our proposed system +5V DC supply is required for ATMEGA16 and DTMF Decoder +12V DC supply is required for DC motor and asan input to 7805 regulator to get +5V DC supply.

Mobile unit: This unit will receive the commands from the another mobile if we have to operate the crane from remote place, and if we don't want to operate crane remotely then we will press keys on this unit and the corresponding signals will be passed on the DTMF decoder.

DTMF decoder: The DTMF decoder will receive the key from the mobile unit and will decode the keys in the corresponding format of dual tone multiple frequencies. These signals then are given to the controller.The matrix for selecting the high and low band frequencies associated with each key is shown in table 1. Each key is uniquely referenced by selecting one of the four low band frequencies associated with the matrix rows, coupled with selecting one of the four high band frequencies associated with the matrix columns.

Frequencies	1209 HZ	1336 HZ	1477HZ	1633HZ
697 HZ	1	2	3	A
770 HZ	4	5	6	B
852 HZ	7	8	9	C
941 HZ	*	0	#	D

Table 1: DTMF Decoder MT8870D

Microcontroller: TheAVR is a modified Harvard architecture8-bitRISC single chip microcontroller. Flash, EEPROM, and SRAM are all integrated onto a single chip, removing the need for external memory in most applications Atmel's AVRs have a two stage, single level pipeline design.

DC motor: Output of controller is given to the dc motor driver L293D. In this project we are using dc motor for the movement of crane parts. Following controls can be carried out using the dc motor by the crane.

IV.CIRCUIT DIAGRAM

The circuit diagram of the proposed system which is designed in Orcad version 9.2 is shown in Fig. 2. The mobile unit is connected to the DTMF decoder MT8870D through earphone. The BCD output of the decoder along with the standard signal is given to the AVR ATMEGA16 port pins. Output of the AVR microcontroller is given to the three DC motor drivers L293D that are connected to the two DC motors each.

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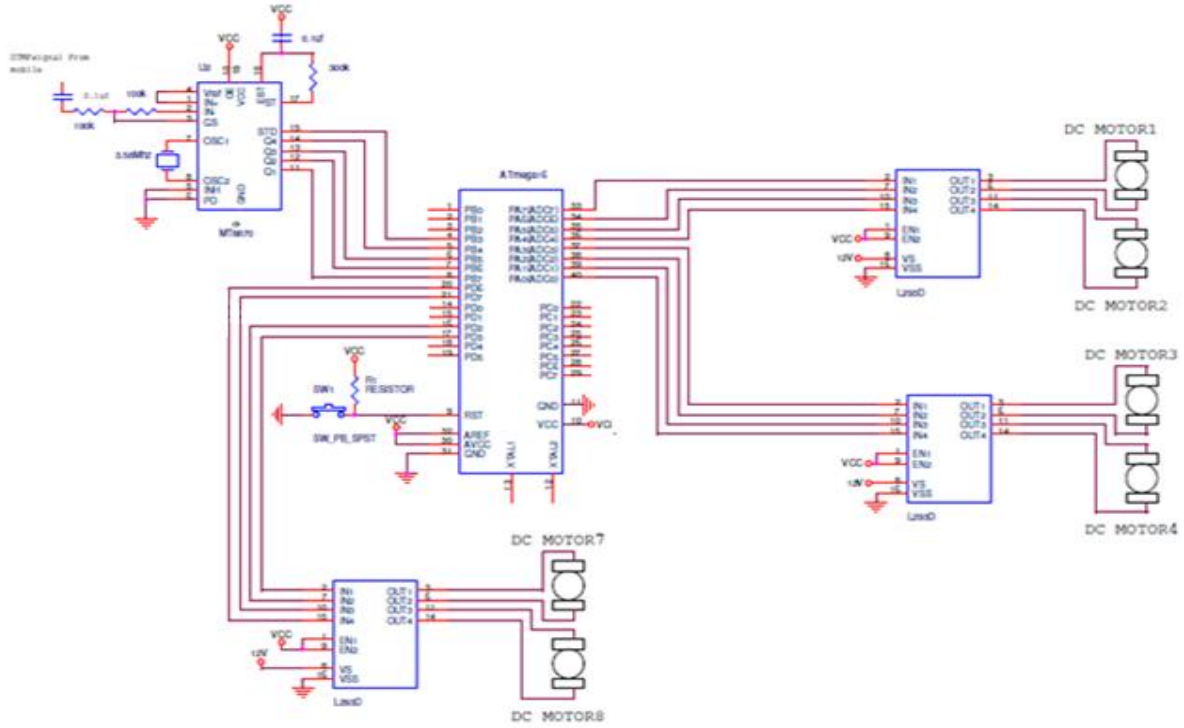

Fig.2 Circuit diagram of proposed system

V. RESULT AND DISCUSSION

We have designed a base of crane with 20x13 inch.Fig. 3 shows the controlling circuit placed at the base model which consist of circuit for DTMF decoder, circuit for AVR microcontroller, and the circuits for the respective motor drivers.

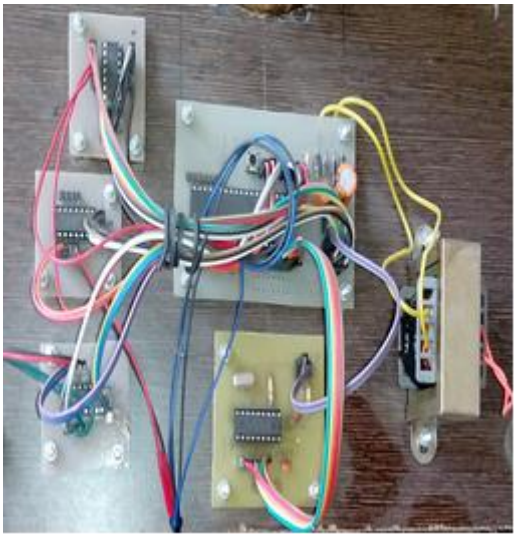

Fig.3 Controlling circuit at the base model

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At the top of a base model, supporting part is placed in order to support horizontal beam. The horizontal beam model is used for hook up and hook down, etc. A pulley attached with the horizontal beam carries a hook to lift the load. Fig. 4 gives the actual assembly of motors for the movement of pulley.

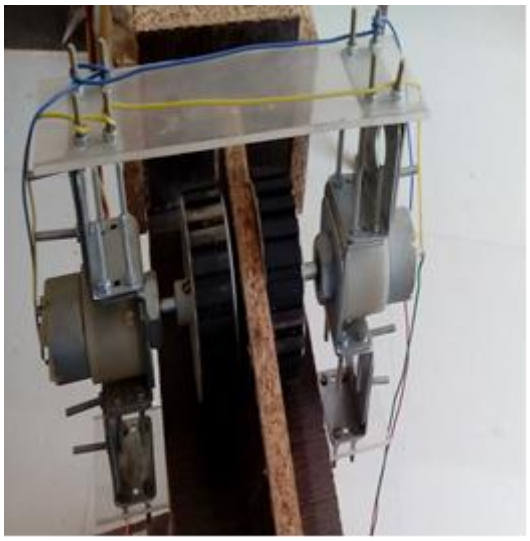

Fig.4 Top assembly on the horizontal beam

Fig.5 shows the complete crane model that contains base model and horizontal beam along with the supporting part to handle heavy horizontal beam.

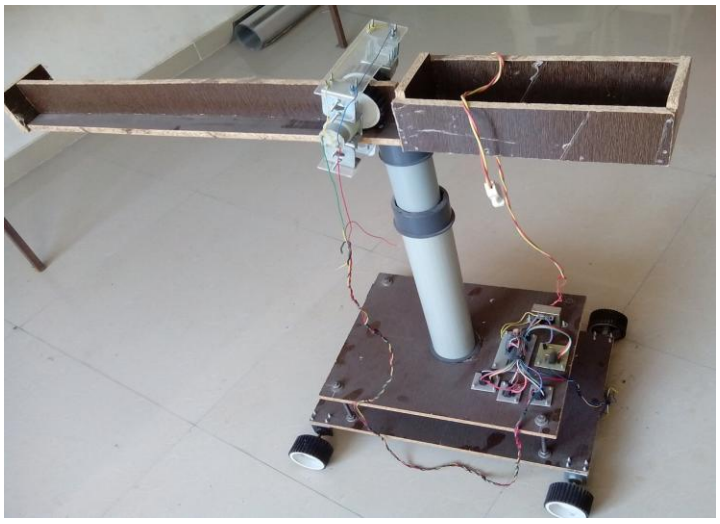

Fig.5 Final crane model

VI.CONCLUSION

Thus the crane can be operated by user just by making a call to the mobile attached at the receiver side. The special type of remote need not to be carried by the user for controlling the motion of the crane, he can use mobile for giving instruction to the crane. The future scope of this proposed system is crane can be moved much efficiently if cameras are fixed.

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