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Crane Control by using Hand Gestures

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Abstract - *In this project, we are designing a system which will respond to our hand gesture. This project mainly consists of a microcontroller programmed in embedded 'C' language and the MATLAB. The camera is installed on a personal computer and the computer is serially interfaced with the microcontroller*

Key Words: **PIC 16F877A, Camera, Zigbee, Motors**

1. INTRODUCTION

There are millions of cranes throughout the world that perform important, challenging, and dangerous manipulation tasks. Crane operators usually require extensive training to develop the skills needed to move payloads without inducing large swings. Given the variability of the manipulation tasks, the changing nature of the workspace, the difficulty of sensing the payload motion, and the need for close human supervision, automating crane motion is impractical, except in tightly controlled situations. Human operators have difficulty driving cranes quickly, accurately, and safely because of the sluggish response of the massive structure and large payload swings. Manipulation issue is additionally augmented by non-intuitive crane-control interfaces that include buttons and levers. A new type of crane-control interface allows operators to drive a crane by using his hand gestures. Hence we introduce a new way of controlling a crane system, minimizing the risk of human hazards.

1.1 Literature survey

Cranes type one among the foremost equipment's in industries of all kind – from domestic industries to armed service yards to warehouses. In most of those places the productivity of the activities depends on however with efficiency Grus is managed. More over these cranes being used for 24 hours a day, even a short down time greatly affects the operations of the plant. In general these area unit a number of the issues that usage of a crane poses.

1.2 Existing systems

- A microprocessor based remote pendant
- Antisway Control
- Crane Control
- PLC based crane automation nd monitoring

2. BLOCK DIAGRAM

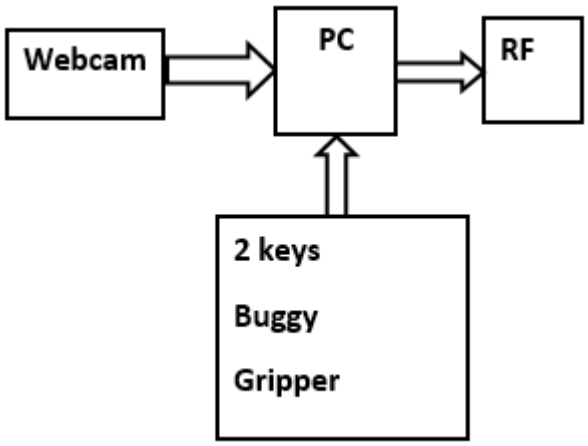

Fig.1 Transmitter block diagram

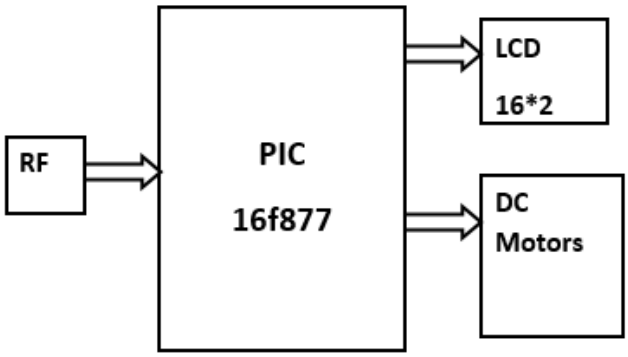

Fig.2 Receiver Block Diagram

2.1 LCD Display: LCD is employed in a very project to examine the output of the applying. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we will write sixteen characters in every line. So, total 32characters we can display on 16x2 LCD.LCD may employed in a project to see the output of various modules interfaced with the microcontroller. Thus alphanumeric display plays an important role in a very project to check the output and to rectify the system module wise just in case of system failure so as to rectify the matter.[8]

2.2 DC MOTOR: DC motors area unit wont to physically drive the applying as per the need provided in code. The dc motor works on 12v.

To drive a dc motor, we'd like a dc motor driver referred to as L293D. This dc motor driver is capable of driving two dc motors at a time. In order to protect the dc motor from a back EMF generated by the dc motor while changing the direction of rotation, the dc motor driver have an internal protection suit. We can additionally offer the rear voltage protection suit by connecting four diode configurations across every dc motor.[9]

2.3 PIC 16F877A:

- 10 bit inbuilt adc 8 channels (an0 – an7)
- 40 pin i/o (a0-a5,b0-b7,d0-d7,c0-c7, e0-e2)
- Reset pin no. 1 (active low)
- Crystal pins at 13 -14 pin
- 1 serial half duplex port (rc7 (rx.) –rc6 (tx.))
- Interrupts (rb0 (int0)- rb1 (int1))
- Inbuilt i2c bus (rc3 (scl) – rc4(sda))
- Inbuilt spi bus (ss,sdi,sck,cs)
- Operating voltage range-2.0v to 5.5v
- High sink/source current-25ma [5]

2.4 ZigBee Module

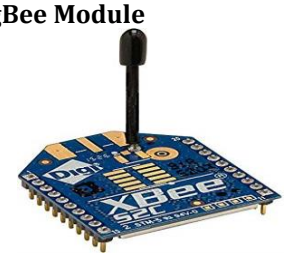

Fig.4 Zigbee Module

Zigbee is honor IEEE 802.15.4-based specification for a collection of high-level communication protocols accustomed end up personal house networks with little or no, low-power digital radios, like for home automation, medical device information assortment, and alternative low-power low-bandwidth desires, designed for little scale comes which require wireless affiliation. Hence, Zigbee could be a low-power, low rate, and shut proximity (i.e., personal area) wireless unintended network.[4]

We are using zigbee to communicate between computer and PIC microcontroller.[4]

- Low **battery** consumption. ...
- Low cost.
- Low data rate. ...
- **Easy** to implement.
- Supports up to 65,000 nodes connected in a **network**.
- ZigBee can automatically establish its **network**.
- ZigBee uses small packets compared with **WiFi** and **Bluetooth**.

3.0 CIRCUIT DIAGRAM:

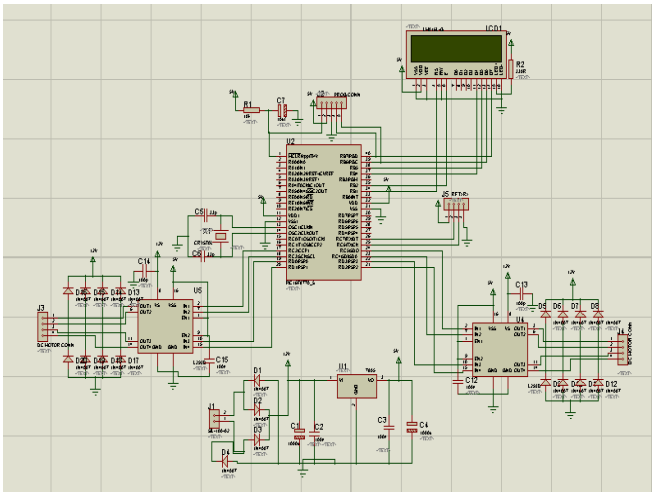

Fig.3 Circuit Diagram

4.0 OUTPUT:

In conventional systems mostly Remote pendant mechanism is used to move the cranes, though it is possible to move the crane with human hand gestures remotely by wireless technology.PIC microcontroller is provided with the different hand gestures to move the crane.

Figure below shows different hand gestures for different movements.

Forward Movement:

Fig.4 Forward Movement of Crane

Pick Movement:

Fig.5 Pick Movement of Crane

Place Movement:

Fig.6 Pace Movement of Crane

5.0 FUTURE SCOPE:

A significant disadvantage of existing gesture-capturing devices is that most of them limit the user's freedom of movement. This results from the need to grasp a sensor component, from wires attached to sensors or from limited sensor range. Progress in component miniaturization and telemetry will help to solve this problem. Static posture recognition has made great progress and allows reasonably high recognition rates, provided the user performs a standard procedure such as pointing at a target area or assuming a standard posture prior to issuing a command. This is not yet true for dynamic gesture recognition and software techniques are still developing in this field. The main difficulty is segmentation, i.e., detecting gesture beginning and end points. Aids such as hand speed and tension are currently being investigated. General interface problems such as immersion are still not solved in a comprehensive fashion.

6.0 CONCLUSION:

A novel interface and control systems have been developed that allows operators to drive a crane by moving a hand-gesture and transmitting through RF tag. And it also greatly reduces design and implementation complexities. The intuitive hand-motion interface is an improvement over traditional interfaces such as a push-button pendent because it removes the cognitive process required to translate the desired manipulation path into a sequence of button presses. This system takes microcontroller PIC16f877A and Zigbee module to achieve wireless sending and receiving, thus the overall process of detection, handling, sending and receiving of operating instructions can be completed.

7.0 REFERENCE:

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8.0 BIOGRAPHIES

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