Remote Monitoring and Controlling of JCB Using Mobile Phone

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Abstract: Basically JCB is a typical hydraulic heavy-duty human-operated machine used in general versatile construction operations, such as digging, ground leveling, carrying loads, dumping loads and straight traction. However, there are many tasks, such as hazard environment (nuclear decomposition, earthquake, etc.) which is not suitable for human to work on site. The remotely controllable JCB are required to work in such environment. In this paper, we have implemented automatic monitoring and controlling of JCB using mobile phones through DTMF decoder. The camera placed on JCB monitors surrounding of JCB and this surrounding we can observe on PC or TV at remote location and with this observation we can operate JCB through mobile phone using DTMF decoder.

Keywords: JCB, Remotely Controlled, DTMF decoder, Mobile phone.

I. INTRODUCTION

Basic objective of our proposed system was to monitor & controlling of JCB remotely by using mobile phone [1]. In this paper we have focussed on DTMF technology for wireless communication. Specific frequency given to the system for specific operation using mobile phones and DTMF decoder. So based on this specific frequency when we press a particular button on mobile phone then a particular frequency gets passed to the system with the help of auto receive mobile phone at JCB and finally JCB operate a specific operation corresponding to respective frequency[2].

Presently in any hazardous areas if we want to work with JCB then we must have to use manual driving so if in case any risky operation is their then at that time the driver's life is in danger so to avoid this we tried to implement this system which does not require any manual driver.
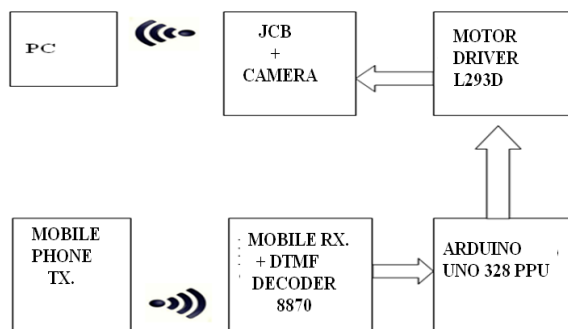
II. PROPOSED BLOCK DIAGRAM

Fig.1. Block Diagram of Proposed System

Above figure shows block diagram of proposed system. Basically at remote location on PC we can observe the whole scene of the surrounding in which our JCB is currently working. Camera is placed on JCB After observation of this scene we can decide which operation we want to execute. Once we decide the specific operation then we can press respective button on mobile phone. For Left Turn we have assigned 4 no. buttons on mobile, for Right Turn 6 no button has been assigned, similarly for forward movement button 2 and for backward position button 8 has been assigned. Remaining buttons assigned for uplifting of bucket and down lifting of bucket. So after pressing the respective button a corresponding frequency gets passed to DTMF decoder and then a corresponding operation gets performed. Arduino board has been used in the given operation.

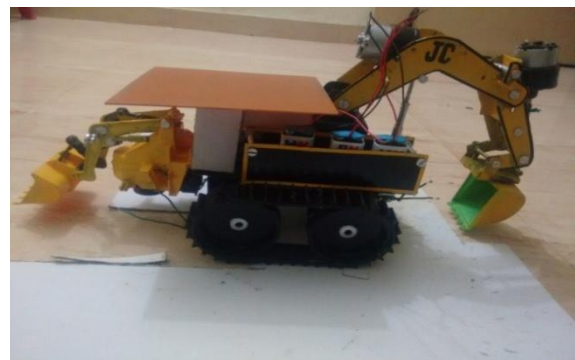## III. HARDWARE IMPLEMENTATION

A. JCB MODEL

Fig.2. JCB Model

We have used seven 150 rpm dc gear motor and one simple motor for making JCB model. The above figure shows the JCB model. For other functioning we have also used motor driver L293D, controller Arduino Uno 328 PPU, 8870 DTMF (Dual tone multiple Frequency) and a voltage controllable 7805 IC. In this project we have used two mobile phones in which one is connected to the circuit board by using the head phone jack and another one for controlling by us from any point. Here by making call to a mobile that is connected to the circuit which is on the receiving side and is mounted on the JCB. On receiving side we have made an implementation that in which call

can be received without using manually using auto answer mode. When the call is received then we transfer the frequency by using mobile keypad from the transmitting mobile. The frequency that we send on the receiver side is received in the form of product of two frequencies ie vertical and horizontal frequencies.

B. DTMF DECODER

We have set different frequencies for the operation of parts of the JCB.As shown in the figure the DTMF decoder is used to decode sending frequency in the form of 4 binary bits. The input from the headphone jack ie 3.5 mm jack is given to 8870 DTMF decoder where the signals are decoded. This decoded bits are obtained at the pin number 11, 12, 13 and 14 of the DTMF decoder. Now we applied the output of this decoder to Arduino controller as the input which is obtained at the pin number A5, A4, A3 and A2.
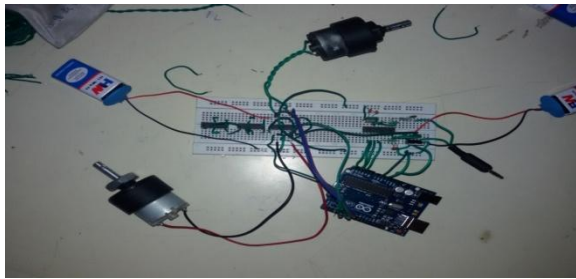

Fig.3. DTMF circuit Testing

C. ARDUINO BOARD

Fig.4. Arduino Board

Arduino is the main controller part of the project, we apply coding to it, by using this coding it drives the DC gear motor through L293D driver IC. For driving six motor we have used Arduinos 12 outputs which drives motor using L293D motor drivers IC. We have used the six 150 rpm DC gear motors which are fitted to the arms of the JCB and also the base. Thus the input given then drives the motors which gives the moments for JCB. Different frequencies are set for moving and giving directions to the JCB. We can move JCB in front direction, back direction also the moments of arms in up and down directions. The key 5 is used to stop the movement of JCB.A small camera is mounted on the JCB which makes us to move the JCB in any directions even though it is several distance long from the operator by seeing the directions.

The camera is used for monitoring the surrounding areas and by monitoring we can control the moments of JCB by seeing the areas on the TV/PC.
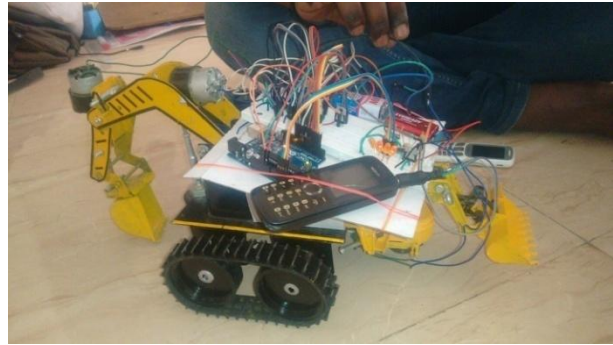
D. TESTING OF JCB MODEL

Fig.5. Testing of JCB Model

Above diagram shows hardware testing of proposed system in which JCB model testing is most important and major part. Auto receive mobile is used at JCB so that it can receive call automatically. Once call gets received then we can control any operation of JCB using mobile phone.

IV.SOFTWARE IMPLEMENTATION

We have an implementation of remote monitoring and controlling of a JCB using DTMF decoder, so many softwares have been used for the same. We have used Arduino Uno for burning AT mega 328 PPU IC, we have used PCB wizard software for implementation of Circuit diagrams. Below is the screenshot of the PCB wizard software.
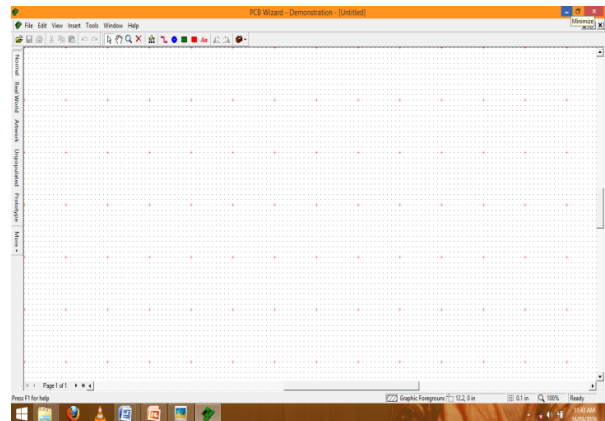

Fig6. PCB software screenshot

V. RESULTS AND DISCUSSIONS

After pressing respective buttons on mobile phones corresponding functions performed by JCB. Every operation takes different time to finish complete task.
The following table gives us the analysis of time required by the system to perform various tasks.

TABLE I RESULT ANALYSIS

OPERATIONS PERFORMED	TIME TAKEN FOR MOMEMENT
RIGHT	2 SEC
LEFT	2 SEC
BACKWARD	1 SEC

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FORWARD	1 SEC
CLOCKWISE	1.5 SEC
ANTICLOCKWISE	1.5 SEC
ARM UPLIFT	10 SEC
ARM DOWNLIFT	10 SEC
BUCKET UPLIFT	4 SEC
BUCKET DOWN	3 SEC

VI.CONCLUSION

Successful implementation of automatic monitoring and controlling of JCB using mobile through DTMF Decoder has been carried out in which every button on mobile perform respective work assigned to them. At a time we have tested only a single function.

ACKNOWLEDGMENT

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[2] Mobile Operated Overhead JCBPreeti Pangare1, Kajal Mahajan2, Mamta Mane3, Seema U.Deoghare4 UG Student, Dept. of E&TC Engineering, PCCOE, Pune, Maharashtra, India1,2,3 A.P, Dept. of E&TC Engineering, PCCOE, Pune, Maharashtra, India

[3] Mobile Controlled JCB using DTMF Technology Via PLC System for Industrial Application& Security Sumit kumarsen gupta Asif Iqbal Mahesh Kumar Gupta

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