ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 3, March 2017

Master-Slave Configuration Based Bluetooth Controlled Robots

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ABSTRACT: This paper describes the robots which are configured in master slave technology. Industries need many workers for doing the same work at the same time and few supervisors are needed to keep a watch on them.Hence manpower is wasted. Therefore, we have come out with a solution i.e. "Master-Slave Configuration Based Bluetooth Controlled Robots". In this, the user sends the data from the phone or tablet which is received and executed by the master robot and simultaneously this data is broadcasted to the slave robots through the RF transmitter. Slave robots receive the data from theRF receiver, decode it, send the command to motor driver circuit and from then to the motor.The transmission and reception takes place at 433MHz frequency.Also, there is aprovisionthatanyof the 3 robots can be madethemasterof the remaining 2 robots.

KEYWORDS: Master Slave, Robot, RF transmitter,RF receiver, Motor Driver, Motor.

I.INTRODUCTION

Some problems of a complex system are internal, whereas other problems exist peripherally. Externally, there may be limitations in a system regarding the expandability or the connectivity of the system. Looking at the current scenario in the manufacturing industry, there are systems wherein each individual manufacturing unit is programmed separately with same commands and same execution is expected. In such a system, the cost of programmable devices is a major drawback. Other types of system requires wires forconnection amongst all machines so that they can communicate and execute the given instructions. In these systems, wires are an avoidable expenditure. To summarize, we can say that:

1) Multiple control devices are required for multiple working devices executing the same job. This leads to the wastage of resources, time, workforce and it also hinders the coordination between the devices with similar applications.
2) The wired connections between multiple control and controlled devices lead to the complexities [2].

Taking these points into consideration and to increase the simplicity of the system, we have provided an application based solution through our project demonstration named 'Imitating Bots'. This is a fool proof solution to these problems and has proven to be much better.This system implicates the Master-Slave model of devices [2]. In this system, there will be a controller device (a master device) which will control the other devices(slaves) while executing the instructions received from an android device(remote) and number of slave devices who will follow the master.

In this application, we are using an Android based mobile phone as a controller. The commands given by the master doesn't fall into any limitations or restrictions which abide the slave to perform the action mentioned in the form of an instruction/command which is transmitted by the master. Thus, only themasteris neededto be controlledand then, mater will take the load to control the slaves. Then, the slaves will perform the same task in real time as that of the master.

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II. METHODOLOGY

A new type of master-slave control methodology, which has the merits of both unilateral and bilateral ones, is proposed. A master-slave control system and method of operation wherein the master element has substantially absolute invasive control over functions and capabilities of slave elements which are linked in with the network and wherein the master element can exercise latent control over slave elements. One robot is having unidirectional control over twoother robots. Master robot establishes its control over slaves using RF communication links. The commands to be executed are modulated at master robot using Amplitude Shift Keying (ASK) [2]. A four bit command is encoded by the master robot which later is decoded by each slave robot. Motors connected to each robot react according to the inputs given to their H-bridge driver circuits.

1) BLOCK DIAGRAM:

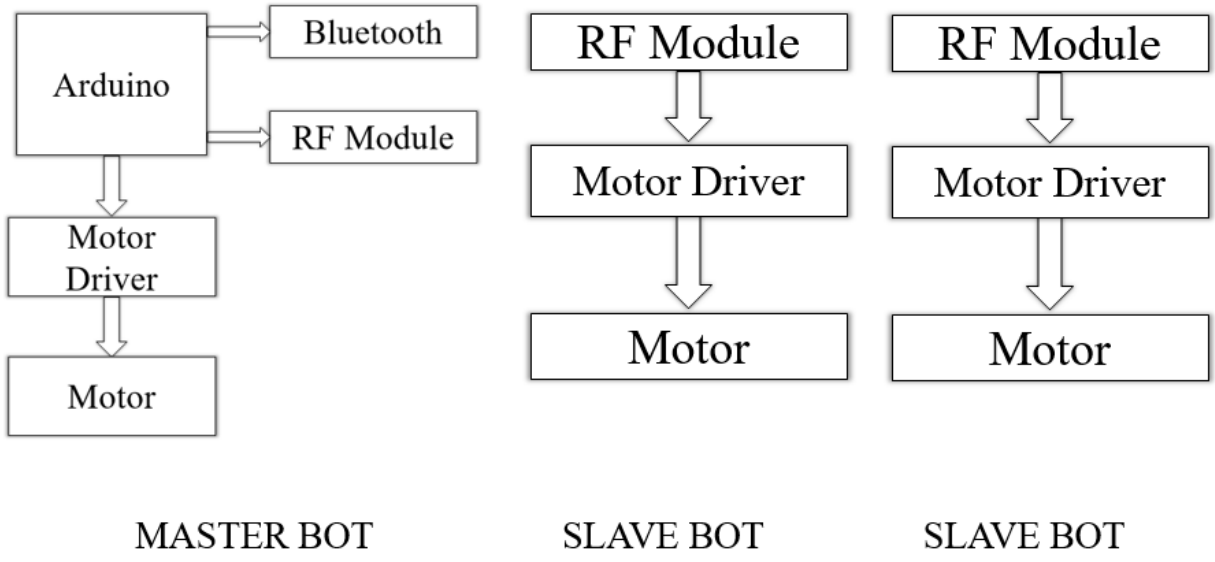

Fig. 1 Block Diagram of Master-Slave Configuration Based Bluetooth Controlled Robots

2) EXPLAINATION OF MASTER:

Power supply [6] is given to the Arduino [3], the Bluetooth module, the RF module [5]and the motor driver. The remote used here is anandroid mobile phone. The mobile phone is here to give commands to the master. We are using Android software Blue-Control as the remote. The mobile phone is connected to Arduino via Bluetooth module. The Bluetooth module is used because of the security and better communication mediumit provides. Bluetooth requires pairing and hence it is controllable by the person who is desired to control it. With the help mobile phone the Master Robot will be assigned with certain tasks. These instructions given through mobile phone will be executed by the Master Robot. Further, after execution, the same commands will be send to the Slave Robot. The data from Arduino is given to the motor driver. The motor driver drives the motor [1] accordingly. Inverted commands are given to HT12Eencoder [4]. This IC converts the parallel data from Arduino into serial data. This serial data is then given to RF transmitter. The RF transmitter transmits the data into free space using ASK modulation [2].

3) EXPLAINATION OF SLAVE:

Power supply is given to the RF Receiver module and the motor driver. The RF Receiver module receives the commands from the master. The data is then given to HT12D [4] which converts the serial data input into 4-bit parallel data. The parallel data is inverted using a not gate. The motor driver receives the commands from the not gate IC and then the motor is driven accordingly. The main advantage here is that there is no controller used in the circuit. This

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reduces the cost and complexity of the overall circuit. Also, multiple circuits with identical circuitry can act as slaves without any changes made in the master.

III. RESULT

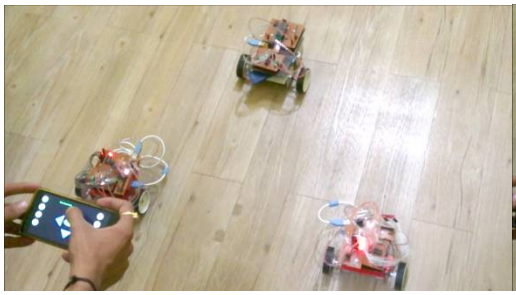

Fig.2 Forward Movement of robots
When master is commanded to move forward,
slaves move is same direction

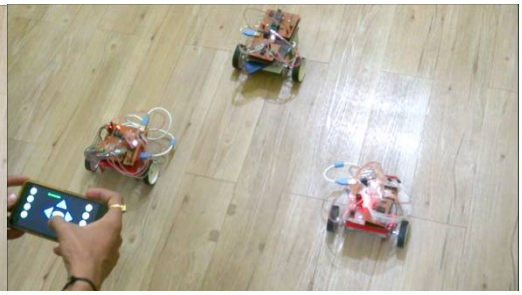

Fig.3Backward Movement of robots
When master is commanded to move backward,
slaves move is same direction

Communication of the master and slave is done at a wide range transmission frequency which takes place at 433MHzAll the slaves receive the command from the master and executes it at the same time. The execution of the master and all the slaves is at the same time, hence they are100% synchronous.

Fig.4Left Movement of robots
When master is commanded to move Left,
slaves move is same direction

Fig.5Right Movement of robots
When master is commanded to move Right,
slaves move is same direction

Serial port Bluetooth module paired to master robot is Bluetooth V2.0+Enhanced Data Rate 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband using CSR Bluecore 04-External single chip with CMOS technology and with Adaptive Frequency Hopping Feature (AFH).

IV. CONCLUSION

The execution of the master and all the slaves is at the same time, hence they are100% synchronous. The slave bots execute the commands at the same time as that of the master hence the slave and the master bots both are

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synchronous. Due to this, the task can be done effectively and accurately as lag will not be introduced in the system.Use of Bluetooth also brings security to the whole system.

V.FUTURE SCOPES

A) Interconnection of many PCs to one by the help of Master-Slave Configuration
B) Advancements made in Bluetooth module may increase the range of the Communication taking place
C) By using motor of higher specification and well-designed chassis the bots can be used for heavy duty applications and the overall weight of the bot may also reduce
D) By connecting a camera, live images can be seen at the same time the on the GLCD connected to many slave systems

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