Available online at www.abhipublications.org
Research Article
International Journal of Pharmacy and Engineering (IJPE)
ISSN 2320-849X

Economic Wireless Remote Switching for Electrical Devices and Networks.

MD. Nizam Uddin [1] , Milan Mazumdar*[2]

1.Department of Electrical and Electronics Engineering, Regent Education & Research Foundation, Kolkata, India.

2.Department of Electronics and Communication Engineering, Regent Education & Research Foundation, Kolkata, India.

Abstract : This project is performed to control independent electrical devices and networks through wireless remote controlling, based on Radio Frequency; From any edplace without any line of sight around any building or factory etc. The RF based remote wireless system is used instead of IR based remote controls as they have the advantage of not requiring line-of-sight operation. The RF based wireless remote control can change the state of power supply of multiple number of connection into both on mode and off mode. The project involves two sub-units named RF transmitter and RF receiver modules operating at 434MHz along with encoder IC HT12E and decoder IC HT12D with many other components while the transmission technique Pulse Width Modulation(pwm)and the circuit is feed with 5 volts. Transmitter converts the input data to serial port data by using HT12E and this serial port data received and converted into parallel by using HT12E. The four channels at encoder part are used as input switches and the four channels at the decoder output are connected through Optocouplers. The main objective of this project is to build an device very cost effective without C, JAVA or any other programming languages and specially without costly microprocessor or microcontroller thus it is very cost efficient and to work without any line of sight Communication requirement thus happen with IR technology and the low as well as medium range 2^{12} number of ac electrical device or a network containing some devices to control effectively that require low data rate, long battery life and secure networking .

Keyword : RF Transmiter, RF Recever,Pulse Width Modulation, line of sight communication, HT12D, HT12E, Optocoupler,

Received: September 9th , 2017, Revised: September 20th , 2017, Accepted: September 23th , 2017,

Corresponding Author: * Milan Mazumdar, Assistant Professor, Department of Electronics and Communication Engineering, Regent Education & Research Foundation, Kolkata, India.

1. INTRODUCTION

1.1 Background : The evolution of science & self-development had been the fundamental requirement of man from oldage.With the development of technology and the continuous improvement of people's living standard, people are in pursuit of automated, intelligent and

convenient control systems. At present, the Computer is used as the terminal for most control systems; however, there are some problems in the Computer monitor terminal, such as its great bulk, inconvenience to carry, high cost and so on. As the computer performs multi task in one device and if we want to have a tippically core device to control electrical devices, it could be a good choice to design a remote which can cantrol the switches of electrical devices . With the popularity intelligent controlling system ,it is very importent to make the system cost efficient and secure . At Android I/O developer conference, Google showed a sneak preview of its Android Home project, which will extend the Android platform into household objects. It means that the remote control based on Android phone will become a mainstream way but it is not that friendly with poor economic condition as the android based system is costly . So the RF based switching may be very popular in south asia , africa and south america and other third world countries. With interfaceing the primary pars to secondary part , the remote can easily control the lights, TVs and air conditionings and other devices anytime, anywhere in the region, which brings great convenience to people and improves the quality of life.

1.2 Motivation : In todays world the more than 70% electricity is generated from non-renewable sources which leads these resources toward its extinction, so we must save electricity and use properly in the service of humanity and specially in the branch of science called electronics which deals with electrical circuits. Today in any small industry, factory,home,office,trade shops etc. have the wired electrical equpment connection and controlling those is time consuming and impacts a lot of cost for bunches of wire. Today it become a common thing of getting fire for short ckt.and burning of wires; our project is to bring step toword reducing these horrible accidents. In this project we can reduce human effort also and make life easyer.

1.3 Literature Survey: For this proposed Seminar, following IEEE papers were studied as part of literature survey. Smart Home System for Disabled People Via Wireless Bluetooth gives moneywise concept by using GPRS as the medium to control and monitor home appliances. Electrical devices switch can be controled with a designed system using microcontroller with android based mobile phone. Here the mode of controlling devices is by sending command wirelessly via Bluetooth [1]. IR remote control has a very wide application in the field of electronics. IR based remote control for controlling multiple home appliances with microcontroller is also reported for the same function [2], [3]. Another approach is by GSM based for home automation. This is done by sending short sms code from a mobile handset. Here it has a wider coverage area. So to control any house hold appliances from a distance place within the network area coverage sending a short sms code will either ON or OFF the devices at home [4], [5]. All these work is carried out for the same function in a different way by using different technology. Some use Bluetooth technology other use GSM technology or IR technology. Each technology has its own advantages and disadvantages over the other but they all serve the common purpose to replace manual work. So, we engineers tried to take a small step to save both the wastage of power consumption and the cost to puchasethose products.

1.4 Project Overview : This project is a RF based wireless remort control system(RF Transmitter & RF Receiver) used to control the output(switch on / off) by a remote place away from it. RF transmitter encodes a signal and uses radio frequency to send that signals at a particular frequency to switch the electrical device from a distance without being a direct

line of sight between the transmitter and receiver. The receiver part catch the signal and decod that encoded signal and give output as per the input given.This project would be able to control 0 to 2^{12} no of switches and by using this technology it is possible to reduce the wastage of power of Bulk power consuming places and save money.

PARALLEL DATA > HT12E > SERIAL DATA > RF TX > > > > > > RF RX > SERIAL DATA > HT12D > DATA OUTPUT

1.5 Future Scope : The users can control appliances anytime, anywhere in the region, letting our houses, offices, factorys become automated and intelligent with in budget. further study can make the project more friendly, secure, relaeble to work and use ,efficient to cost and power consumtion. There is a bright scope for this project to use in high voltage engineering and machine operateing in mostly anykind of physical condition(tempareture, humidity, atomospheric pressure, poisonous and hazzerd area,air poluted area etc.) which can make it very effective. Perhaps a day in future, it can bring some jobs to physically challenged persons in the Electrical Device , Drives and Motor controlling department.

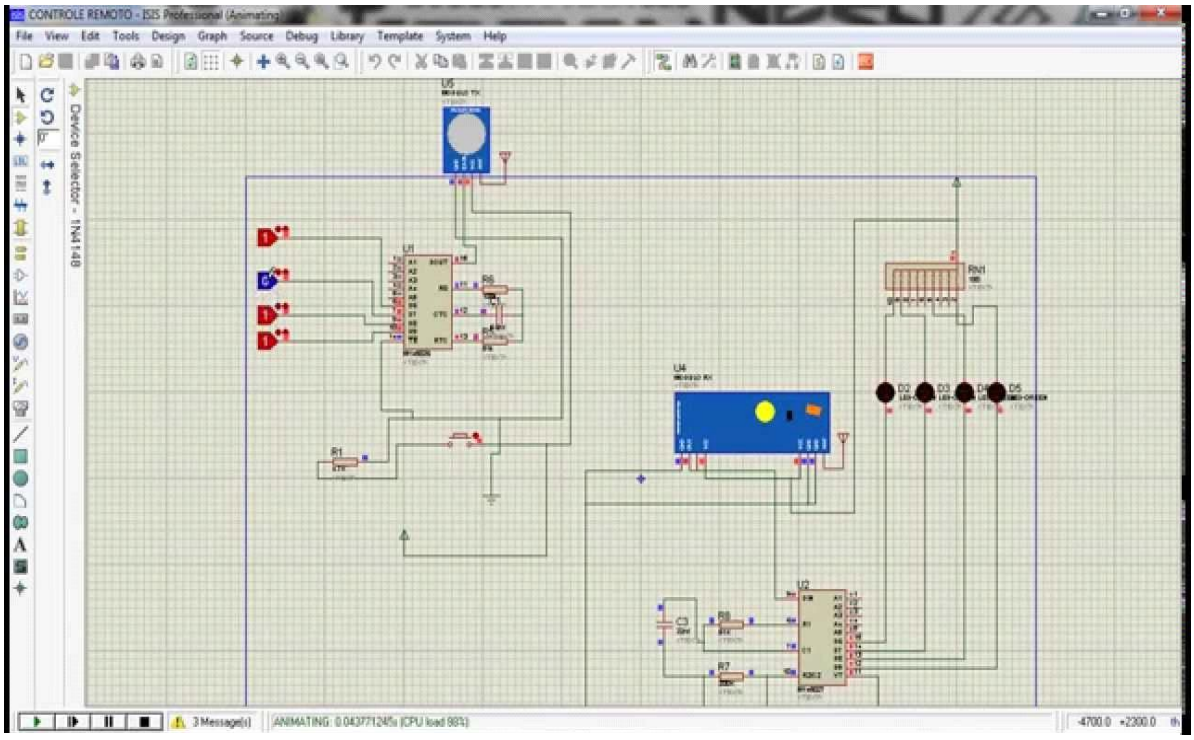

Fig.1.1 : RF Transmitter and RF receiver circuit diagram and performing on softwere

2. CIRCUIT IMPLEMENTATION

A wireless radio frequency (RF) transmitter and receiver can be made by using IC HT12D Decoder, IC HT12E Encoder and RF Module. Wireless transmission can be done by using 434Mhz RF Transmitter and Receiver module. In these modules digital data is represented by diffrent Amplitude of the carrier wave hence it is called Amplitude Shifting Key. IC HT12E Encoder IC will convert the 4 bit parallel data given to pins D0 - D3 to serial data and will be available at D_{out}. This output serial data is given to RF Transmitter. Address input A0 - A7 can be used to provide data Scurity and can be connected to GND(Logic ZERO) or left open(Logic ONE). Status of these Address pins should match with status of address pins in the receiver for the transmission of the data. Data will be transmitted only when the Transmit

Enable pin(TE) is LOW. It acts as a control pin which allows data transmission. Thus by this it can control 0 to 2^{12} switches and sends the data to the transmitter for transmission. A 1 MΩ resistor will provide the necessary external resistance for the operation of the internal oscillator of IC HT12E.

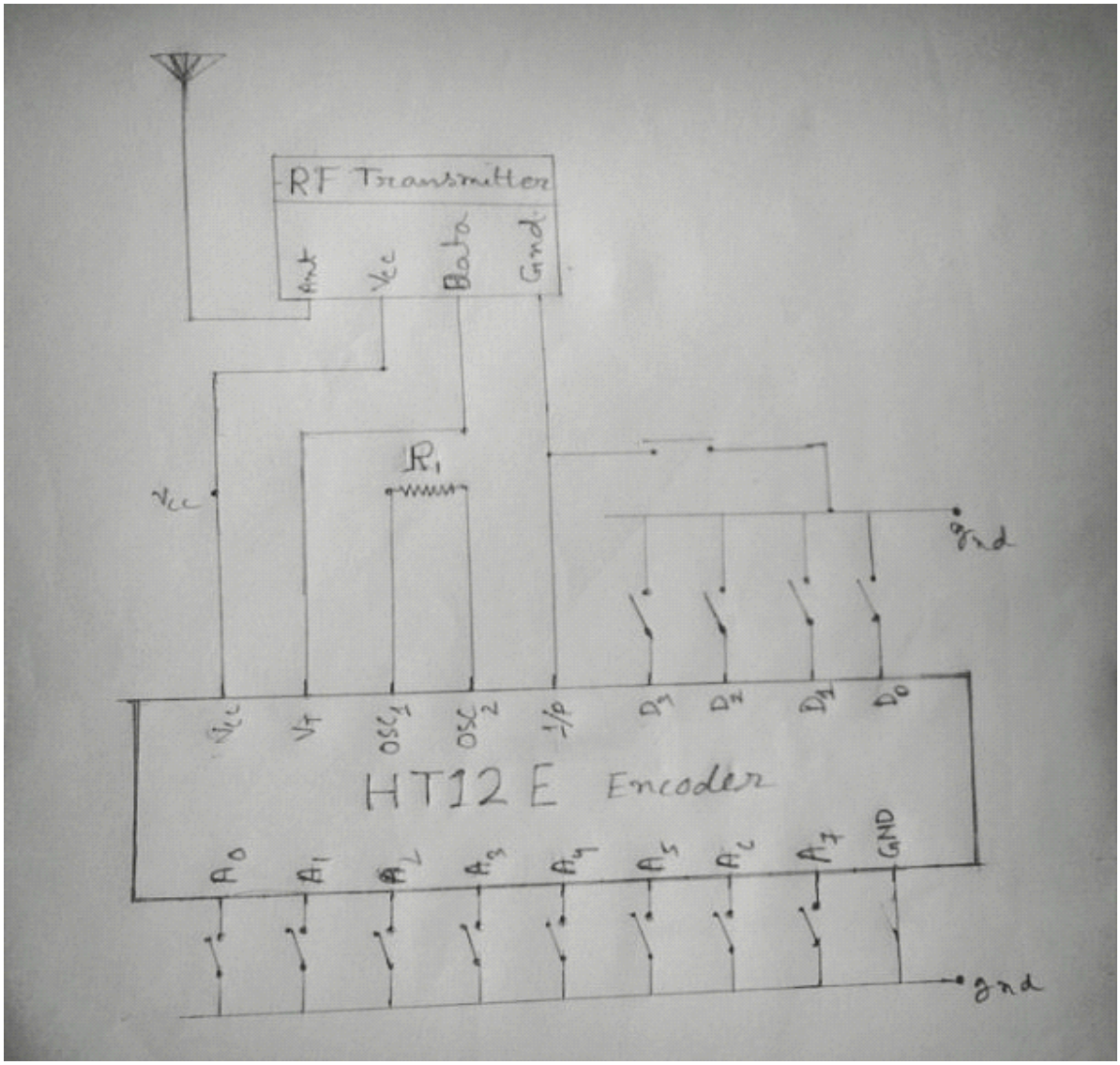

Fig.2.1 : RF Transmitter circuit sketchmetric diagram

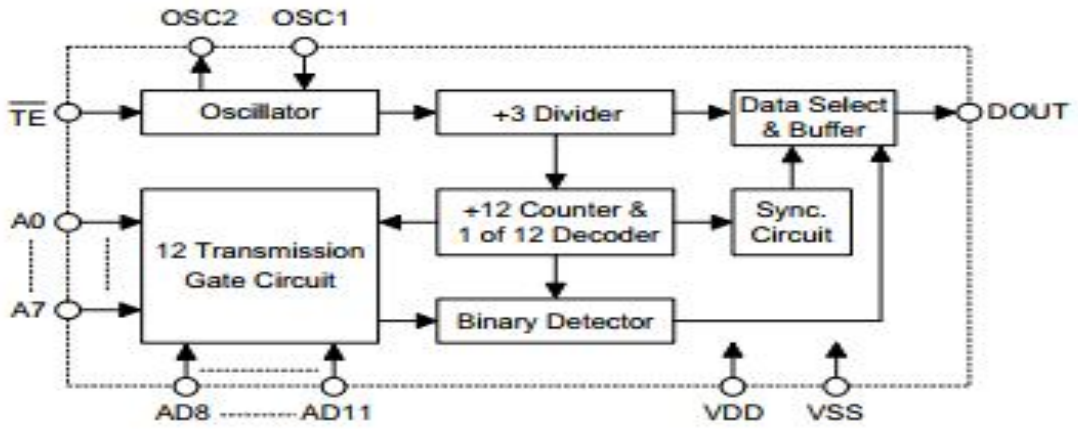

Fig 2.2 : Internal block diagram of IC HT12E

Pin No	Function	Name
1	8 bit Address pins for input	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	Ground (0V)	Ground
10	4 bit Data/Address pins for input	AD0
11		AD1
12		AD2
13		AD3
14	Transmission enable; active low	TE
15	Oscillator input	Osc2
16	Oscillator output	Osc1
17	Serial data output	Output
18	Supply voltage	Vcc

Fig 2.3 : Pin Description of IC HT12E

RF Receiver receives the data transmitted using RF Transmitter by its own antenna. IC HT12D decoder will convert the received serial data to 4 bit parallel data D0 – D3. The status of these address pins A0-A7 should match with status of address pin in the IC HT12E at the transmitter for the transmission of data. The LED connected to the above circuit glows when valid data transmission occurs from transmitter to receiver. A 51KΩ resistor will provide the necessary resistance required for the internal oscillator of the IC HT12D. The address pins MUST have the same address in both transmitter and receiver, or else the data won't be transferred. The output pins can now be used to switch any electric appliances as required and thereby can be used to save power wastage.

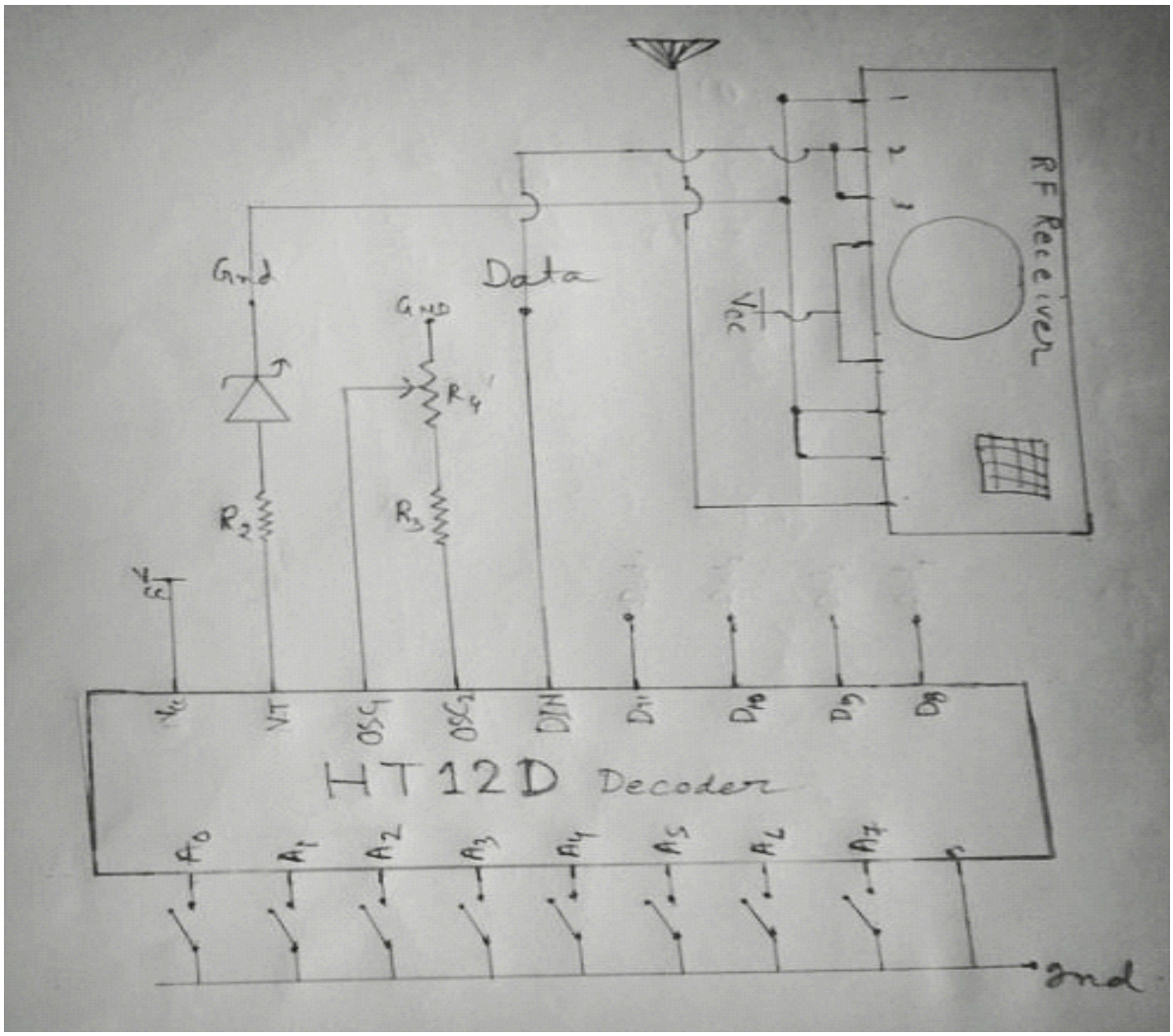

Fig 3.1 : RF Receiver circuit sketchmetric diagram

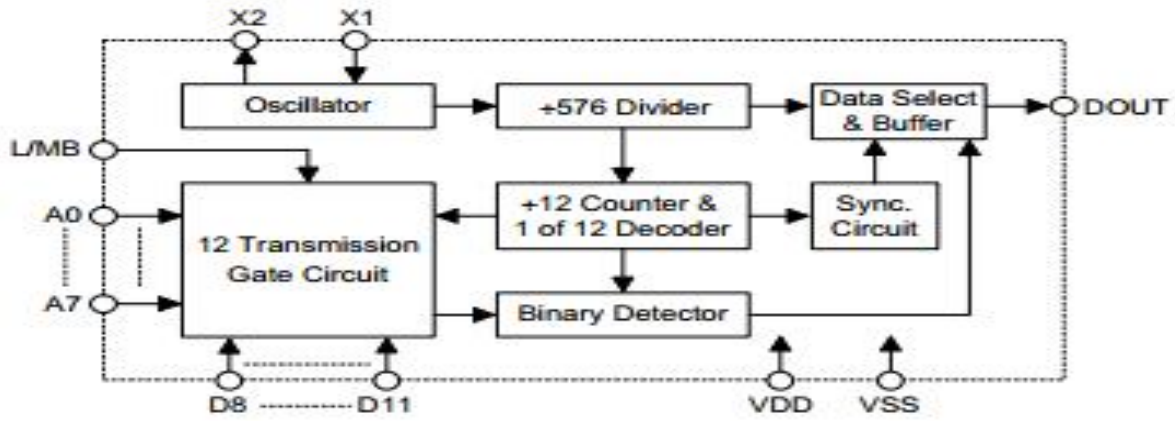

Fig 3.2 : Internal block diagram of IC HT12E

Pin No	Function	Name
1	8 bit Address pins for input	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	Ground (0V)	Ground
10	4 bit Data/Address pins for output	D0
11		D1
12		D2
13		D3
14	Serial data input	Input
15	Oscillator output	Osc2
16	Oscillator input	Osc1
17	Valid transmission; active high	VT
18	Supply voltage	Vcc

Fig 3.3 : Ping Description of IC HT 12D

3. RESULT

Once the circuit is made and powered up & if 4 LEDs are connected across the 4 out put terminals, the four LEDs on the receiver end will glow by default. The LED corresponding to data O/P point glows only when some data is received for that particular point. Now whenever someone press any switch(on the transmitter end), that particular LED (on the receiver end) goes off/on as required. We have 8 address pins, through which we can control 256 diffrent receivers with 4 output pins to control as much as 0 to 2^{12} individual Loads. By changing the pin of the address any of the receivers any time.

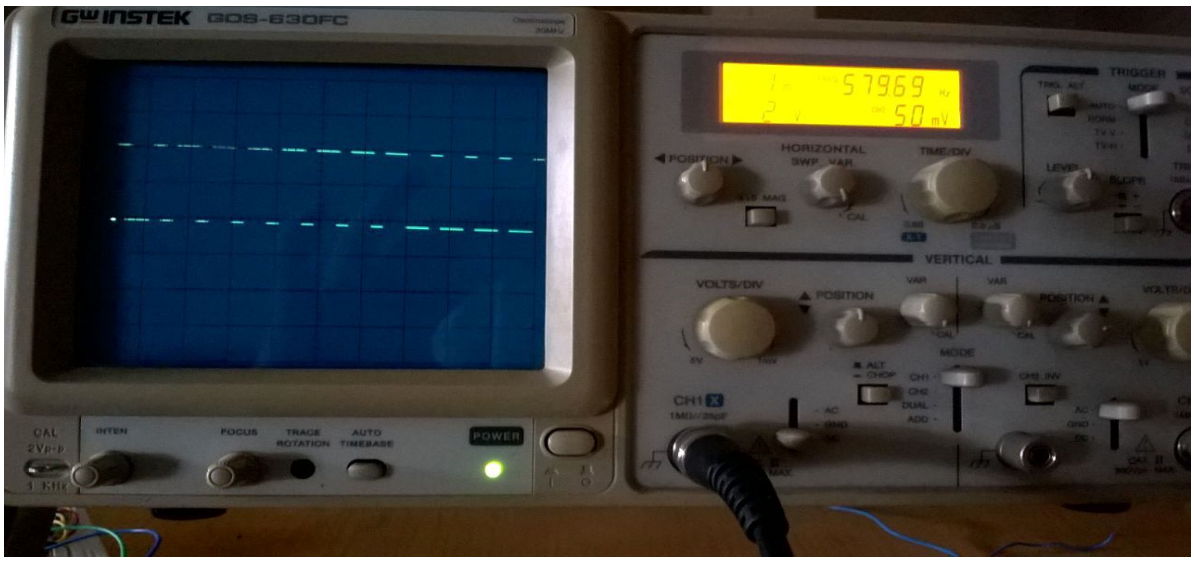

Fig 4.1 : The carrier signal which is used to transmit the data from the Transmitter to the Receiver

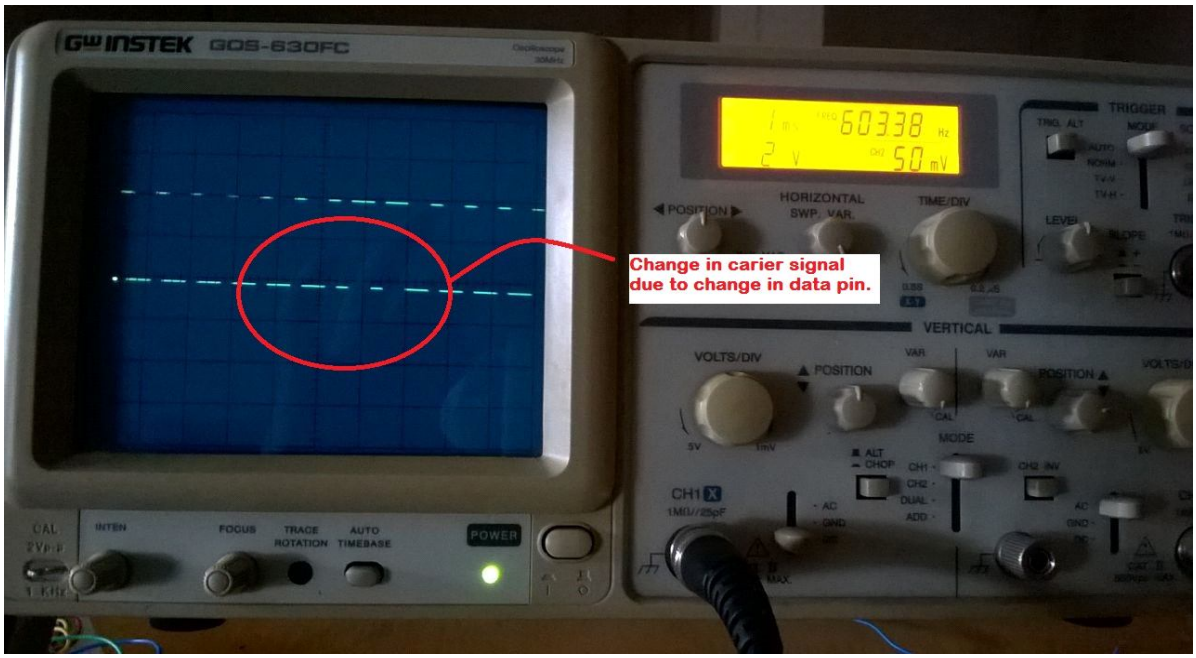

Fig 4.2 : The change in carrier signal due to change in address pins viewed in CRO.

Transmitted signal received from receiver from the data pin.

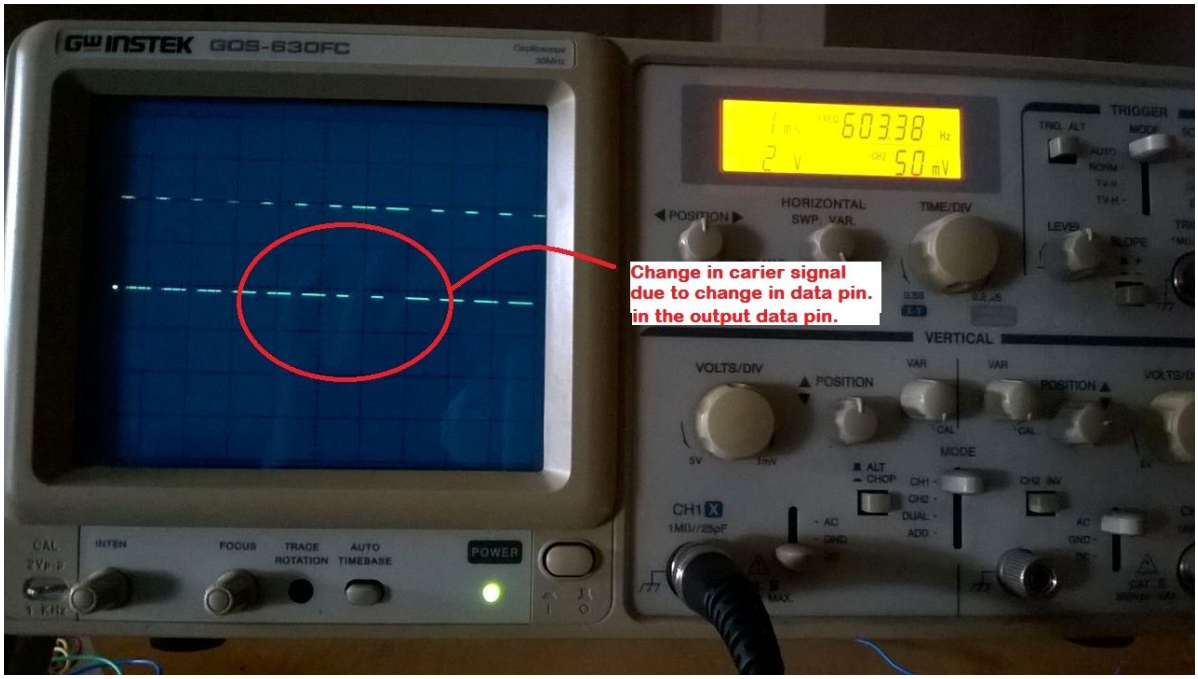

Fig 4.3 : Change in carrier signal due to data pin.

The receiver circuit output is shown in bellow :

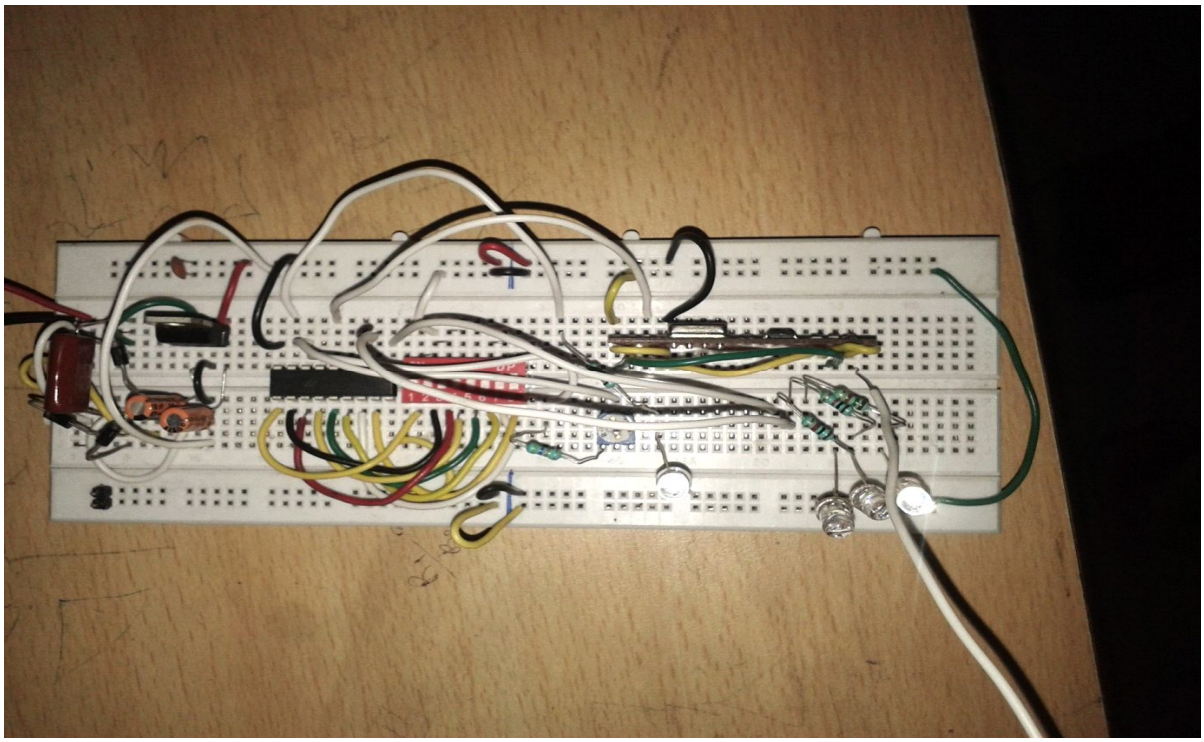

Fig 5.1 : - The light glowing due to the signal input placed at a distinct place.

5. CONCLUTION AND FUTURE SCOPE

Huge up-gradiation can be made over this module . HT12E Encoder for encoding and HT12D Dcoder for decoding, are very small I/C but has the ability to control 0 to 2^{12} lodes. So if we use some big I/C , we can control even more no. of loads. there are two ways to transmit data normally, first parallel and second series .

When we want to transmit data parallel , we need parallel no. of link for wireless or no of wire for wired communication depend upon how many bit you want to transmit at a time. For example 8 bit , 16 bit, 32 bit . Where as in series transmission only one channel is required for wireless transmission or one wire for wired communication. In serial transmission one by one bit is transmitted through channel or wire . So we can use as per needs.

If we can interface some sencer , timer with this project then it could count in some mordan days greatest projects regarding application and features and evan can be switable for a replacement for the technology like PLC & SCADA in few cases.

Some places in which this project would make important contribution are Vehicle Monitoring, Remort control, Telemeter,Wire-less meter reading, Wire-less security systen,Industrial data acquisition system, RF contactless smart card, Wire-less fire protection system, Hydrological and Metrological monitoring, Industrial remote control and remote sensing and so on.

6. REFERENCES

[1] Belgi Y.G.1, Avatade P.G.2, Deshmukh P.V.3, Sakhare A.M.4, Shinde A.J.5 and Prof. Patil J.M.6 “Android Based Appliances Control System” International Journal of Emerging Technology and Advanced Engineering. Vol 3, issue 12, pp. 681-683, Dec 2013.

[2] Abu Farzan Mitul1, Fida Hasan Md Rafi1, Md. Manirul Islam1, Mohiuddin Ahmad1. International Conference on Electrical, Computer and Telecommunication Engineering, pp. 511-514, 01- 02 December 2012 (ICECTE2012), RUET, Rajshahi-6204, Bangladesh.

[3] Santosh.M.Nejakar "Wireless Infrared Remote Controller for Multiple Home Appliances" International Journal of Electrical and Electronics Research. Vol. 2, Issue 1, pp. 25-35, Month JanuaryMarch 2014.

[4] Sachin Kishor Khadke IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 9, Issue 3, (May - Jun. 2014),

[5] Sindhuja Alla, B.Kiran Babu "Remote Control of Electrical Appliance using Wireless Technology GSM" International Journal of Science and Research. Volume 2 Issue 4, pp. 498-500, April 2013.

[6]. Jianjun Lv, Zhishu Li, Mingyi Mao. "A new USB home appliances based on PC and infrared remote control protocol".2010 International Conferences on Computer and Communication Technologies in Agriculture Engineering.2010, pp.572 -575.

[7]. Shengwen Chen, Chunghuang Yang, Chung-Huang Yang."Design and Implementation of Live SD Acquisition Tool in Android Smart Phone". 2011 Fifth International Conference on Genetic and Evolutionary Computing. 2011, pp. 157-162.

[8]. Xiao Yuan, Yuliang Pan, Zaiying Ling. "The Application of Infrared Remote Controlled Code Lock in the Management of Industrial Machine Parameters" .Electrical and Control Engineering (ICECE), 2011 International Conference on.2011, pp. 418-421.

[9]. Feng Xun, Ye Zhi-xia."Sunplus SPCE061A MCU Simulation PT2262 Coding". Journal of Yunnan Normal University (Natural Sciences Edition), 2010. 30(4) . pp. 40-42.

[10] (IJETT) – Volume 4 Issue 9- September 2013]. Ki-Cheol Son, Jong-Yeol Lee. "The methods of android application speed up by using NDK". Awareness Science and Technology (iCAST), 2011 3rd International Conference on. Sept 2011, pp.382- 385.