AMERICAN INTERNATIONAL UNIVERSITY – BANGLADESH (AIUB)

Where leaders are created

Course Code:	EEE 2104	Course Name:	Digital logic and circuit Lab

Remote control circuit through RF without microcontroller

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Objectives of the Work

- **Design a remote control system using RF without a microcontroller.**
- **Utilize HT12E and HT12D encoder-decoder pair.**
- **Ensure cost-effective and efficient wireless communication.**
- **Enable simple implementation for automation and security systems.**
- **Maintain low power consumption with reliable operation.**

Introduction

- **Wireless communication enables modern electronics to operate remotely.**
- **RF systems replace traditional wired control with flexibility and simplicity.**
- **Motivation:**
  - **Avoid complexity of microcontrollers.**
  - **Build a cost-effective wireless control system.**
- **Applications in home automation, security, and industry.**

Literature Review

- RF-based systems are widely used in consumer and industrial electronics.
- Many systems use microcontrollers (complexity and cost).
- Our work eliminates microcontroller:
  - Simplifies design.
  - Reduces power and cost.
- HT12E/HT12D pair used in previous basic RF applications.

Working Method

- **HT12E (Encoder) + 433MHz Transmitter**
  - The **HT12E** takes **4-bit parallel data** and encodes it into a **serial** signal.
  - The **433MHz Transmitter** sends this serial data wirelessly.
- **433MHz Receiver + HT12D (Decoder)**
  - The **433MHz Receiver** gets the **serial** data.
  - The **HT12D** decodes it and converts it back to **4-bit parallel data**.

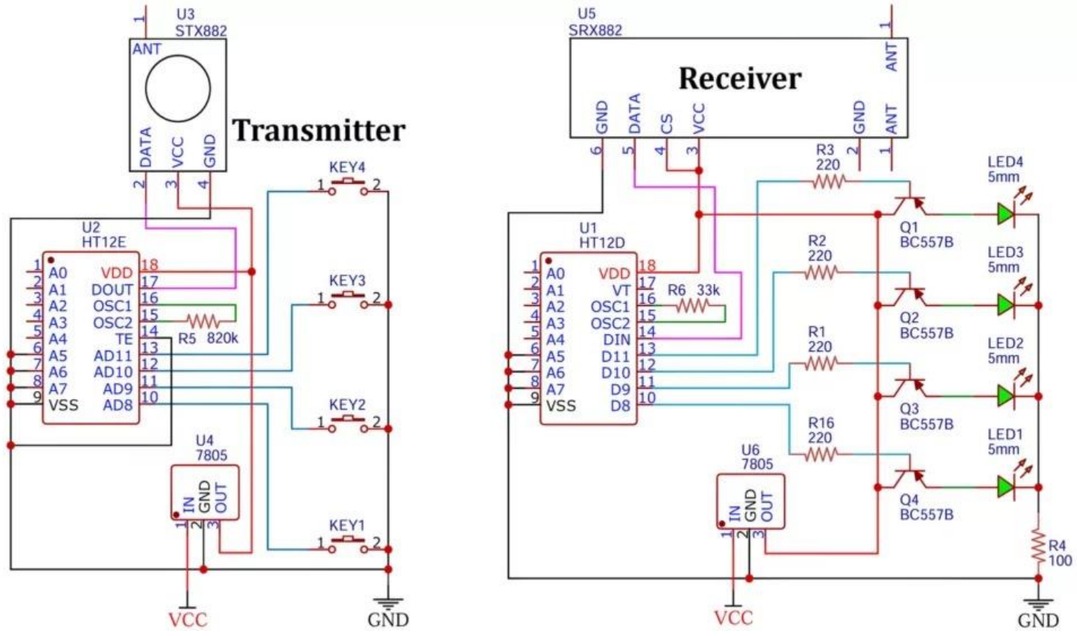


Fig 1: Circuit Diagram

Working Method

- Built on breadboard
- Transmitter powered by 5V supply.
- Receiver connected to LED/relay for action.
- Components:
  - RF Modules: STX882/SRX882
  - Encoder/Decoder: HT12E/HT12D
  - Resistors, Transistors, Voltage Regulator, Push Buttons, LEDs

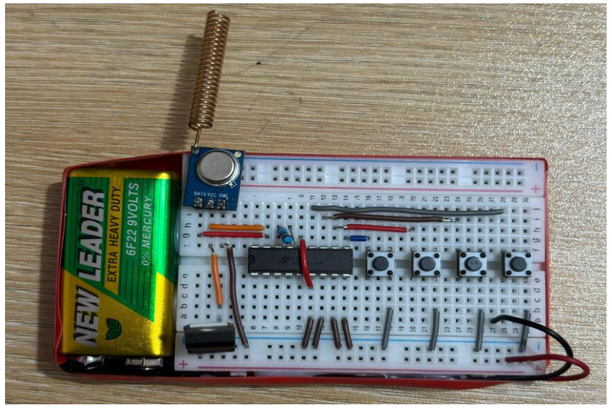


Fig 2: Transmitter circuit

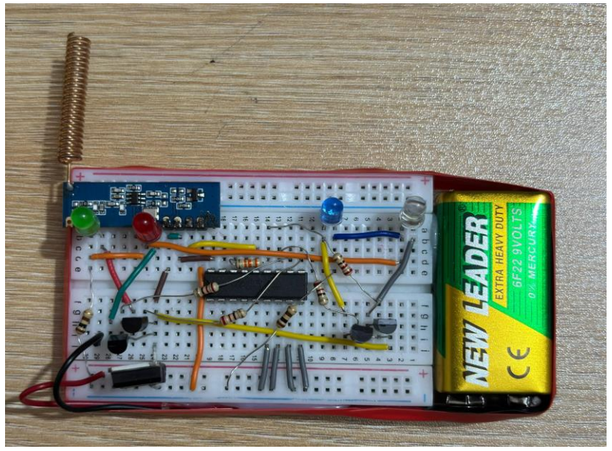
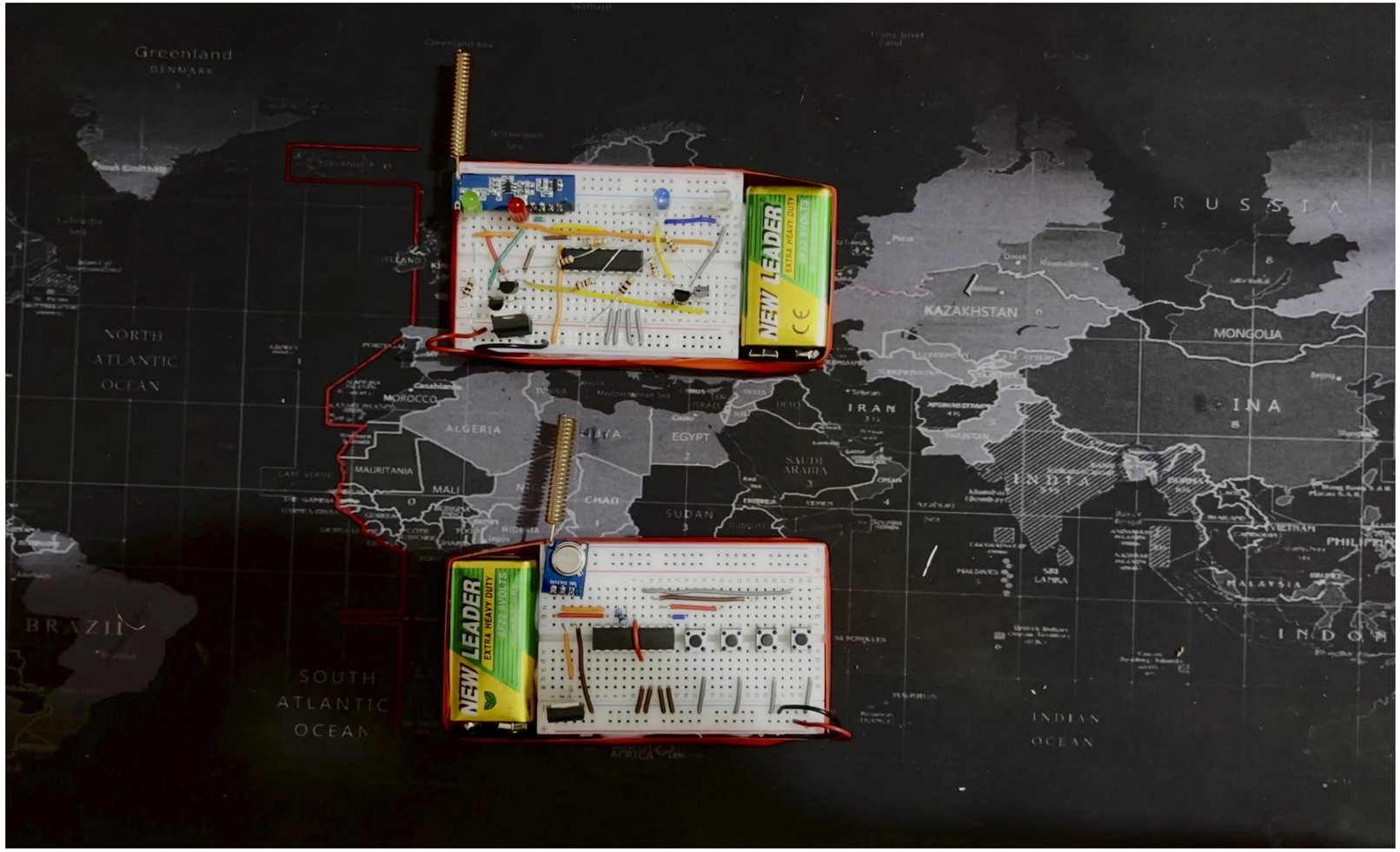


Fig 3: Receiver circuit

Here is a video how it works



Result and discussion

- Pressing transmitter buttons successfully triggers receiver output.
- LED lights indicate correct signal reception.
- Can operate over a range of 100 meters.
- Consumes minimal power, ideal for battery applications.
- Stable communication with minimal interference.

Applications

- Remote control(Toys, Garage doors, Fans, Lights)
- Wireless security systems
- Home Automation
- Doorbells
- Short-range data transmission
- Remote control of household appliances

Advantage

- Wireless and flexible device control.
- Controls up to four devices.
- Uses low-cost, easy-to-find parts.
- Low power usage.
- Simple and easy to build.

Disadvantage

- **Potential Interference**: RF signals are susceptible to interference from other electronic devices and physical obstructions, which can affect performance.
- **Security Concerns**: Hackers can intercept signals without proper encoding, creating security risks in sensitive applications.
- **Limited Range**: Obstacles and interference can reduce the circuit's effective range.

Conclusions

Building a 433MHz RF transmitter and receiver circuit is an excellent way to explore wireless communication. With a simple design and affordable components, this circuit offers a reliable solution for remote control applications.

Thanks for listening our presentation....