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***Department of Electronics & Telecommunication
Engineering***

“Wireless gesture controlled robot”



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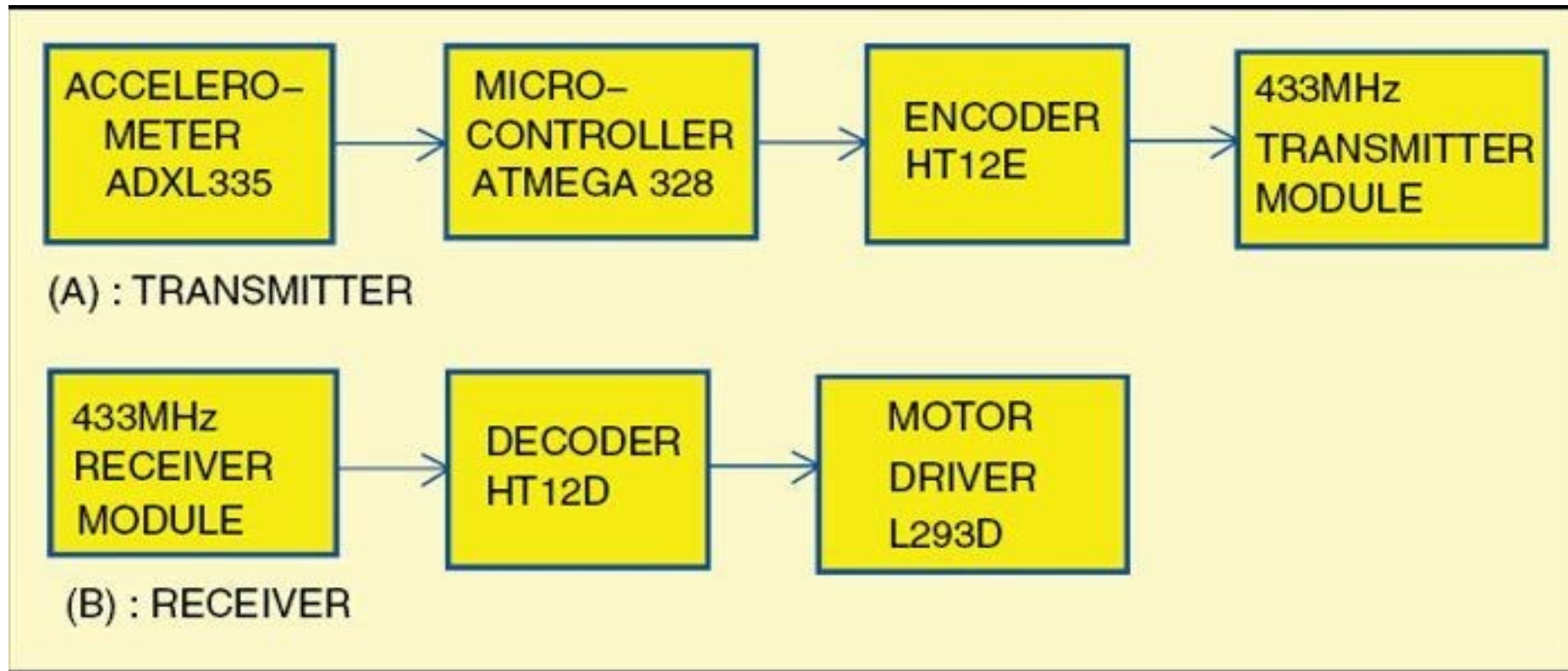
CONTENTS:-

- Introduction
- Proposed Block Diagram
- H/W & S/W specifications
- Design & implimentation
- Results
- Advantages,Disadvantages & Applicationas
- Conclusion
- References

INTRODUCTION:-

- In this **wireless gesture controlled robot project** we are going to control a robot using hand gestures.
- This is an easy, user-friendly way to interact with robotic systems and robots.
- An accelerometer is used to detect the tilting position of your hand,
- a microcontroller gets different analogue values and generates command signals to control the robot.
- This concept can be implemented in a robotic arm used for welding or handling hazardous materials, such as in nuclear plants.

BLOCK DIAGRAM:-



SPECIFICATIONS:-

H/W Specifications:-

- **Semiconductors**
- IC1 - 7805, 5V regulator
- IC2 - ATmega328 microcontroller
- IC3 - LM1117-33, 3.3 voltage regulator
- IC4 - HT12E, 2 12 series encoder
- IC5 - HT12D, 2 12 series decoder
- IC6 - L293D, dual H-bridge motor driver
- LED1 & 4 - 5mm LED

CONTD...

- **Resistors (all 1/4-watt, $\pm 5\%$ carbon):**

- R1 - 1-mega-ohm

- R2 - 10-kilo-ohm

- R3 - 750-kilo-ohm

- R4-R7 - 220-ohm

- R8 - 47-kilo-ohm

- **Capacitors:**

- C1, C2 - 22pF ceramic disk

- C3 - 0.1 μ F ceramic disk

- C4 - 0.33 μ F ceramic disk

- C5 - 10 μ F, 16V electrolytic

CONTD...

- **Miscellaneous:**
- CON1, CON3 - 2-pin connector
- CON2 - 6-pin connector
- X TAL 1 - 16MHz crystal
- TX1 - 433MHz transmitter module
- RX1 - 433MHz receiver module
- M1, M2 - DC-gearred motor, 100rpm
- S1, S2 - On/off switch
- Batt.1 - 9V PP3 battery
- Batt.2 - 4.5V, 1.5Ah lead-acid battery
- ANT.1, ANT.2 - 17cm long single-strand wire antenna
- - ADXL335 3-axis accelerometer

CONTD...

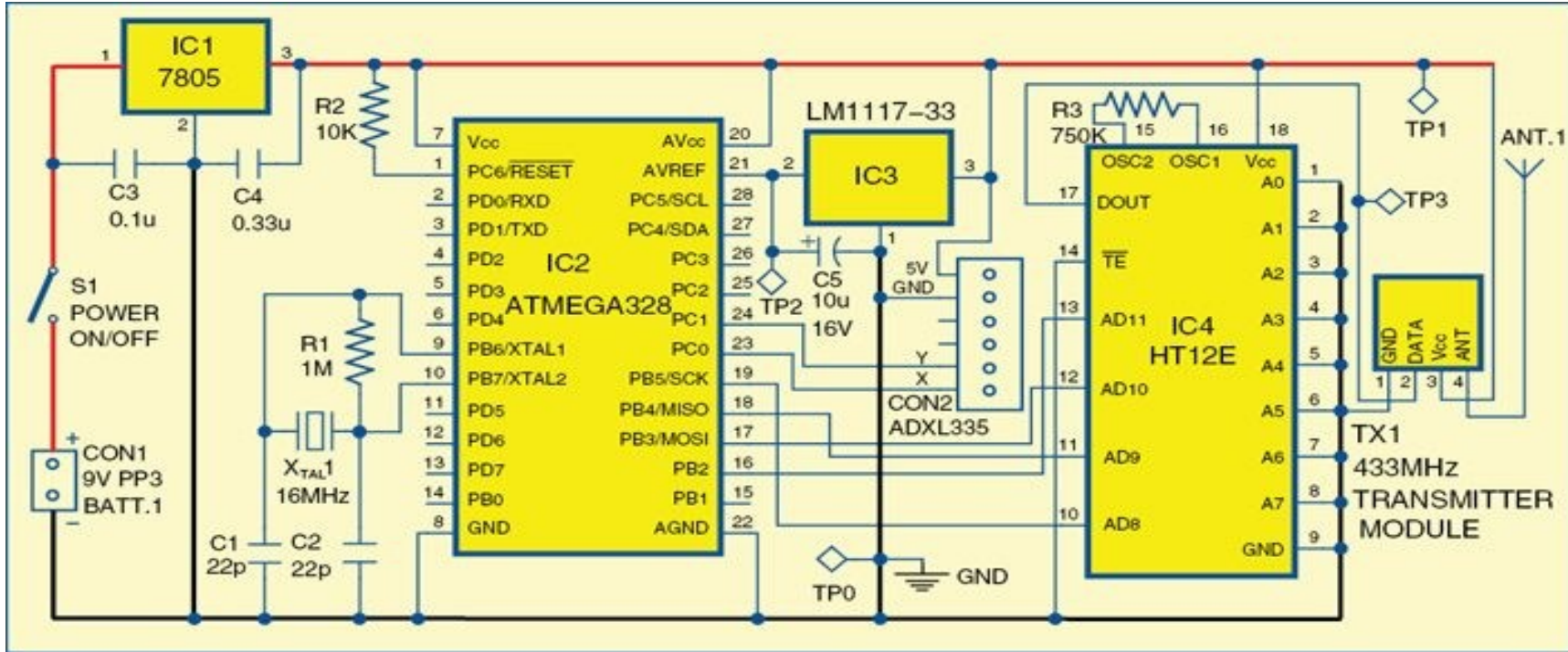
S/W specifications:-

- The software program is written in Arduino programming language. We programmed a fresh ATmega328 microcontroller with the help of Arduino IDE 1.0.5 and an Arduino Uno board.
- First, we have to load bootloader code into the microcontroller. For that, we used Arduino Uno for in-system programming (ISP) given in the IDE, by selecting File → Examples → Arduino ISP. Once the bootloader is uploaded into the microcontroller, gesture.ino code of this project can be uploaded.

DESIGN & IMPLIMENTATION:-

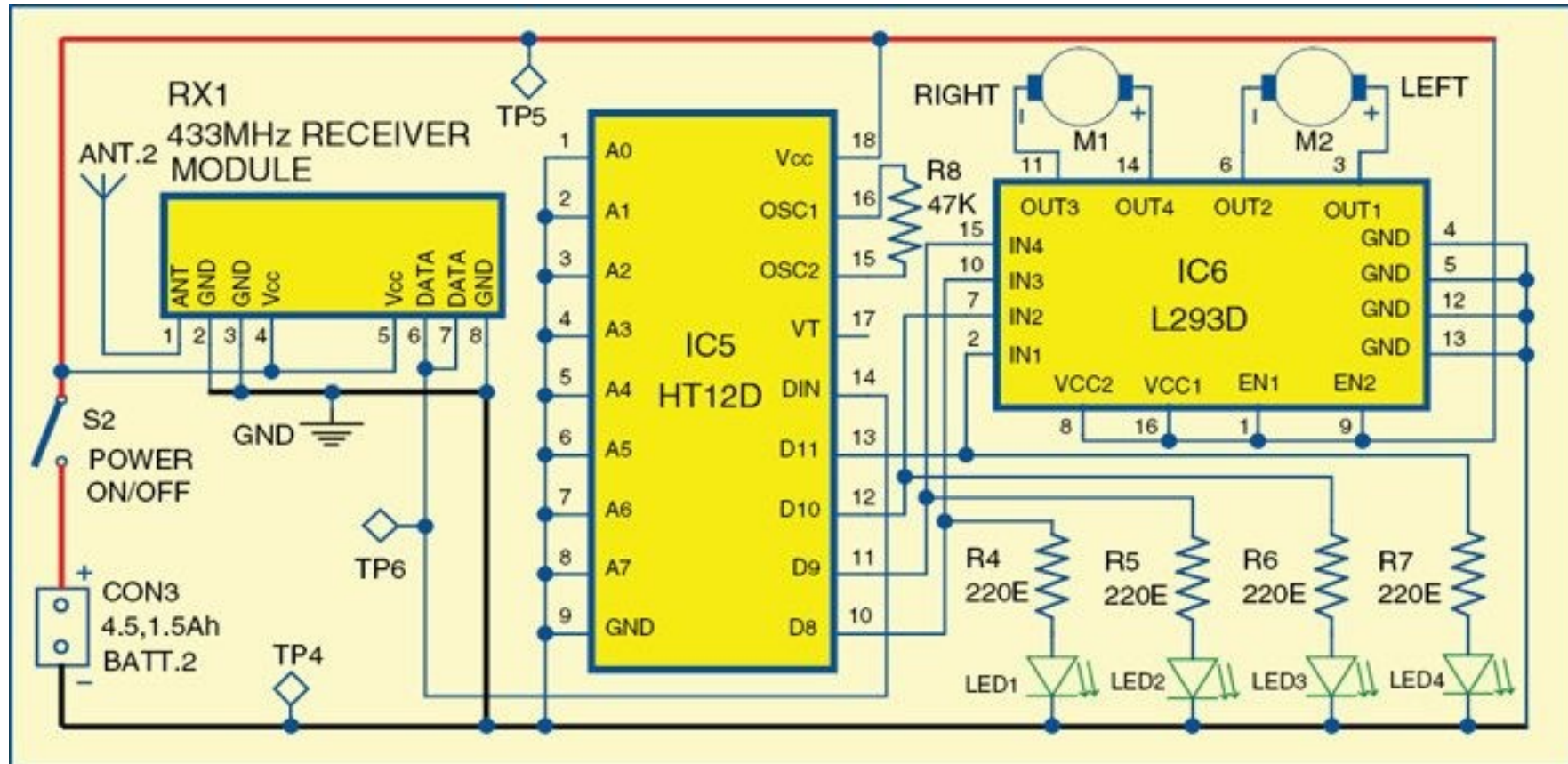
- CIRCUIT DIAGRAM:-

TRANSMITTER



CONTD...

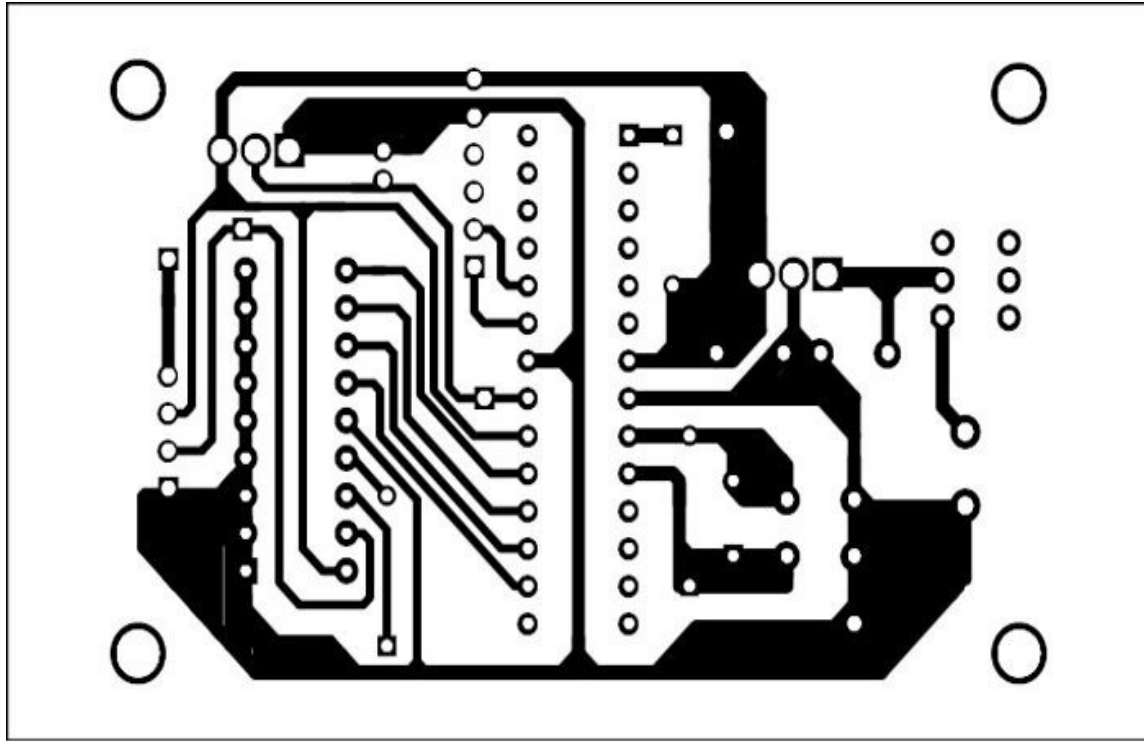
RECEIVER



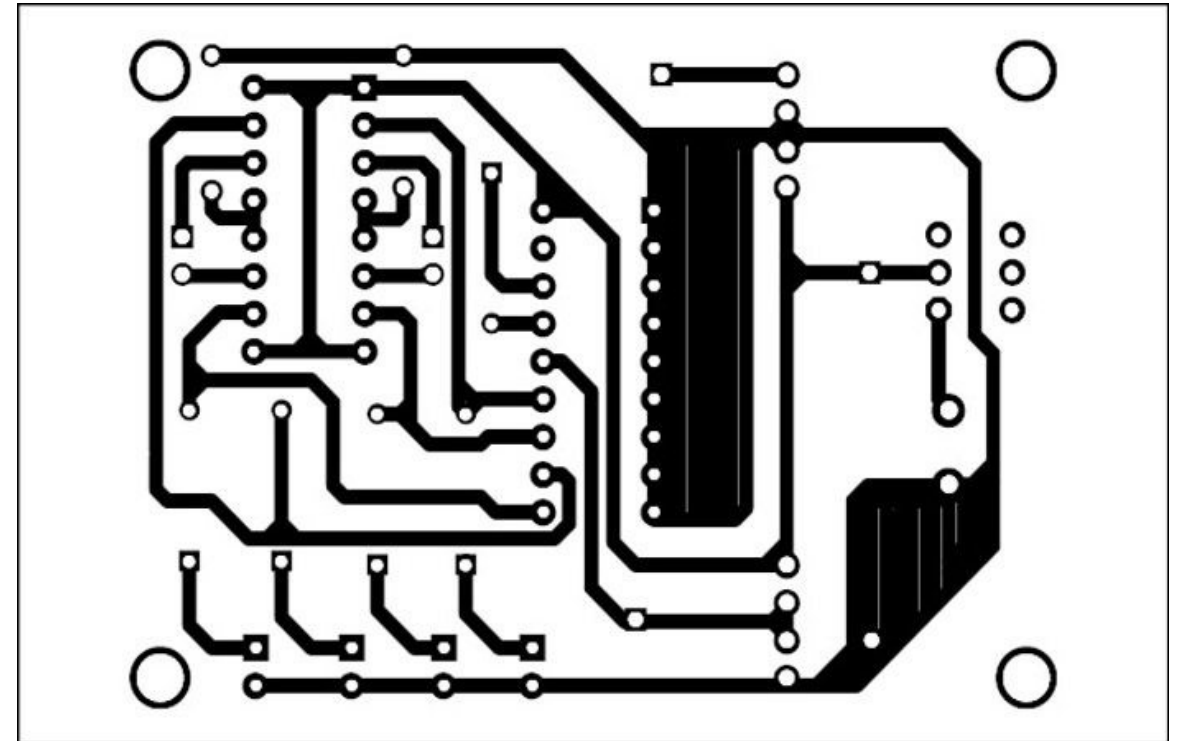
CONTD...

PCB layout:-

TRANSMITTER



RECEIVER



ADVANTAGES:-

- Speed and sufficient reliable for recognition system.
- Good performance system with complex background.
- The system successfully recognized static and dynamic gestures. Could be applied on a mobile robot control. ➤
- Simple, fast, and easy to implement.
- Can be applied on real system and play games. ➤
- No Training is required.

DISADVANTAGES:-

- Irrelevant object might overlap with the hand.
- Wrong object extraction appeared if the objects larger than the hand.
- Performance recognition algorithm decreases when the distance is greater than 1.5 meters between the user and the camera. ➤
- System limitations restrict the applications such as the arm must be vertical, the palm is facing the camera and the finger colour must be basic colour such as either red or green or blue. ➤
- Ambient light affects the colour detection threshold DISADVANTAGES

APPLICATIONS:-

Gesture recognition has wide ranging applications such as the following ➤

- Enabling very young children to interact with computers ➤
- Medically monitoring patients' emotional states or stress levels
- Navigating and/or manipulating in virtual environments ➤ Communicating in video conferencing ➤
- Public Display Screens: Information display screens in Supermarkets, Post Offices, Banks that allows control without having to touch the device. ➤
- Robots: Controlling robots without any physical contact between human and computer.

CONCLUSION:-

- The importance of gesture recognition lies in building efficient human machine interaction.
- Its applications range from sign language recognition through medical rehabilitation to virtual reality.
- Gesture recognition 35 Soft computing tools pose another promising application to static hand gesture identification..
- Thus, gesture recognition promises wide-ranging applications in fields from photojournalism through medical technology to biometrics.