

Proposal

Hand Gesture Controlled Obstacle Avoidance Smart Robotic Car

Spring 2021-2022

MCTR601

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I. Introduction

The Team:

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Robots are playing an essential part in automation in various areas, including construction, military, medical, and industrial. We used hand motion to drive the car in this project. We have used an accelerometer, which operates on acceleration, for this purpose and we created an ADC converter using 4 channel comparator circuit.

Generally, a transmitting circuit is used in the hand, which contains an RF Transmitter and accelerometer. This will transmit signals to the receiver circuit so that it can do the required task like moving forward, reverse, turning left, turning right and stop.

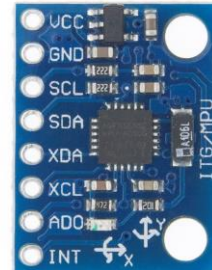
The accelerometer gives an Analog output so we need to convert these Analog signals into digital. For this purpose, we will use a 4-channel comparator circuit using op amps in place of the ADC (so as to not use an extra microcontroller or an expensive ADC IC). By setting reference voltage, we get a digital signal and then apply this signal to HT12E encoder to encode data or converting it into serial form and then send this data by using RF transmitter into the environment.

At the receiver end, we have used an RF receiver to receive data and then connecting the signals to HT12D decoder. The decoder IC converts received serial data to parallel to be read by the ATmega328p MCU. According to the received data, we drive the car by using two DC motor in forward, reverse, left, right and stop direction.

The robotic car is designed also to avoid any obstacle that may exist along its path, and that is achieved using the ultrasonic sensor attached to the receiver circuit. Using closed loop control, feedback from the sensor, a proportional controller unit makes a correction and this in turn, this changes PWM signal duty cycle, which in turn controls the speed of the motors to change the direction of movement.

II. Required components

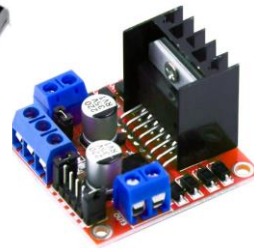
- ATmega328p
- DC Motors
- Accelerometer MPU 6050 GY-521 (Gyroscope)
- 433Mhz RF Wireless Transmitter and Receiver Kit (aa098)



- HT12E encoder



- HT12D decoder



- Motor Driver L298N

- Ultrasonic sensor HC-SR04



- OP AMP lm324



- 12 Volt Battery

- Battery Connector

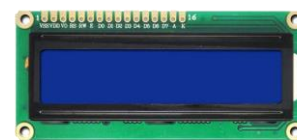


- USB cable

- Car Chassis



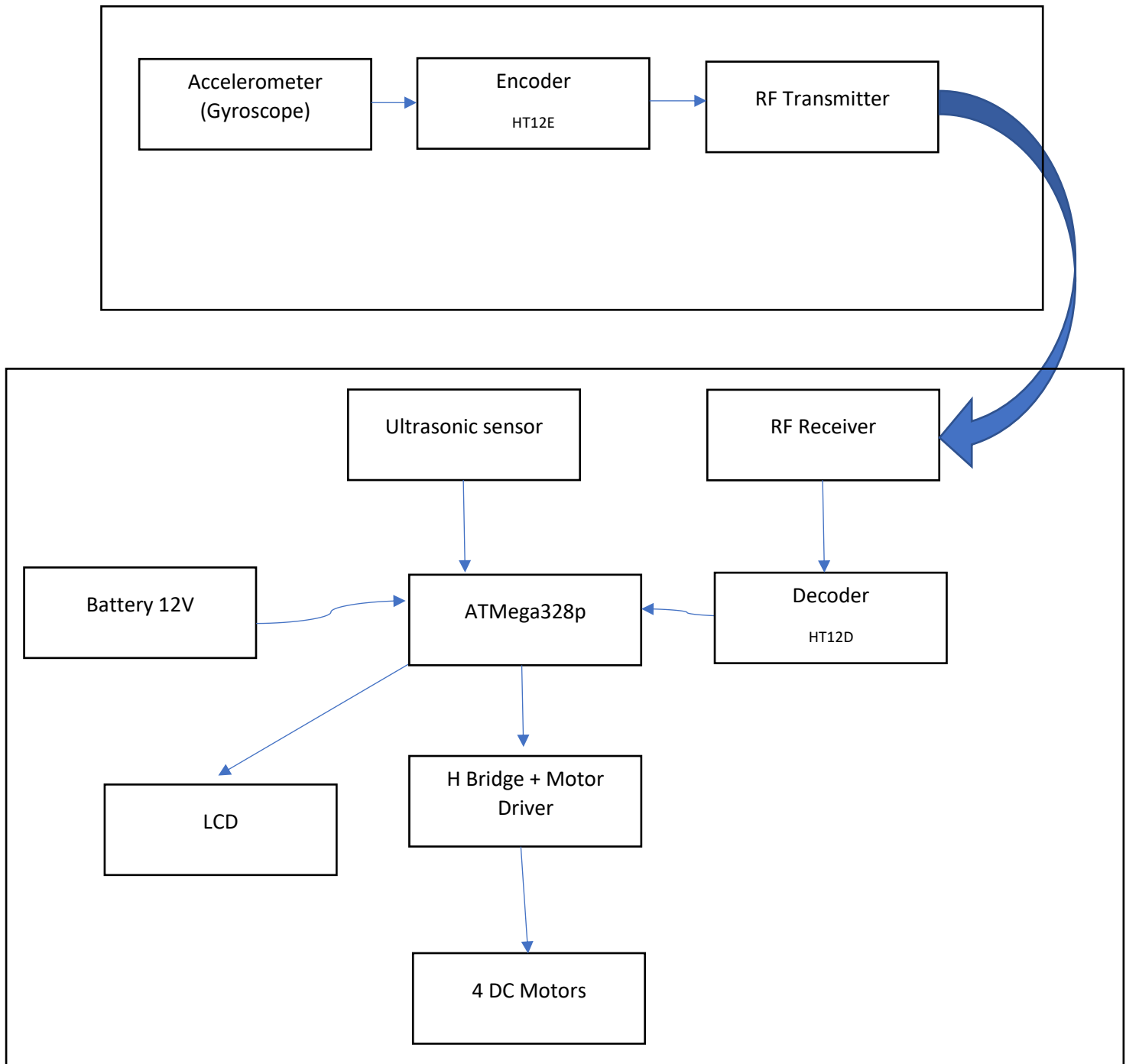
- LCD (Character LCD 2×16)



- Push Buttons



III. Functional diagram



IV. Closed Loop control diagram

