AUTONOMOUS CAR

EMB 535 GROUP – MAADI

Team Members :

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Introduction :

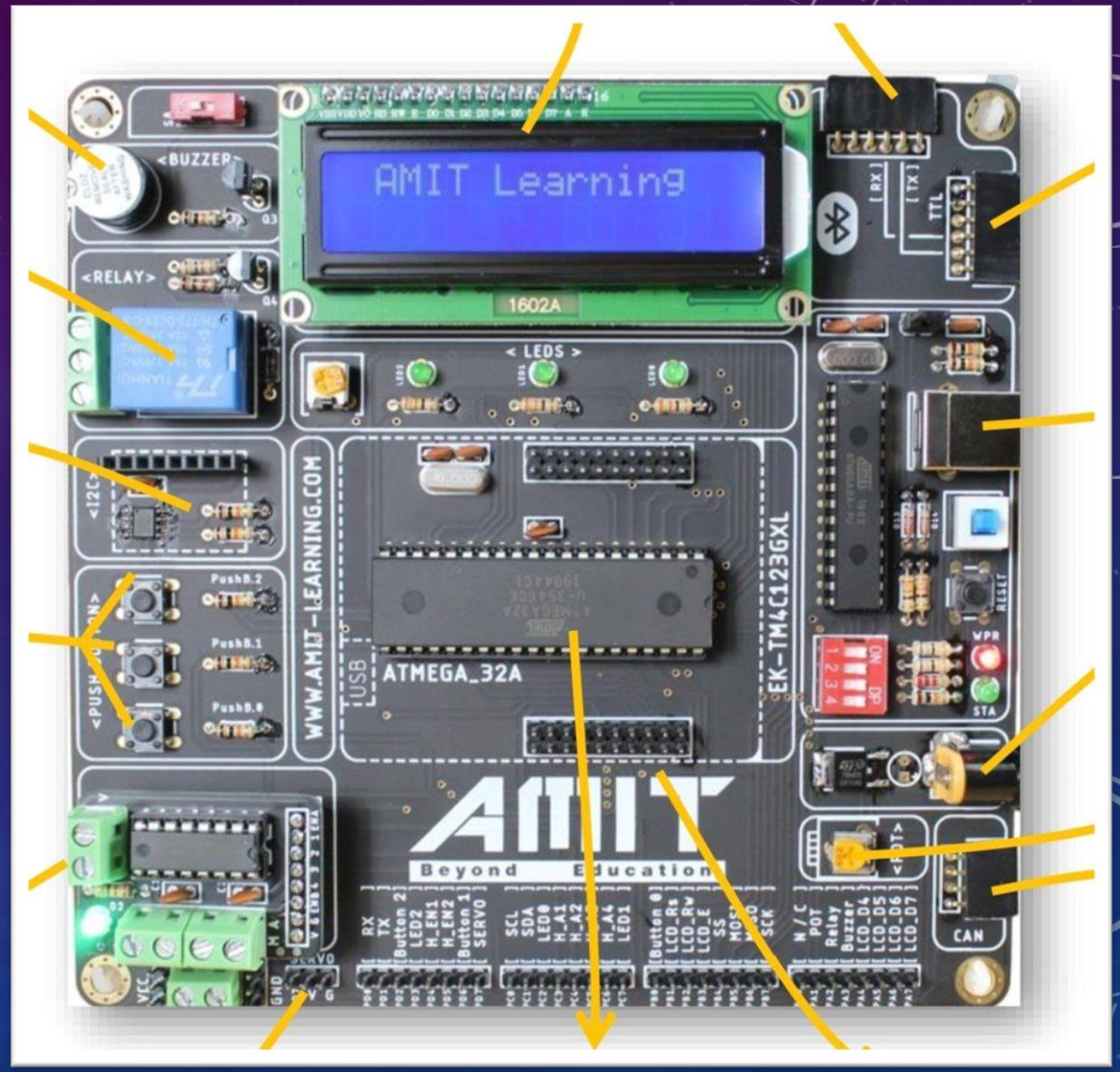
- This Project aims to implement a Self-Driving Car that can avoid the obstacles with very fast response by AVR-ATmega32-Drivers .
- Autonomous cars, also known as self-driving cars, are vehicles equipped with advanced technologies to navigate and operate without human input. These vehicles utilize sensors, cameras, radar, and artificial intelligence to interpret their surroundings and make decisions. The goal is to enhance safety, reduce accidents, and provide a more efficient and convenient mode of transportation.

Component :

- AMIT AVR-KIT (AVR-ATmega32)
- Ultrasonic HC- SR04.
- Servo motor.
- LCD
- H-Bridge (L293D).
- Motors.
- Caster wheel.
- Chassis

AMIT AVR-KIT (avr-atmega32)

•The ATmega32 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

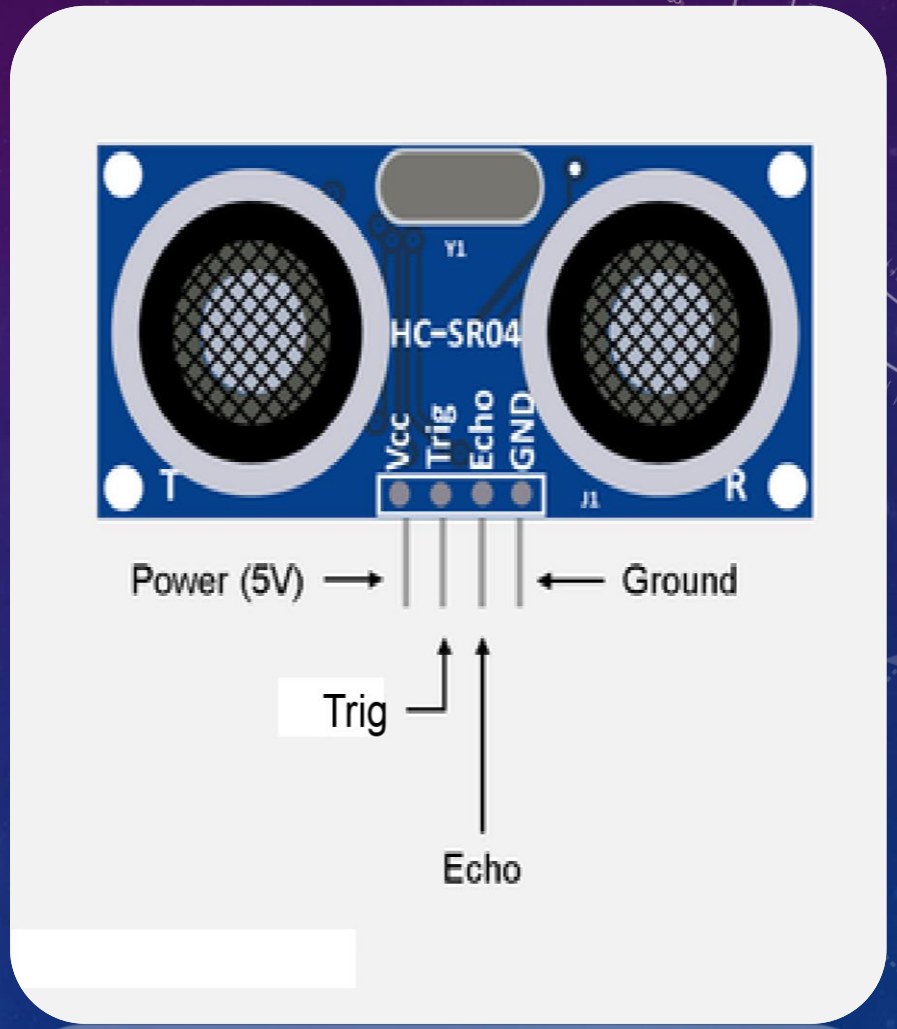


Ultrasonic Sensor

•Ultrasonic is placed on servo motor axis, its function to detect the obstacles on the car way.

• Ultrasonic is used to detect any obstacles towards to the car, and the car must fast react to avoid this obstacle like stopping and turning to any empty direction.

•If the car found an obstacle, it must change its way according to the ultrasonic data

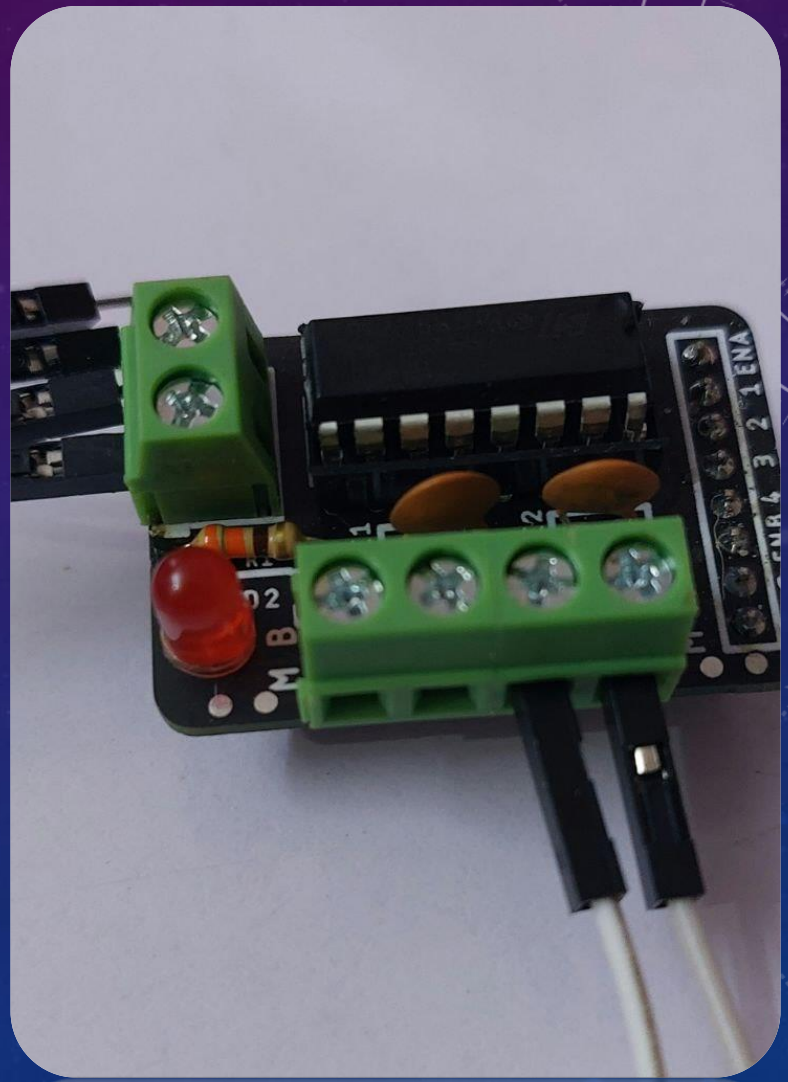


Servo Motor

- Servo is used to make ultrasonic scanning around 180°.

H-Bridge (L293D)

• L293D is used to control the speed and the direction of motors.

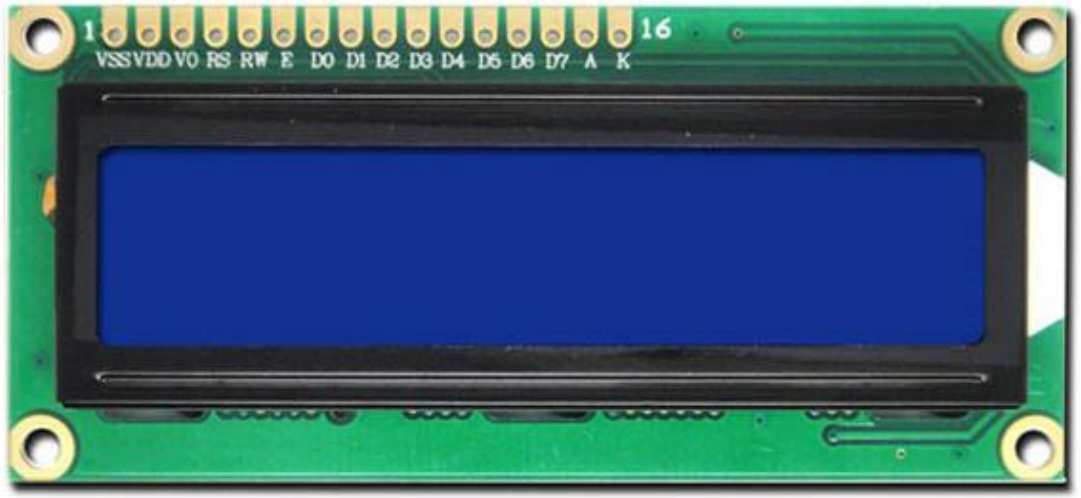


MOTORS

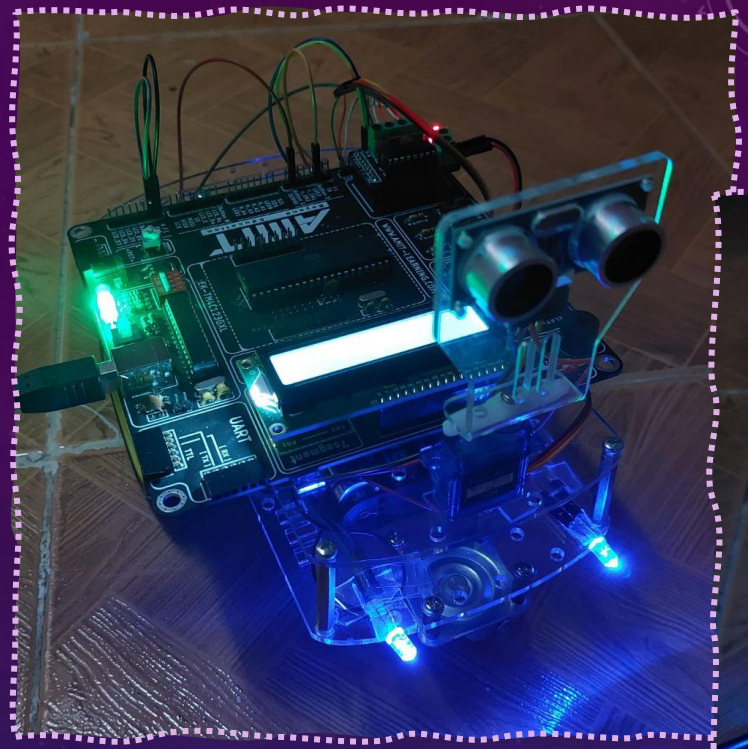
A DC motor is an electrical motor that uses direct current (DC) to produce mechanical force.

LCD

• LCD displays the current direction that car immediately move and the distance between it and the wall.



CHASSIS & CASTER WHEEL.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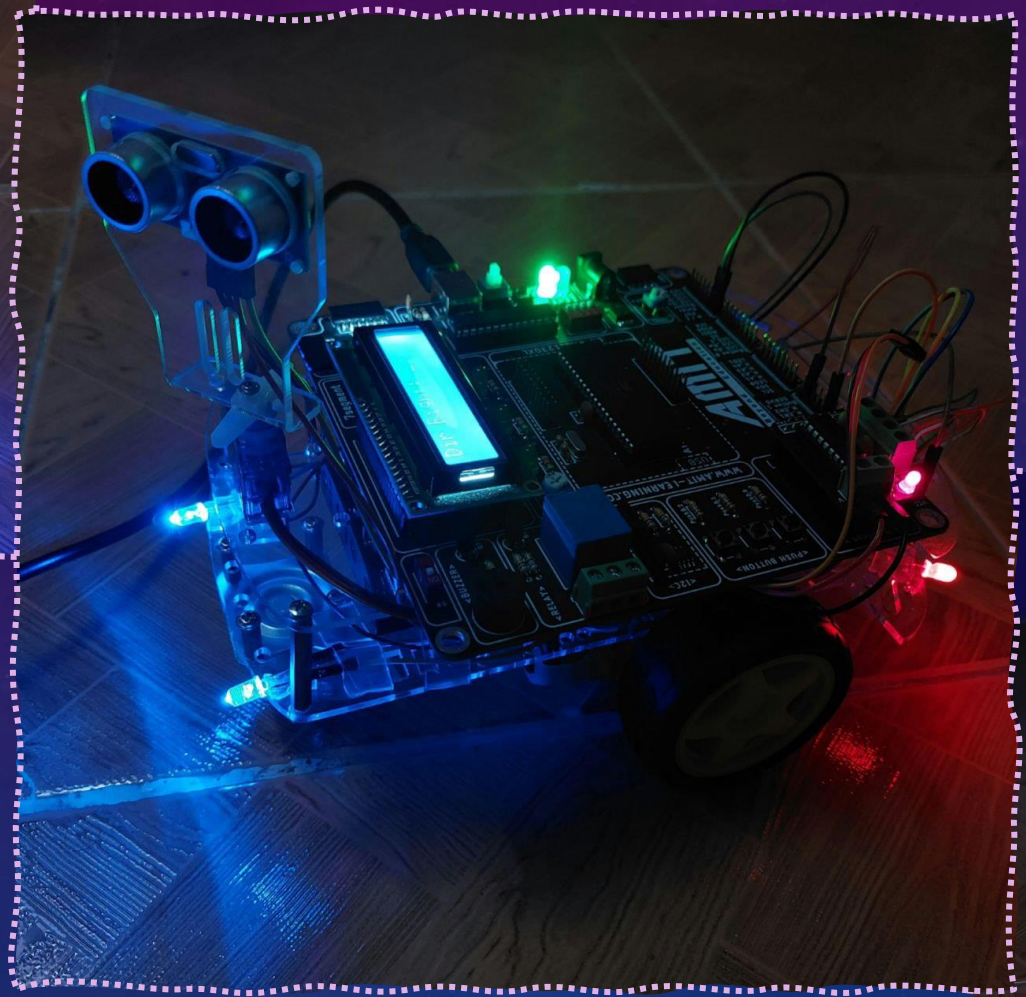
UART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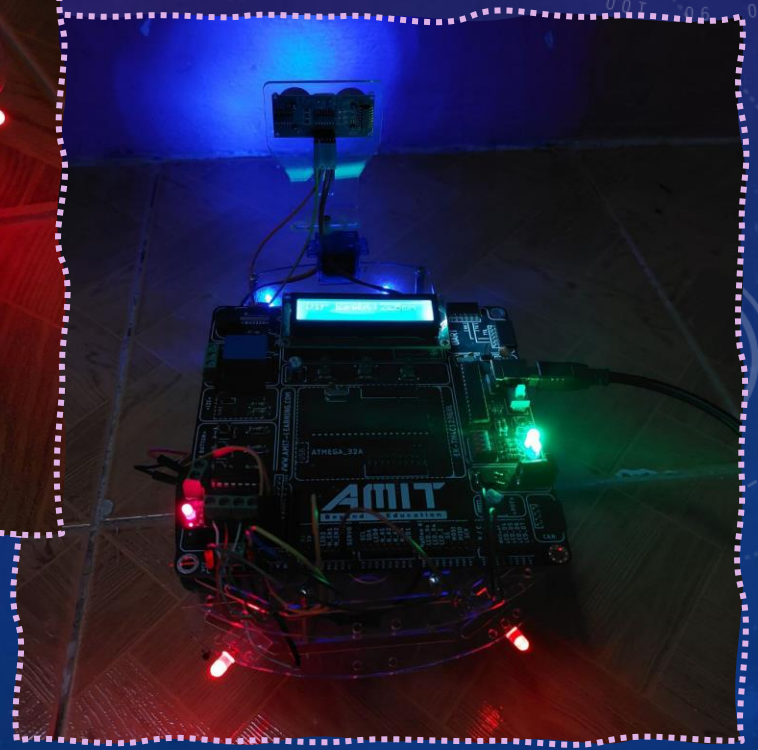
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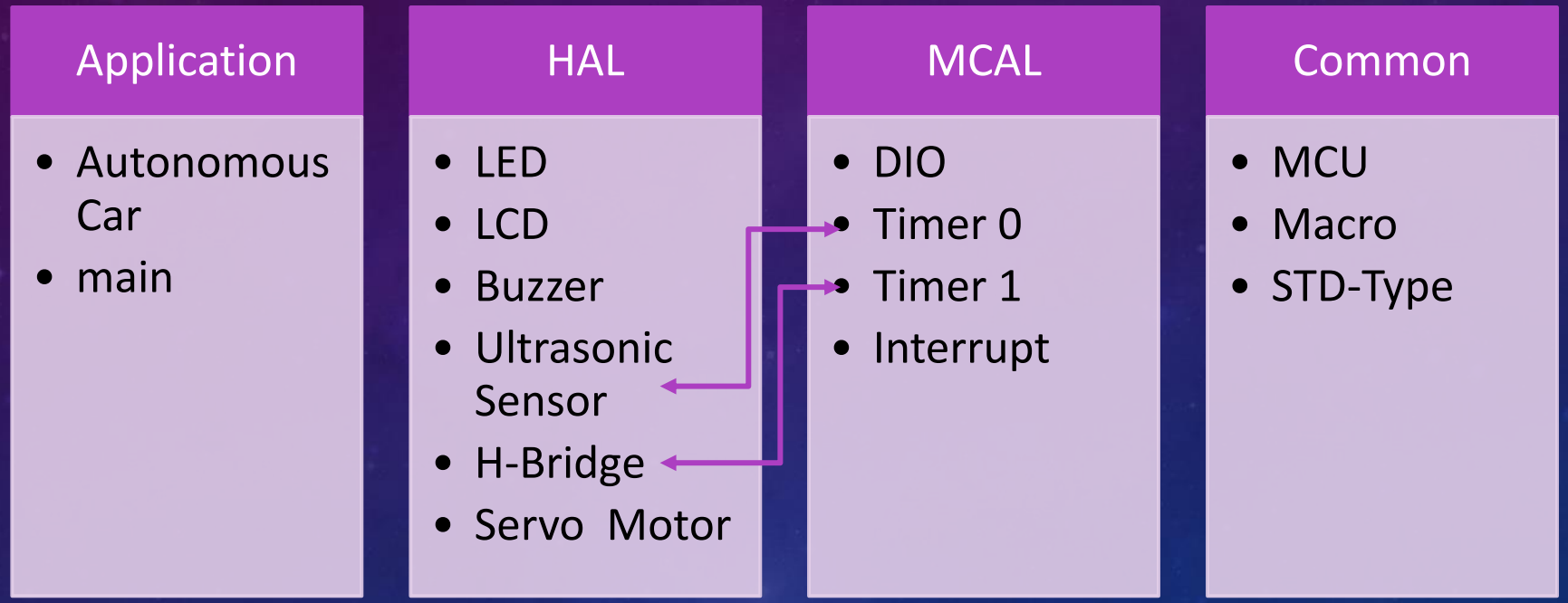
DRIVERS

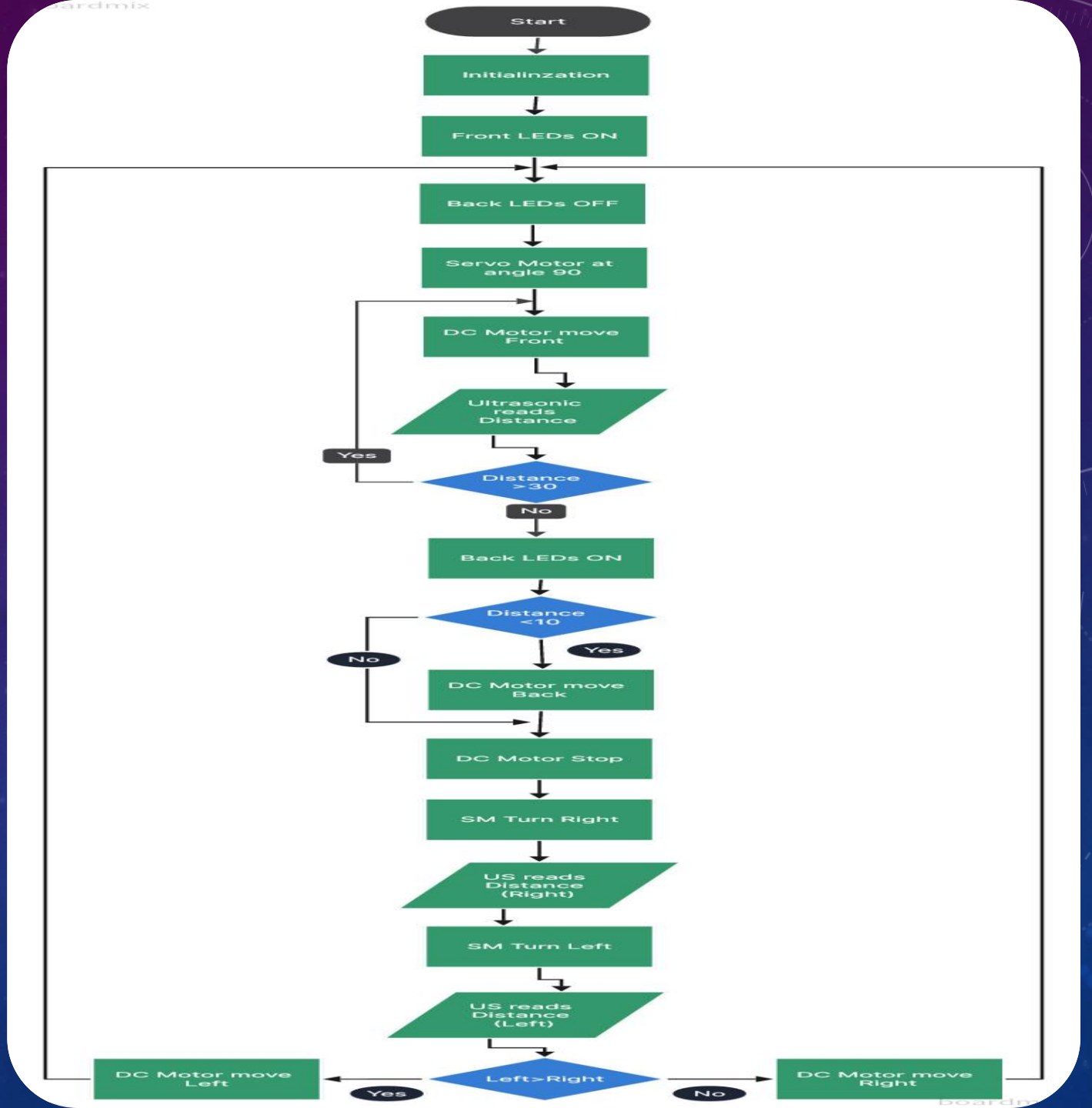

Application
Autonomous Car
main
HAL
LED
LCD
Buzzer
Ultrasonic Sensor
H-Bridge
Servo Motor
MCAL
DIO
Timer 0
Timer 1
Interrupt
Common
MCU
Macro
STD-Type

Code Overview :

- First of all We make initialization for the system by initialize the front lead and put the servo motor at angle 90° .second, the robot starts to move forward movement as the maximum speed and the ultrasonic sensor is to detect any block in the anonymous car way, and show the distance of any object in front the ultrasonic sensor at the LCD by cm, when the anonymous car see a block in front of the ultrasonic sensor when the distance between the car and the is less than 30cm, the servo start to move from 0° and 180° to see the right path and the left path if right has a distance between the car and the blocks more than the left. The car will turn right with one second(this is the time to make a car turn right or left and to be in line again). If the block is less than 10 cm the car will move backward with lead is blinking and buzzer is on, until the distance will be 30 cm then moved to right or left and this is dependent.

Flowchart

Here



Thanks
Amit

Links :

- Code in GitHub
- Code in Drive
- Video in Drive
- Flowchart in Drive
- ATmega32 Datasheet

THANKS ...