



Team 45 Project Report

Members:

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Brief description and Components:

Our project is a car with 3 features:

- Lane keep Assist
- Control indicators
- Sound system

The lane keep assist insures that the car stays on the lane and gives a visual alert using a led, we used 4 motors, H-bridge and 2 IR sensors in order to control the car motion

Control Indicators are divided into 2 elements:

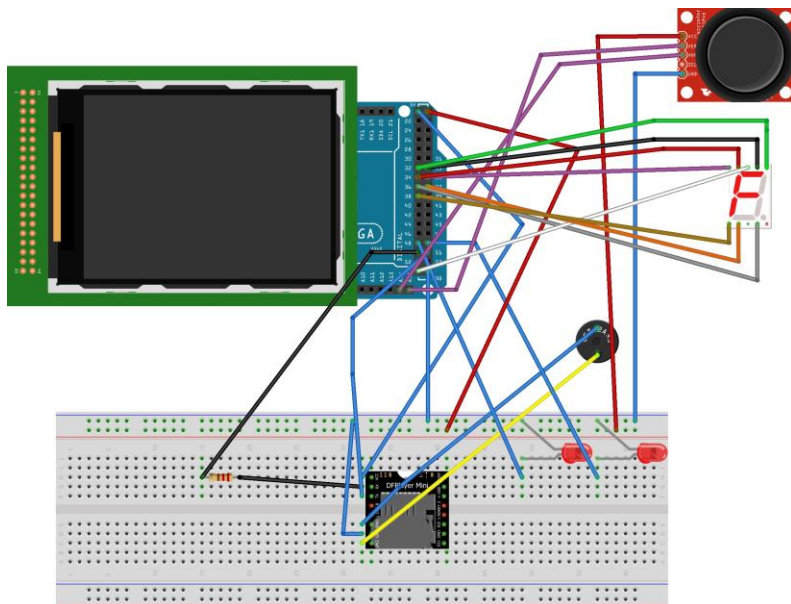
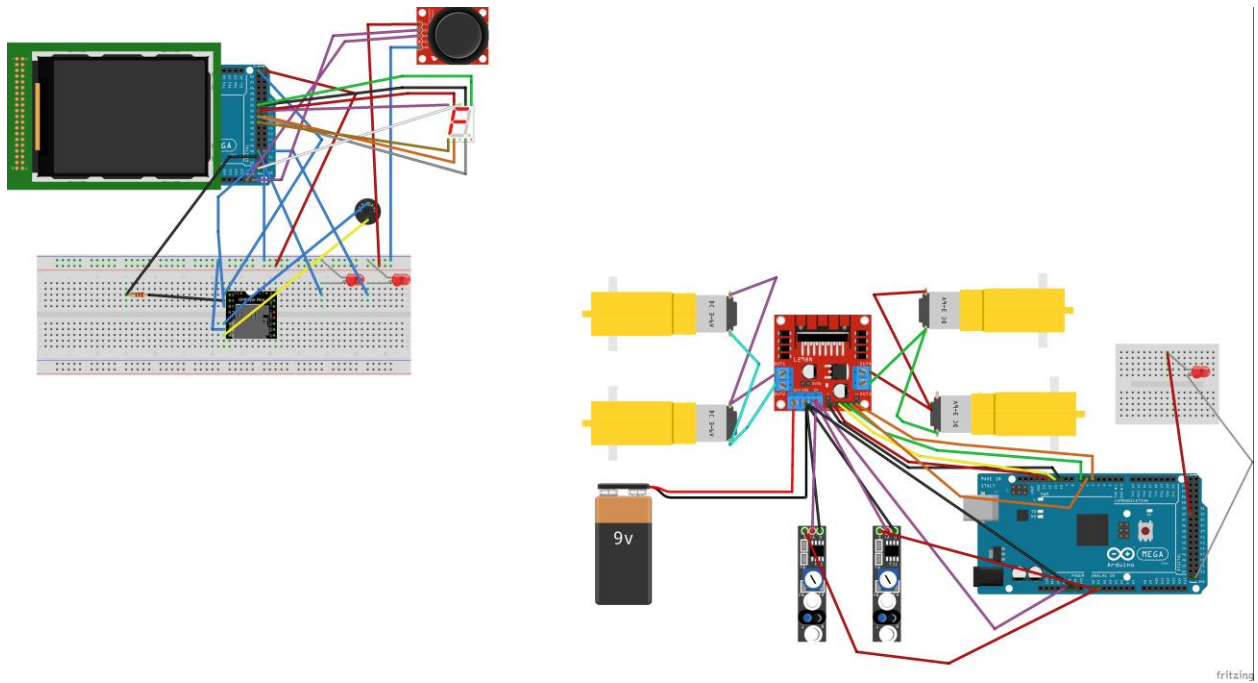
- Gear shifting
- Light detection

Gear shifting was implemented using a joystick that is connected to a 7 segment display to indicate the state of the car (P,D,R,N).

Light detection was implemented using 2 led with 3 different intensities which differs by changing the light intensity detected by the UV sensor.

Sound system was implemented using a 2.4 LCD touch screen that controls the mini mp3 player that generates sound using speakers.

Fritzing:



Output:

Lane keep assist: Depending on the input of the 2 IR sensors, we used 6 pwm pins (2 enable pins) as an output from the Arduino to the H-bridge, If the car needs to move right the output will be 1,0,0,1,1,1 from pins 12,11,7,6,10,5 , If the car needs to move left the output 0,1,1,0,1,1 from pins 12,11,7,6,10,5 and if the car needs to move forward the output will be 1,0,1,0,1,1 from pins 12,11,7,6,10,5.

Sound system: We use 2 pins to communicate with DFPlayer Mini 50,51. If the user chooses play song button then “player.start()” will be called. If the user chooses next button then “player.next()” will be called. If the user chooses previous button then “player.previous()” will be called. Finally, If the user chooses pause then “player.pause()” will be called.

Light intensity: Depending on the intensity if the light intensity is too low, then pin 48 and 49 will be set to high and if the light intensity is too high pin 48 and 49 will be set to low and if the light intensity is in between pin 48 will be set to high and 49 will be set to low.

Gear shifting: 7 pins are used as an output from the Arduino to the 7 segment display pin 33,32,36,37,38,34,35. if the values provided from A14 between 0 and 50 and the value provided from A15 between 450 and 550 the output will be (high, high, low, low, high, high, high) from pins 33,32,36,37,38,34,35, if the values provided from A14 between 950 and 1023 and the value provided from A15 between 450 and 550 the output will be (high, high, high, high, high, high, low) from pins 33,32,36,37,38,34,35. if the values provided from A15 between 0 and 50 and the value provided from A14 between 450 and 550 the output will be (high, high, high, low, high, high, low) from pins 33,32,36,37,38,34,35. if the values provided from A15 between 950 and 1023 and the value provided from A14 between 450 and 550 the output will be (high, high, high, low, high, high, high) from pins 33,32,36,37,38,34,35.

FreeRTOS :

Created 2 tasks, one for processing the screen and sound with priority 1, and the other for processing lights and control indicators with priority 2, the second Task has a higher priority because it's more important to control the gears and the lights that may lead to a catastrophic while the other task was to play music which is not as important as task 1.

Limitations:

- The system required a lot of batteries that are consumed so fast, to operate the 4 motors ,The car and those batteries cannot be recharged
- Running out of pins on Arduino because all of them were taken by the 2.4 TFT LCD so we used 2 Arduino mega boards to overcome this problem

Tasks:

- Youssef Alaa : Lane keep assist (hardware) and RTOS
- Mohamed Yehia : Lane keep assist (code) and light intensity
- Yousef Magdy : Gear shifting
- Mostafa Mohamed : Sound System