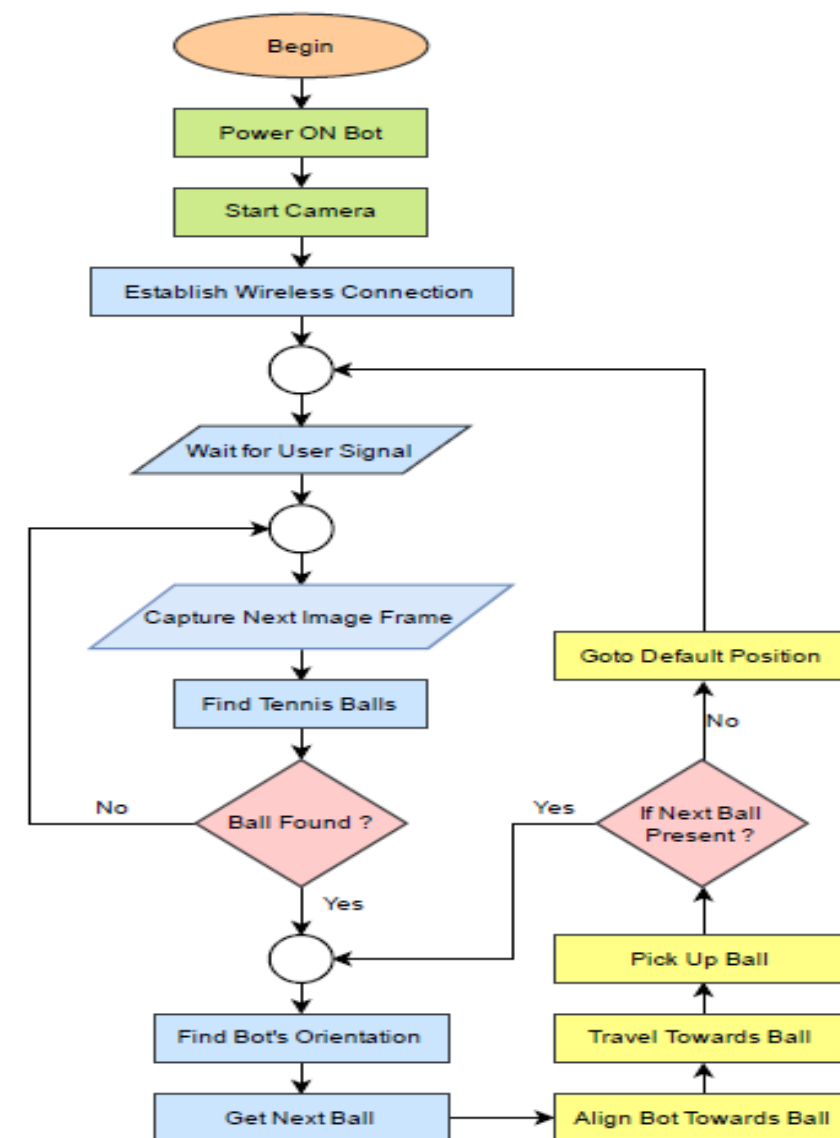
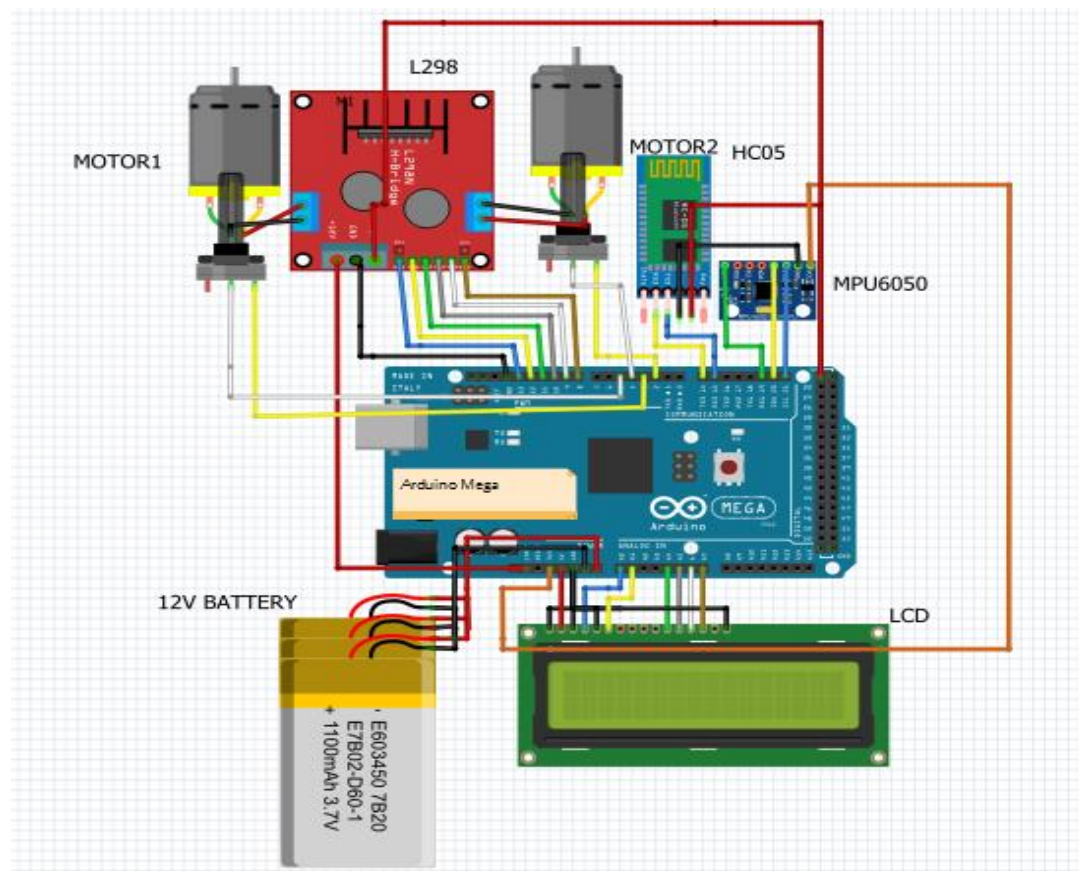
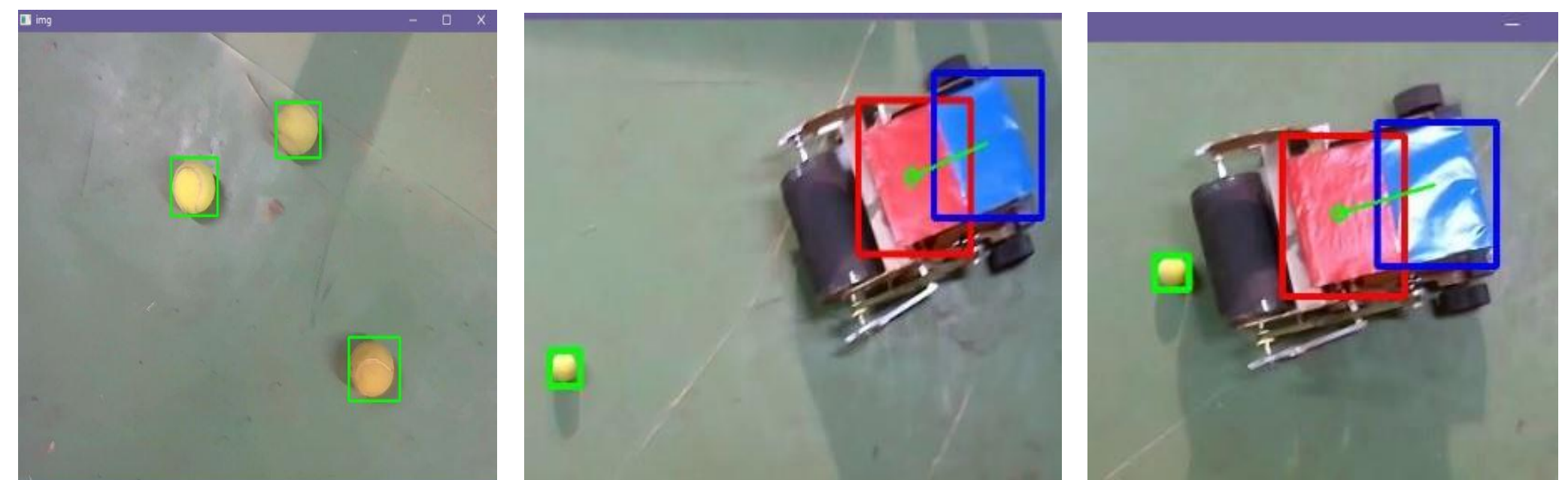


AN AUTONOMOUS TENNIS BALL PICKING ROBOT

PROCESS FLOW DIAGRAM :



RESULTS:



OBSERVATIONS :

- At the beginning, the number of balls present in the frame of image will be detected as well the orientation of bot will be detected simultaneously.
- One of the ball from the detected balls will be selected at random. The bot will then orient itself towards selected ball and it will be instructed to go forward.
- The moment it inches closer to the ball, the roller mechanism would engulf the ball within the basket located inside the robot.

CONCLUSION :

- The project presented a way to detect and pick up tennis balls autonomously with the help of a mobile robot.
- Availability of the robot was improved by implementation of algorithms such as odometry and Haar Cascading for traversal and ball detection respectively.

COMPONENTS :

- STM32 F446RE Nucleo ARM Cortex M4 microcontroller.
- 4480 PPR Rotary Encoder Motor (for odometric control)
- HC-05 Bluetooth Module (for wireless communication between bot and PC)
- Customised Motor Driver logic 3.3 V (for higher current requirement)
- L298N Motor Driver IC
- 16x2 LCD Display (to display information)
- An overhead camera located on the top (to scan the field and will determine the position of the balls if present and to orient the bot towards the selected ball)

THEORY:

- The closed loop system features feedback from wheel encoders by taking into consideration the parameters such as payload, velocity, diameter of wheel and distance between the wheels.
- Implementation of advanced Image Processing techniques to find and trace tennis balls has been showcased using Haar Cascading technique.
- It also involves development of a DC motor driver with n-channel enhancement type MOSFETs for driving the motors.
- A robust mechanical design suited to the requirements facilitates picking the tennis balls off the field.

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