OBJECT DETECTION IN UNKNOWN ARENA

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Problem Statement

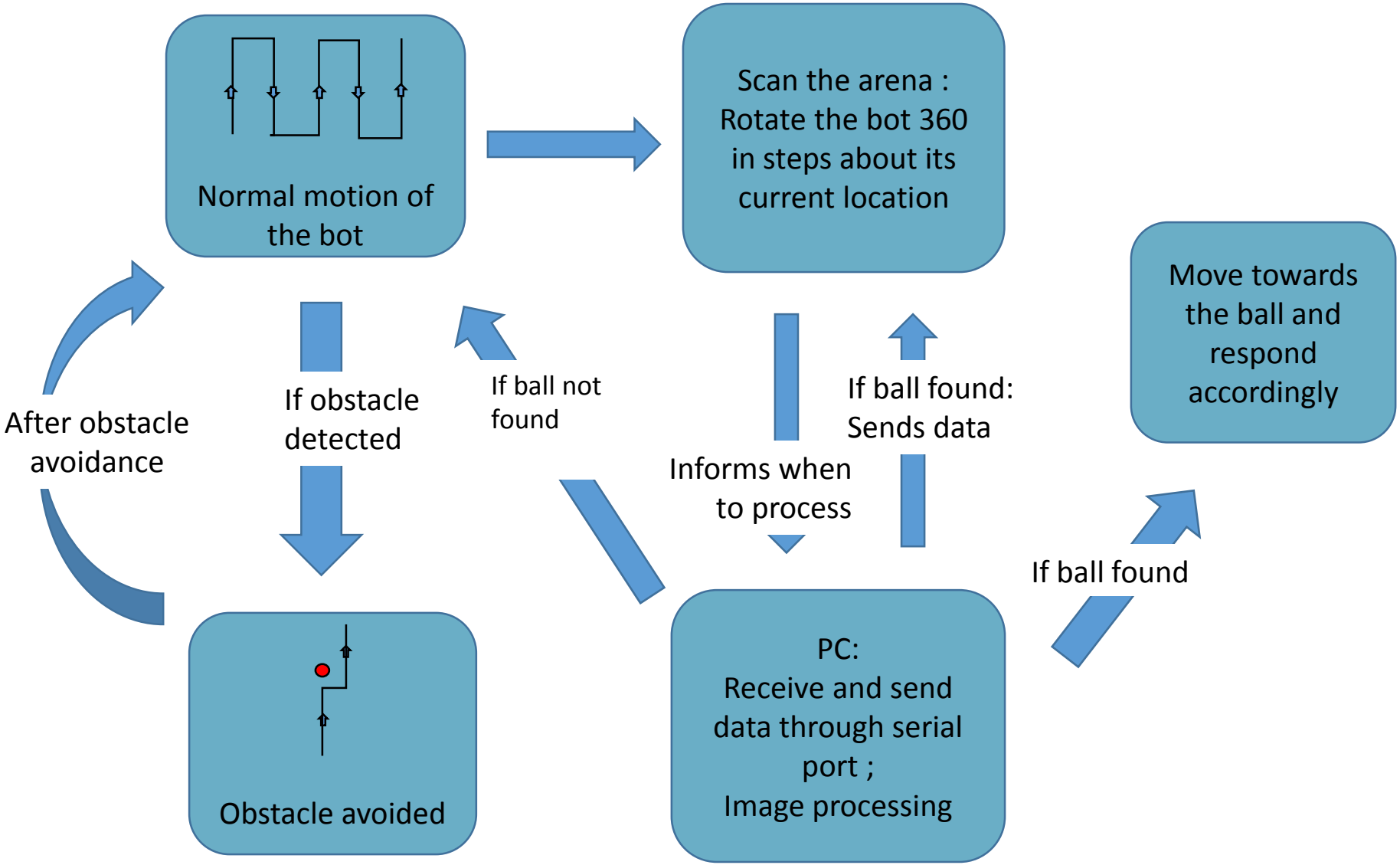
- To make the bot traverse the entire arena such that it will detect the object irrespective of its location in the arena.
- To make the bot avoid all obstacles along its path.
- Establish a wireless communication between the bot and the laptop.
- To obtain a live video feed from the camera placed on the bot and detect the object, and make the bot respond accordingly.

Project Implementation

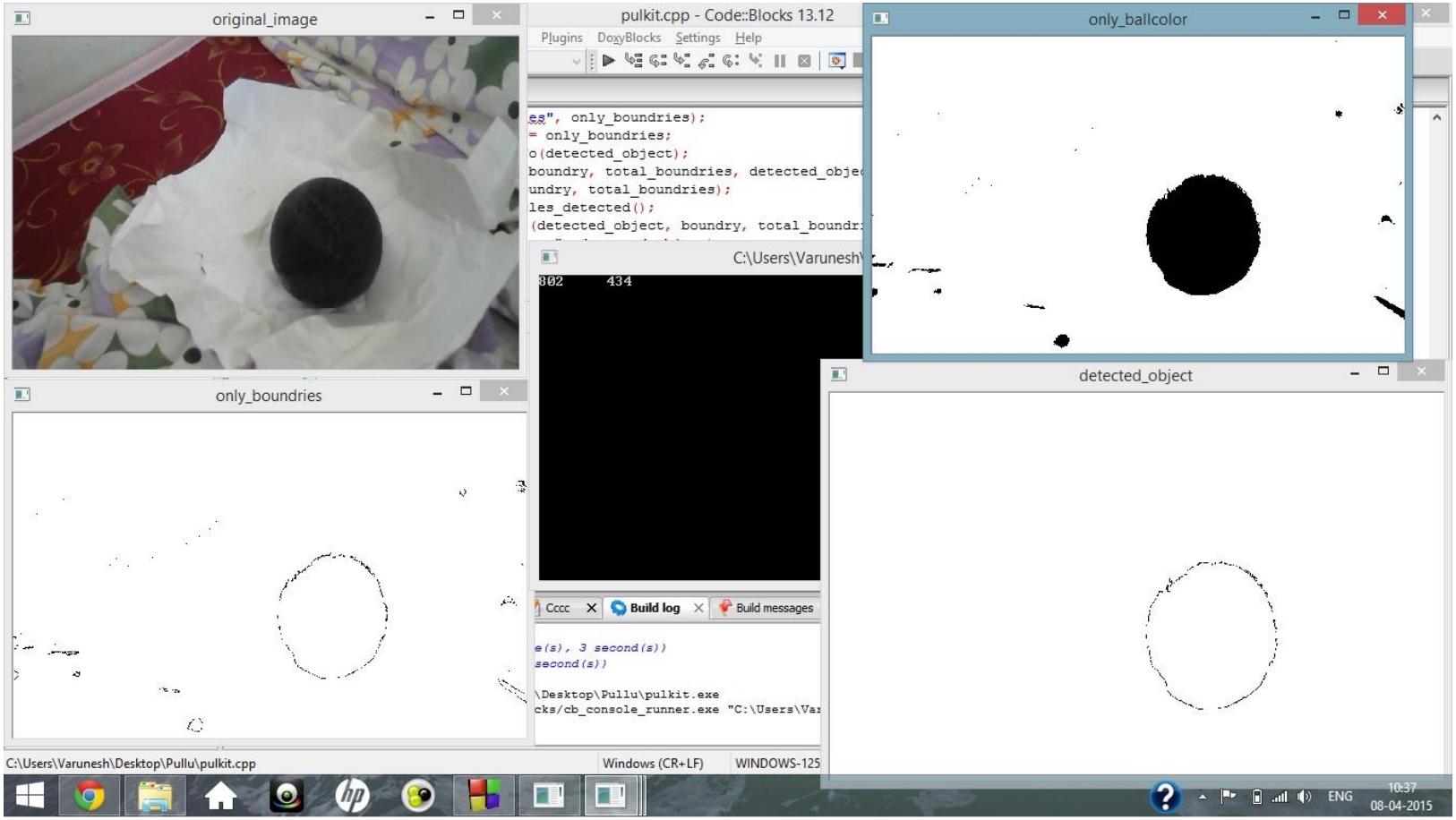
- We have created an algorithm which allows us to traverse the arena systematically.
- Obstacles will be detected with the help of sharp sensors and will be overcome.
- Attempts have been made to accommodate for as many types of obstacles as possible.
- Snapshots of the arena are taken at regular intervals from multiple angles and positions to look for the object using a webcam connected to the laptop.

Project Implementation (contd)

- These snapshots are processed to search for the object with the help of OpenCV.
- The communication between the laptop and the bot will be done with the help of Zigbees.
- Once the object is detected, the bot will receive a command from the laptop. It will stop the detection algorithm and move towards the object.
- Using the distance of the centre of the object from the centre of the camera screen, we will be using an algorithm(most probably PID) to get to the ball and sound a buzzer once it reaches its destination.


Normal motion of the bot
Scan the arena : Rotate the bot 360 in steps about its current location
Move towards the ball and respond accordingly
After obstacle avoidance
If obstacle detected
If ball not found
Informs when to process
If ball found: Sends data
If ball found
Obstacle avoided
PC: Receive and send data through serial port ; Image processing

Project Screenshots



Project Video – Could Not Be Uploaded Check Youtube Links

Challenges

- ZigBee communication between the bot and the laptop has consumed a lot of time, without considerable progress.
- Hardware limitation – The bot does not rotate through the exact angle specified despite several attempts at calibration.
- Image Processing may fail to detect the object in insufficient lighting or due to lack of color difference.
- Integration of Modules

Future Work

- We will integrate the code of image processing with the motion code along with the communication of the ZigBees.
- If time permits, we will graphically display the path that the bot took from the start point to its destination. We are already storing the x-y co-ordinates of the bot.
- The rest of the work should mostly be debugging.

Applications

- The bot can be used to locate a variety of objects in any possible area. This gives it a wide range of applications ranging from locating missing objects to
- It can also be used to search and traverse the terrain inaccessible to humans.
- The bot can be programmed and modified to carry out a number of tasks, after the object is detected.

THANK YOU