Voice Controlled Bot

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PROBLEM STATEMENT

STAGE 1:

The initial step of our project was to have a wireless controlled bot which is aware of its surroundings, i.e. it stops on encountering an obstacle.

STAGE 2 :

In this stage, we have to make our bot voice controlled following basic commands like forward, backward, left, right, etc.

REQUIREMENTS & TASK SPECIFICATION

- We are doing our project on AtMega2560 bot . It has various sensors attached to it for different functions . We are using sensors to detect obstacles.

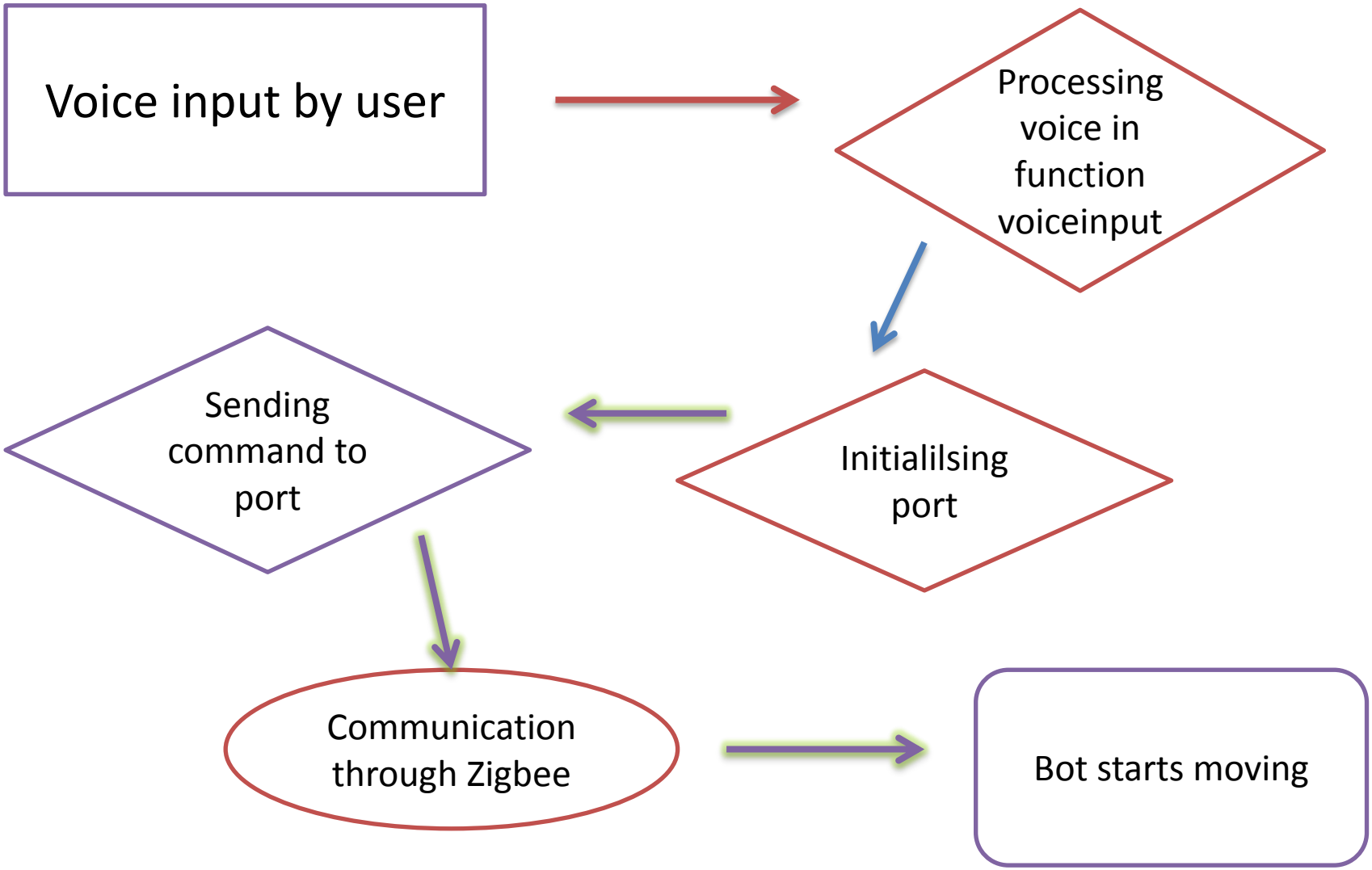
- We are using an X-bee to setup wireless communication .We are giving commands through PC to X-bee which sends it to bot .

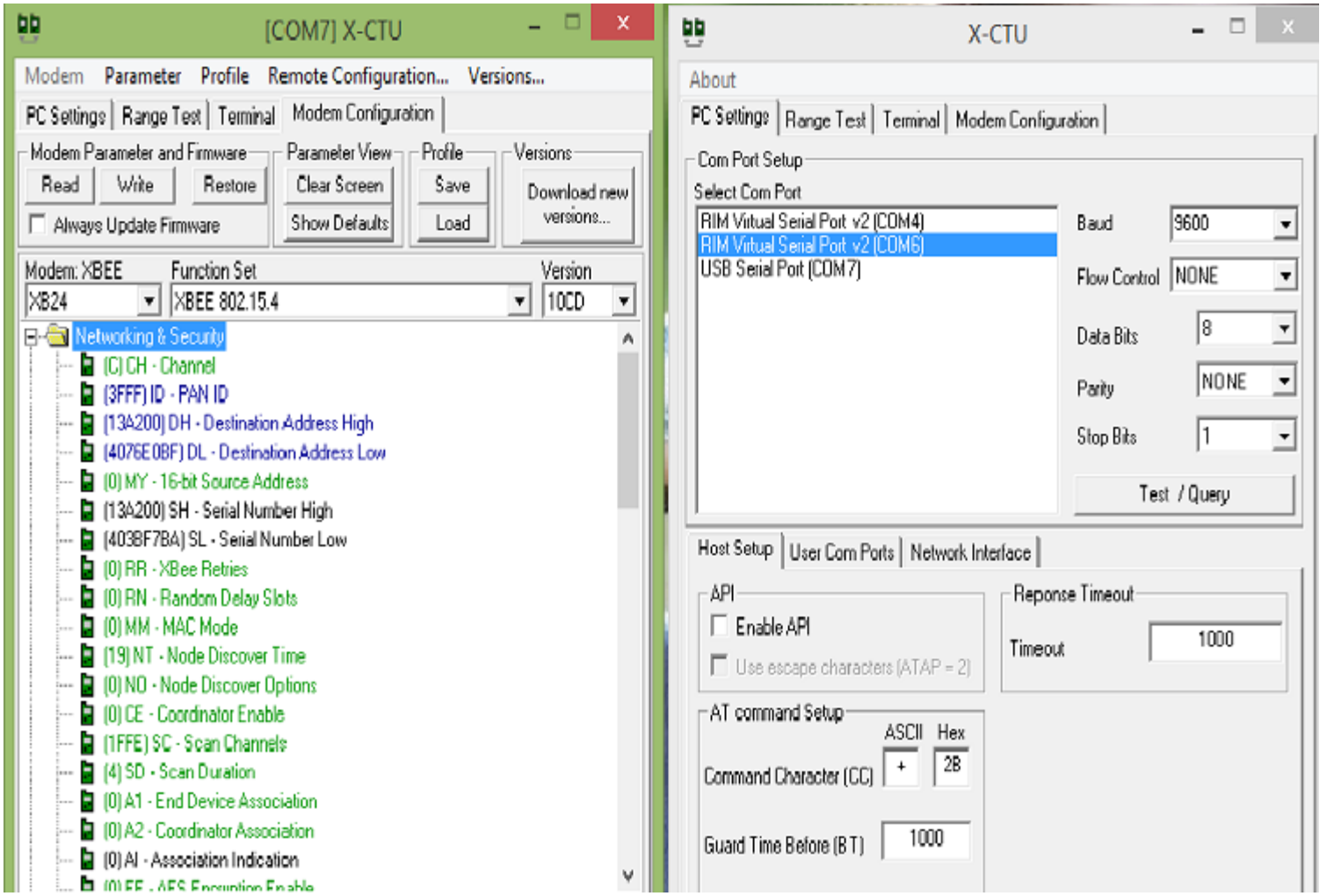
- We are using the sharp sensor attached on the front of bot to detect obstacles .

PROJECT PLAN

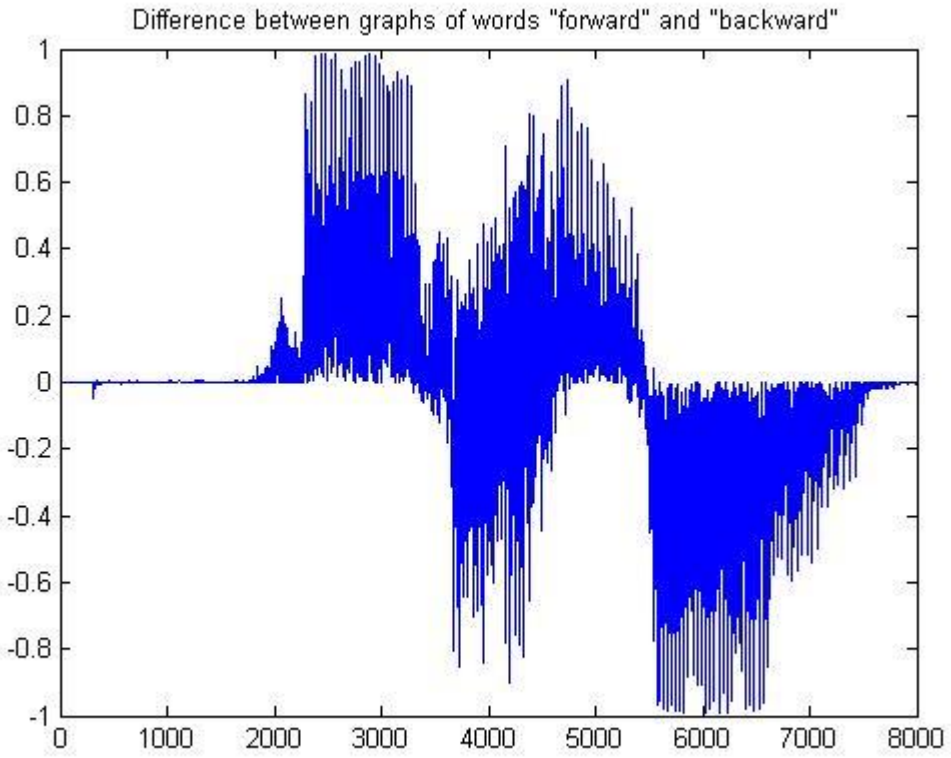
- For the first half of our project we decided to divide in pairs and work accordingly on Matlab ,Zigbee and programming the bot.After achieving the stage 1, we all worked together on voice processing and serial port communtication.
- Due to this division criteria our tasks were achieved on right time.
- The critical situations in our project were processing voice, and serial port communication.

FLOW OF CONTROL





PORT CONFIGURATION FOR ZIGBEE



GRAPH PLOTTED FOR DIFFERENCE IN FORWARD AND BACKWARD COMMAND

INNOVATION & CHALLENGE

- We used simple Matlab commands to compare given commands with already stored sample commands using graph plotting and subtraction to control our bot using user's voice.

- Our first challenge was to setup X-bee to set wireless communication between bot and laptop.

- One of the biggest challenges was to write the compare functions to compare the commands given and process the output.

- Next challenge was to setup connection between the bot and Matlab software.

TASKS COMPLETED

- Using X-bee to setup wireless communication between laptop and bot. The challenge was to configure X-bee to setup the communication . This was done by using a sister X-bee and configuring together.

- Writing basic codes for motion of the bot like forward , backward , etc and also writing code for obstacle detection.

- Integrating the functions for stopping on seeing an obstacle and basic motion controls . The problem was to combine the static and dynamic functions. It was finally sorted out finally by checking the distance before every command.

TASKS COMPLETED

- Writing basic Matlab functions to record and take input and compare various voice input . The challenge was to get a basic understanding of Matlab software as we were using it for the first time . We watched various online tutorials to get used to the software .
- Sending data from desktop to bot using Matlab . This again caused problems due to being unfamiliar with the software .

TESTING

The testing criteria for the first stage of the project is by controlling the bot using keys assigned keys for forward(8),backward(2),left(4),right(6),stop (5),buzzer on(7),off(9),soft left(1), and soft right(3).Also , the bot stops and beeps on encountering an obstacle in front of it.

The criteria for the second stage is controlling the bot using the same with vocal commands. Since our bot is directed towards use by a single person , it will follow the commands of a particular person whose voice is stored in the system . The bot should again follow the basic commands and also stop on encountering an obstacle in front .

PERFORMANCE METRICS

- As we have done voice processing using simple low pass filter using windowing method,so the noise disturbance while giving command does not yield cent percent accurate results.

Re-usability Features

- We have programmed the bot to be run in a voice controlled environment which can be further re-used , adding various new hardware for various features like grab and pick , carry etc.

- The code used for voice detection can be used as a base for further enhancements to refine the voice recognition feature.

FUTURE ENHANCEMENTS

- Our basic aim while doing this project was to make a bot that can help the handicapped and physically impaired in their day to day activities . The bot is able to do movement according to commands given and by using various hardware parts like gripper , servo motors , etc we can help them in transporting objects and following their other commands as and when required.

- Another application can be in resque operations in case of calamaties like earthquakes when the bot , equipped with a camera can be used as an asset to find people in debris.

THANK YOU