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NATIONAL INSTITUTE OF BUSINESS MANAGEMENT

HIGHER NATIONAL DIPLOMA IN SOFTWARE ENGINEERING

COURSEWORK

Robotics Application Development

Pet Robot

SUBMITTED BY

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Contents

1. Problem Definition

The proposed robotics application is a smart pet robot with following functions.

- Performs walking, sitting, tilting the head, wagging the tail
- Follows the user
- Shows emotions

The functions are planned to control using a mobile phone, optionally a hand gesture-controlled system is also planned to implement if possible.

Purpose of implementing a pet robot is to replicate the traditional pet with an automated pet in order to provide the owner with companionship, entertainment and convenience with certain limitations.

Basic requirements which are expected from the pet robot is to perform following activities.

- Perform functions mentioned in above
- Display emotions with the aid of an LED panel
- Responds to the user commands from a mobile phone or hand gestures

As per the above problem definition, it is clear that the proposed pet robot will assist the user with its owned functions to replace a traditional pet with a robot instead.

2. Researching and Designing

2.1 Researching

According to the proposed robot, the main focus of the implementation is given to its movements and emotion display. The following electronic components are needed to build the pet robot to function as expected.

01. Chassy

- As the body of the robot to mount all the components.

02. Servo Motors

- Facilitates to implement movement processes such as walking, sitting, tilting the head, wagging the tail

03. Sensors

- Ultra sonic sensors are used to prevent the robot from hitting the obstacles as it detect the object.
- Infrared sensors are used to implement user following functionality.

04. Arduino Board

- Considered as the brain of the robot as it is responsible to grab the inputs and control output using selected components

05. Breadboard

- Used to connect components together in the circuit

06. LED panel

- Used to display the relevant emotions of the robot

07. Lithium Iron battery

- It is the power source for the robot

08. Motor Shield

- Used to control multiple servo motors in the robot

09. Buzzers

- This component is used to get audio output from the robot

10. Switches

- Used to power On and power off the robot

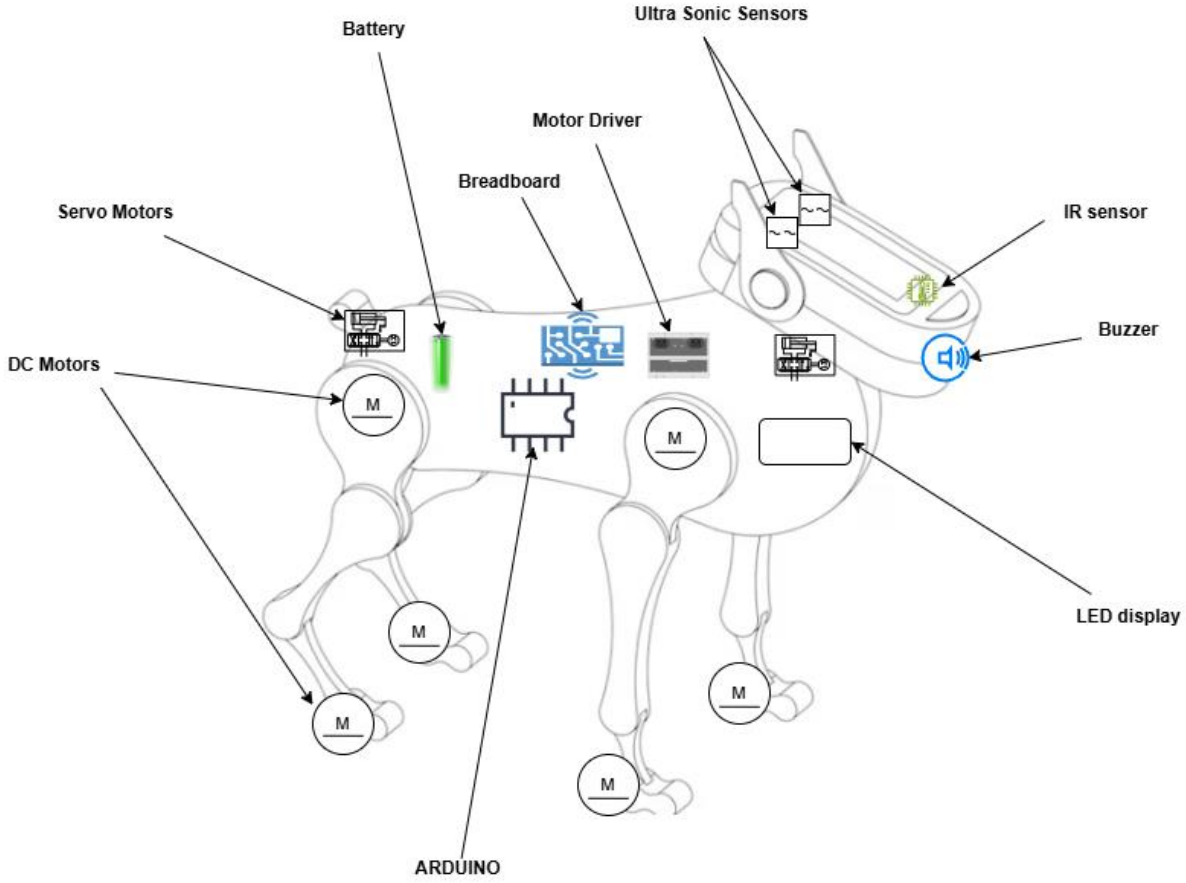
11. Wires and Connectors

- Used to connect each and every component together.

Apart from above devices more tools and materials are needed to design the external appearance and fix the model as designed. Those will be mentioned in the fourth chapter.

2.2 Designing

Following is an sketch of the pet robot to display where the certain components are added.



3. Build the Robot

To build the robot, the following tools, components and equipment are needed. They are listed as a bill of materials.

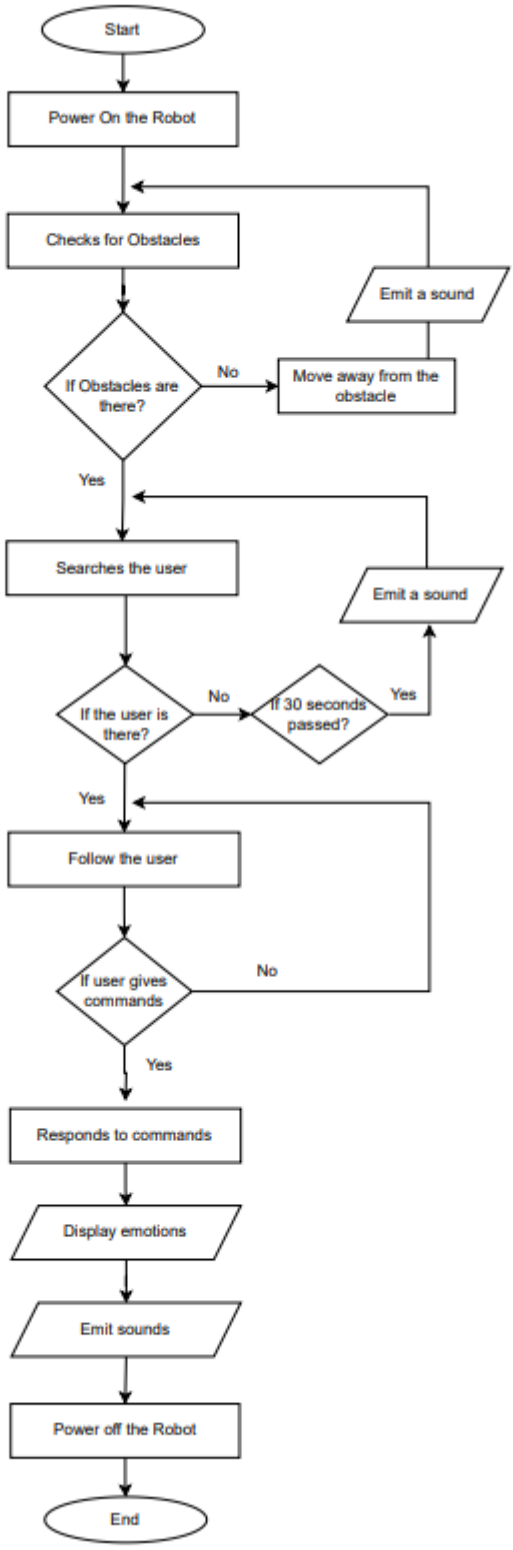
Component	Quantity	Amount (Rs)	Total(Rs)
Chassy	01	2000	2000
Servo Motors	06	390	2340
IR Sensor	01	190	190
Ultra Sonic Sensor	01	250	250
Arduino Uno	01	2250	2250
Jumper Cables (male to male)	01 pack	380	380
Jumper Cables (female to female)	01 pack	270	270
Jumper Cables (male to female)	01 pack	270	270
Lithium Iron battery (3500mah)	690	08	5520
Motor shield	01	550	550
Buzzers	01	80	80
Switch Set	05	50	100
Breadboard	01	290	290
Dot board	01	130	130
Charging case	01	240	240
Glue Sticks	06	40	240
Glue Gun	01	720	720
Nuts	As requires	100	100
Soldering Iron	01	790	790

Scissor	01	150	150
Glue (normal)	01	115	115
Bristol Board	01	55	55
Super Glue	01	95	95
Paper Cutter	01	200	200
Other		200	200

Total Amount : Rs 17525.00

4. Programming

According to the proposed project, the process of the robot can be displayed using a flow chart as follows.



5. Evaluating the robot

5.1 Results of the operation

Once the robot is implemented and ready to work, it will start to work according to user commands.

The user can command to perform actions such as sit, walk, run, stop and while the operation happens, if any obstacle is detected it will stop automatically while emitting a sound.

Additionally, the robot will also display emotions according to received commands and for some external effects. They can be low power or no command for relevant time period.

5.2 Limitation

As for the limitations of the project, the following can be considered.

- Some output and action errors may occur as the sensors may not work perfectly.
- The robot will only trigger relevant user commands because it is designed to perform only certain tasks.
- Hardware may wear out with time and regular maintenance and fixes are required.
- The initial cost for implementing a robot is high.
- Battery life will be stored for a small time period and it is needed to recharge.
- As the limited storage of certain components cannot store large amounts of data.
- The robot cannot locomote across uneven surfaces smoothly.
- High and low temperatures will affect certain functionalities of components.
- Overtime usage may heat the system and cause failures.

5.3 Recommendation

As the future recommendations,

- Artificial intelligence can be applied to identify environmental changes and advance performance
- Can implement the robot to understand and identify selected users voice and emotions to provide more likely pet feeling using biometric sensors.
- Allow to respond to virtual assistants such as Alexa
- Implement data security measures.
- Enhance the design which is eco-friendly to prevent harm to environment.

In conclusion, the proposed project will act as a pet instead of a traditional pet in order to the need of owner for their ease of use.