SOFTWARE ENGINEERING PRINCIPLE

PERSONAL ASSISTANT ROBOT

ASSIGNMENT 1.2 INTERVIEW PROGRESS

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1. What is the concept of the project?
   The project is to create a robot (rover) to send it to a fixed point, destination to lift an object or load and to come back to its commander to give it to him. It should be used for the replacement of the human physical work and resemble human activities.
2. What are the features to be involved in it?
   The rover should do its commanders commands through voice, it should point the objects or to see it. It should also be able to speak back or respond.
3. How many modes of operation to be incorporated?
   It should be operated in two ways, one is the manual operation, to control the rover end to end by the commander through the mobile application and by the voice commands and the second way is to be automatic. The commander will just give the end destination and it should do everything else for him by itself.
4. What is the duration of the project?
   The duration of the project is going to be six months.
5. What will the cost of it?
   The funding is totally split into different ways, one is the actual cost for the rover itself and the other one is making cost. For the prototype it will be around $2000 and for the making cost it will be separate which will be based on the number of people working on the project and will be paid for the number of hours they are worked for it.
6. How will be the control implemented?
   The users should have a user-friendly mobile application, with which they can control the rover either manually or automatically by giving their choice into it. And another mode of control is going to be by the voice commands.
7. Is there any limitation for the components to be used in the project?
   No limitations for the components to be used. If the rover demands any part or component to meet the objective, we could go for it.
8. What type of power supply to be given?
   The power supply for the rover is the Direct Current (DC).
9. Will that be a wired or wireless?
   The rover is totally wireless. It should be communicated wirelessly.
10. Can the robot power supply, be rechargeable?
    Yes, we need to use rechargeable high-power, long lasting DC batteries for the project.
11. What will be the size of the robot?

The size of the robot should be in a reasonable level with which it has to carry its own weight, components, batteries and the circuit. And on top of it should also carry the commander's object for which it has been sent for. So, keeping in mind all of these notes, the size of the rover should be.

12. Where will the robot be made to work? (Indoor or outdoor)
    So, for now, we as the clients want you guys to develop it for the household purpose, since the name of the project says it's a personal assistant robot.
13. What sort of personal assistance to be undertaken by the robot?
    If the user sets a destination to go to, it should and carry the object that he points to and bring it back to him. And then it should understand the voice commands and it should also want to respond to the voice commands if needed. And it should also have the ability to play songs.
14. What will be the load acted on the robot?
    It should withstand 300gm in motion apart from its original weight.
15. What should be the speed of the robot?
    The speed of the robot should be in the range of 1.5 to 2kmph.
16. Will the users be able to control the motion of the robot?
    Yes, they should have the access to control the motion of the robot via mobile by typing or touching something and also by the voice commands.
17. Will the resources will be provided?
    No, we will be providing only the funds and all sort of resources are up to you guys.
18. How long should the robot's power should last?
    It should at least withstand for one full day.
19. How frequent the robot will be used?
    It will be used most frequently based on the users and based on the need for it.
20. Should it involve all the real actions of the human being?
    Not all the actions but it should be able to understand the voice commands, it should respond for the commands and should also play some songs, it should able to identify the objects that the users pointing to, it should move around without hitting itself or others.
21. If there a robotic arm available, how many axes should be incurred?
    Yes, robotic arm is available and the number of axes should be any number so that it should move freely and lift the object.
22. What type of end effector or finger of the robot should be used?
    End effector such that it could lift something with area of 10cm*8cm.
23. What should be the holding or lifting torque of the end effector?
    End effector such that it could lift something with 100 to 300gm.
24. Should the motion of the arm be pre-programmed or to be let to the commander?
    The motion of the arm is let to the users, such that they could control it via mobile application or through the voice commands.
25. Should the end location or the destination of the robot be hard coded or pointed out at the run time?

All the locations should be a fixed point only. So that if I point the pre fixed location, it can go and pick it up for the user.

26. Should the path carried by the robot be pre-programmed or decided at the point of operation?
    The path of the robot should be known to it already, so that it knows which direction to take while moving by itself.
27. Are we involving the speech back operation to the robot?
    Yes, we are involving the speech back operation.
28. What are the speech instructions will be given by the robot to the users?
    Yes, it should answer some simple questions put towards it by the user and it should also have the option to play a song.
29. Are we controlling the volume of the robot's speech?
    Yes, it should be controlled by the users manually at some time if needed.
30. Will there be a transmitter and a receiver part?
    Yes, we are making the project totally wireless so it is going to involve the transceiver part.
31. Will there be some space available on the robot?
    Yes, it should have enough space on top of it, so that it can hold the object on top of it.
32. What will be the commands to control the robot by the users?
    The voice commands are going to be just the simple ones to control the movement of the robot front, back, left, right, stop, play a song, and some simple questions to it.
33. Will the robot be portable?
    Yes, it should be made portable so that if needed the users will carry to some other places and can make it work there.
34. What kind of tyres be used for the robot?
    The type of the tyres doesn't matter now, but it should be okay to use in indoor and be capable of moving freely and lifting the loads.
35. How is the chassis of the robot being?
    The chassis of the robot should be nice and neat so that it should have enough room to places all the equipment's meanwhile it should look good and be effective.
36. Are we controlling the robot by the commander's voice?
    This should be the extra option other than the mobile control option.
37. How many commands will be given to the robot via voice?
    There will be roughly 13 to 15 voice commands.
38. What will be the distance between the robot and the commander?
    The distance will be normally one room distance so that the commander can sit at one place and can control it remotely.
39. What if the voice recognition system fails?
    If the voice command fails, still we could able to operate it through the mobile.
40. Are we developing a Printed Circuit Board (PCB) for the design?
    Hence the robot involves lot of circuits and wires, it will be effective and durable if we deploy the PCB.

41. Will the features of the robot be fixed or variable?
    Every feature discussed till the moment should be there and the robot should be developed such a way that it should be improved in the future by adding or minimising the feature.
42. Are we including the obstacle detection sensors to stop the robot itself, when it is about to hit somewhere?
    Yes, we have to install some to avoid accidents from the other objects.
43. Should the robot be fully automated, by including more sensors?
    If needed definitely yes. If that improves the precision then we can install more numbers.
44. Can the robotic arm be controlled by users or fixed movement only?
    It should be controlled by the users only. If it is going to be a fixed motion then we will be lagging in many operations of it. So, we can leave it to the users.
45. Are we including the live streaming cameras to see the robot position or operation?
    Yes, if we install that feature, we could keep track of the robot where it is and what does that do.
46. Should the streaming have done only in particular device or in server?
    The streaming should be loaded into the server so that it could be tracked in any device in the home.
47. When we point a destination for the robot to reach, are we telling the robot to come back our self, or it should come back itself after sometime to us where we are?
    Once when the robot reaches the destination and done with its job there, it should stand still until the commander gives the command to come back to its previous location.
48. For telling the path to the robot, are we including the line following technique to the project or are we using cameras?
    Either of the technique will do, but it should be efficient to reach the destination.
49. If we are using cameras for the image processing, should it be stand still or are we including the pan and tilt mode to make it simple to identify the objects?
    We can use the pan and tilt to make it more precise detection of the objects.
50. Should the end destinations of the robot be a fixed number or countless?
    The end destinations of the robot should be a fixed number. We don't need the countless destinations for now.
51. For recognising the voice commands, the voice recognition modules should be used, so do you need it as a separate part apart from the robot on the hands of the user or it should be placed over the robot only?
    If the voice recognition module is placed on the robot, the size and weight of the robot will be increased and on top of it, the robot is going to be in motion so, it will be bit weird if the recognition system is placed on the robot. It is better to make it as a separate part and give to the user when they want to use it. That will be more efficient way.

52. There will be multiple ways to control the robot, so are we blocking the access of one feature when the other is in the use or all the features of control will be working all the time?
    All the users will be having the mobile phone with them, so it will be better to make the mobile control part a superior one to other features of control, and the control feature should also be controlled by the user through the mobile. When the user feels to give other feature of control to take the action he could, or else he can lock it. So, all the control feature is based on the user's mobile control.
53. What should happen, when the battery running out and the operation still in process?
    When the operation that it is supposed to do and when the battery is running out, then the robot when it recognises the low battery level then it should hold or send the current running process to the temporary memory and the robot should return back to its home location or the user and indicate the battery level in the display or in a LED. And when the battery is charged and the robot is ready to run, it should perform first the operation that it made as a hold or in the temporary memory, and then it should come back to its normal operation mode.
54. What will happen to the robot if it is moving out of the communication range?
    While the robot goes to the range out of control, there should be a separate observer in the system and when detects the out of range, it should start storing the path of the robot motion after the range is exceeded and then it should perform the reverse operation of the path stored in the memory to bring it back to the users control. By this way it will never go out of the range leaving the user.
55. How about the designing part, how are we covering the entire portion of the robot and the transmitter?
    The designing part and the covering of the other parts should be done in 3D printing. With the help of 3D models, we can create fancy designs for the look and the appearance to be aesthetic and this way it makes it cheaper for the designing and it could also be replaced with the other designs too if needed.
56. When we done with the development are, we including a special chip into our design to make it work specifically for this particular task or will we be using the same processors for the other purposes or alternatives?
    Once when this design is totally complete, this application is going to perform this particular task only for which it meant for. So, by adding the Application Specific Integrated Chip into our design if it adds any value to our project, we can definitely add that chip in our project.
57. What should be the duration or running period of the robot, and the wear and tear?
    When this design is bought by the user, he should able to reuse and make it run 100% roughly 4 years. Even by making the lifetime longer, that will add more value to our project.