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Humanoid Robot as Receptionist in Institutes

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Abstract: *A dream of a humanoid robot receptionist is to develop a complete "human-like" agent in terms of brain and body. We now have seen an increasing number of humanoid robots (such as Honda's ASIMO, and many more). The proposed system will demonstrate restricted number of human skills like recognizing the object or person, decision making, and real time perception. In this paper, we propose an intermediate approach for body-brain integration in a form of a humanoid robot, we built a humanoid robot with an upper-body as we power on and signal sends from controller to respected component model start reacting to it and solve user query.*

Key words: Robotic, receptionists, Arduino microcontroller, Embedded Systems

1. INTRODUCTION

A humanoid robot is being established in public sectors including Banks, Airports, and Hospitals. The rise in numbers of individuals who needed psychological support and association pushes a need for Socially Supportive Robotics. Socially Supportive robotics mainly focuses on constructing robots that can promote influential communication with their users. Humanoid robots are being used as analysis tools in various scientific areas. Researchers study the body structure of humans to construct a humanoid robot. Humanoid Robots are now used as research tools in several scientific areas. Researchers study the human body structure to build humanoid robots. On the Opposite side, the plan to simulate the physical body result in a far understanding of it.

Further, this paper is organized as section 2 briefs about the different literature available in this domain. Section 3 gives description about system architecture. Then section 4 explains the operation of system with its simulation based experimentation is explained in section 5 and its hardware implementation is explained in section 6. Later results are explained in section 7 and paper concludes with conclusion in section 8 and future scope in section 9.

2. LITERATURE SURVEY

Nowadays a great revolution has been done in robotics, IoT, automation, and wireless technologies. There are various robots developed by using various technologies.

[1] Nourbakhsh et al. (Naurbakhsh, Bobenage, et al. 1999): Nourbakhsh et al. design and locate, SAGE mobile robot at Carnegie museum of natural history. As shown in below fig [2.1] interaction with visitors through audio and LCD screen and uses a frame of mind to seize visitor. SAGE is completely self-govern and when resist trouble and ask for help. SAGE implement Social capability, reliability, and safety to be an effective member of the museum. SAGE not only have the communication capability but also non-verbal communication is an important part of communication

Fig 2.1 Design of SAGE mobile robot [1]

[2] Cooperative robot Assistance (Iossifidis Theis et al. 2003): An assistance should manifest a high degree of liberty to acquire information about their surroundings. Iossifidis et al. developed CORA that is accommodated on the senses, anatomy of humans, and behavior. CORA is assembling on the table and communicate through hand gesture, speech, mechanical interaction and gaze permit it to obtain the required information about their partner and their environment. CORS's job includes comprising of visual identification of entity presented by its instructor. Recognition of item amongst many, grabbing and hand over the item and execute and convention tasks.

[3] CERO (Huttenrauch, Green, et al. 2004): CERO is an assistance robot construct to assist those who have a physical disability in an environment. During the sequential expansion of CERO analysis interaction

through speech alone was not practical enough. After observation communication wasn't productive. To conquer this trouble, the humanoid body assembles in front of CERO that it can move harm and head as shown in fig [1].

[4] Sidner and Lee (Sidner and Lee 2005): Sidner and Lee show that interacting with the robot not only through gesture but also communicate through the behavior of their human partner for better communication. Their robot MEL, is a structure like a penguin as below in fig [4] interact with the visitor through vision and speech recognition for better communication. MEL points the item in the experiment, scans the direction of the instructor to establish instruction given by them, and looks at instructor to acknowledge their presence. MEL is a good example of the channel of communication, with clear gestures and speech, which is used for duplex communication.

Similarly different ideas related to presented work in this paper is also found in [5], [6], [7] & [8]. The methods mentioned in [9] & [10] has helped to motivate the proposed idea about information sharing technique. Also the hardware related inputs from [11], [12], [13] has helped to develop the proposed system. As compared to these references, proposed idea in this paper is unique with respect to salutation application, hand gestures and system architecture used. Overall, this humanoid receptionist will try to reply to all the questions being asked to it. Further technical details is discussed in system architecture.

3. SYSTEM ARCHITEURE

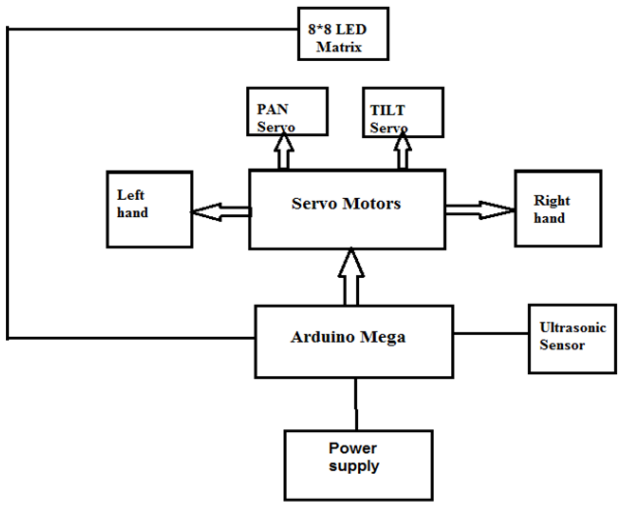

Fig 3.1 System architecture

As power on person detects with the help of an ultrasonic sensor, Arduino mega is the main controller of the robot, the controller gives control action as an output to all servo motors, LED matrix, and ultrasonic sensor. After detection of humans, the output of the ultrasonic sensor goes to the controller. Servo motor moves to the left and right hand and rotates in such a degree to make salutation.

4. SYSTEM OPERATION

As the power supply turn on the robot first detects human with the help of an ultrasonic sensor and starts greeting. Greeting includes movement of both hands so for this we used servo motor at the shoulder and at the elbow. Each servo motor rotates at 120 degrees to 270 degrees. A pan-tilt mechanism allows ahead of the robot to be moved through to axes under servo motor control. Pan is turning to left or right, tilt is moved up and down. 8*8 LED matrix is used for the blinking of the eyes of the robot. Arduino Mega is the main controller of the robot, the controller gives control action as an output to all servo motors, ultrasonic sensors, and 8*8 LED matrix. After the detection of humans, the output of the ultrasonic sensor goes to the controller. Servo motor makes the movement of the left and right hand and rotate in such a degree to make salutation. These actions of motors are controlled by Arduino mega.

At the same time eyes of the robot also start blinking which is displayed by using 8*8 LED matrixes. While giving the gestures like nodding, eye blinking, and salutations simultaneously it will say "Welcome, how I may help you". Now if the user has any query then he or she has to enter a key number of query to the answer. For this purpose, we have a predefined set of questions and answers. Here we have set of 10 questions and answers, if users want to ask a question like "where is the E&TC department", then he or she has to enter a key number of that query. After entering a query user can ask a question using a microphone. Question asked by user is get recorded and it will speak out the answer with respect to predefined sets of questions. Microphone and speaker are used for voice. input and output, if the user asks any query which is not predefined then the robot will suggest that go to the student section.

Similar technique can be implemented in Museum to answer the questions asked by tourist regarding that particular monument or historical object kept. This idea can be incorporated in accordance with the method used in [14] & [15]. Hence the scope of this project idea has variety of verticals and horizontals with respect to application domain

5. SIMULATION RESULT

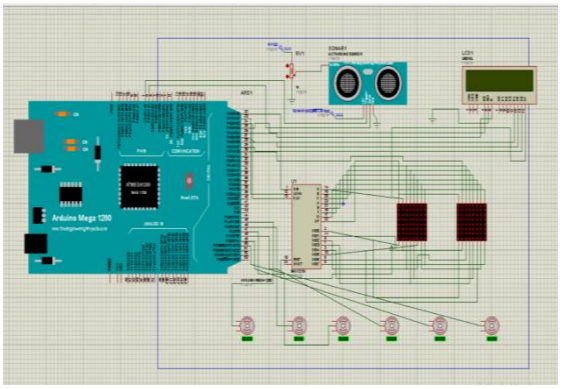

Fig 5.1 Before simulation

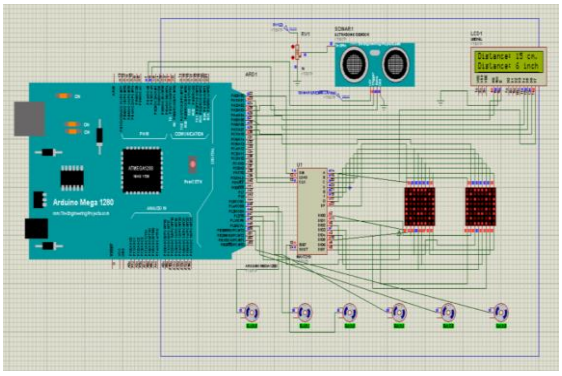

Fig 5.2 After simulation

In a simulation, Arduino mega 1280 is used alongwith 8x8 LED matrix with LED Driver IC MAX7219, PWM servo motor, Pot, LCD of LM016L, and ultrasonic sensor. As the simulation is turned on, ultrasonic sensor detects the distance, the distance range of ultrasonic sensor can be varied with the help of pot and the distance information is sent to the main controller. Arduino Mega 1280 sends an output signal to the LED matrix and servo motor. After receiving the output signal Led matrix starts blinking with the help of the LED Driver, and the motor starts rotating.

6. HARDWARE IMPLEMENTATION

This is a hardware implementation of the robot, in Fig [6.1] robot searching for a person, as person detected with the help of an ultrasonic sensor, it starts blinking eyes and makes the Salutation as shown in Fig [6.2]

Fig 6.1 Searching nearby objects using ultrasonic sensor

Fig 6.2 Salutation after detecting the object

7. RESULT

In this project a humanoid robot is built to solve the user's queries. So here when user asks any question or queries then our robot gives answer to those particular queries which are predefined. For selecting particular query user must enter key assigned to each query. If user's query is not predefined then it will suggest that go to student section. Robot will give proper gestures with the help Arduino Mega, ultrasonic sensor. It means first robot will say welcome, how may I help you with salutation, eyes blinking and head nodding. Thus the synchronous working of servo motors, LED eyes gives the influence of human responding to query asked to receptionist. Hardware implementation completely resembles the software simulation observed using Arduino hardware.

8. CONCLUSION

So humanoid robot is implemented as a receptionist for Institute which interacts with user and reply to the queries asked. Initially set of ten questions were loaded in database and the Humanoid robot responds to it accurately. Implementation of such systems on field reduces overtime of institute's staff. Also now a days most robots working for people in industries, factories, warehouses, and laboratories. Robots are useful in many ways. For instance, it boosts economy because businesses go to be efficient to stay up with the industry competition. Therefore, having robots helps business owners to be competitive, because robots can do jobs better and faster than humans can, e.g. robot can built, assemble a car. Yet robots cannot perform every job; today robots roles include assisting research and industry. Finally, because the technology improves, there'll be new ways to use robots which can bring new hopes and new potentials

9. FUTURE SCOPE

•A robot mounted with camera: Used as part of the compelling reason for using cameras on robots for tasks like autonomous driving. The camera will tell you about really useful photonic information out there within the world.

•Aircraft assembly lines: By using humanoid robots on aircraft assembly lines Airbus looks to alleviate human operators of number of the more laborious and dangerous task.

•A mission control center: This will provide scope in NASA for various control mechanism like ability to send commands, ability to receive the data, voice communication and video communication system.

Similarly, many applications can be built using such Humanoid. Also incorporating Artificial Intelligence, Machine learning, Data Science, Image processing, Cyber Security and Internet of Things into it will definitely make this as a Universal Humanoid responding to all gestures and the inputs from external environment.

10. REFRENCES

1) Nourbakhsh, I. R., J. Bobenage, et al. (1999). Affective mobile robot educator with a full-time job, *Artificial Intelligence*, 114, (1-2), 95-124

2) Ioannis Iossi_dis1, Christoph Theis, Claudia Grote, Christian Faubel, and Gregor Sch¨oner, "Anthropomorphism as a pervasive design concept for a robotic assistant", In Proceedings Of The IEEE/RSJ International Conference On Intelligent Robots And Systems (IROS 2003), 2003.

3) Scott A. Green, Mark Billinghurst, XiaoQi Chena and J. Geoffrey Chasea, "Human-Robot Collaboration: A Literature Review and Augmented Reality Approach in Design", International Journal of Advanced Robotic Systems, ISSN 1729-8806, pp. 1-18, Vol. 5, No. 1 2008.

4) Cadence L Sidner, Christopher Lee, "An Architecture for Engagement in Collaborative Conversations between a Robot and Humans", Mitsubishi Electric Research Laboratories, Dec-2003.

5) Lingling shi, Hiranya Jayakody, Jayantha Katupitiya, "Coordinate control of a Dual-Arm Space Robot", IEEE Robotics and Automation Magazine, Isuue no.4, Volume 25, pp. 76-85, 2018

6) Polychronis Kondaxakis, Khurram Gulzar, Stefan Kinaure, Iasonas Kokkinos, Ville Kyrki, "Robot Guesturinng for Anchoring Representation", IEEE Transactions on Robotics, pp. 1-15, 2018

7) Alessandro Albini, Simone Denei, Giorgio Cannata, "Enabling natural human-robot physical interaction using a robotics skin feedback and a prioritized tasks robot control architecture", 2017 IEEE-RAS 17th International Conference on Humanoid Robotics, pp. 99-106, 2017

8) Laura Steffan, Lukas Kaul, Tamim Asfour, "Online stability estimation based on inertial sensor data for human and humanoid fall preventation" , 2017 IEEE-RAS 17th International Conference on Humanoid Robotics, pp. 171-177.

9) Erik Berger, David Vogt, Nooshin Haji-Ghassemi, "Inferring guidance information in cooperative human-robot tasks", 2013 IEEE-RAS 17th International Conference on Humanoid Robotics, pp. 124-129, 2013

10) Katsu Yamane, Akihiko Murai, "A Cooperative study between Humans and Humanoid Robots", Humanoid Robotics, pp. 1-2-3

11) Parvin S, Shireen S, Pooja K, Prashant T, "IOT Based Reserved Car Parking Slot Using Android Application" International Journal for Research in Applied Science & Engineering Technology (IJSART), ISSN [ONLINE]: 2395-1052, Volume 6 Issue 5 – MAY 2020.

12) Shweta Joshi, Kajal Rathod, Celeste Gudiwada, Mr. Prashant Titare, Dr. D. G. Khairnar, "Motion Based Message Conveyer for Paralytic or Disabled Person", International Journal for Research in Applied Science & Engineering Technology (IJRASET), ISSN: 2321-9653; Volume 8 Issue II Feb 2020.

13) P Titare, DG Khairnar, "Development of Multiprocessor System on chip using Soft core: A

review", International Engineering Research Journal (IERJ), ISSN 2395-1621, pg 390-397, March 2020.

14) Ashmita B, Alka K, Vaishnavi S, Prashant T, "Smart Museum based on IoT", International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056, Volume: 07 Issue: 04, Apr 2020

15) S Behnke, "Humanoid Robots-From Fiction to Reality", Human-Robot Interaction, Issue no. 4, Volume 08, pp. 5-9, 2008