IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 2, March 2023
Impact Factor: 7.301

Humanoid in Robotics

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Abstract: *This research paper contains detailed statistics about the robotic methods and systems. Artificial intelligence is increasing in the marketplace. The market is receiving totally depending on artificial intelligence for responsibility the multifaceted tasks. Robotics is a greatest famous division in the area of manufacturing and sciences. All engineers are taking attention to make a robot. It can do a certain task and can give optimum result for the given task. Every robotic engineer is trying to mark a robot with 0% error but it is not possible at the current technological state. It will give you the correct answer for every question without any error. It uses its database for, how it works and how it senses works. It will be enough for getting good information about robotics and devices along with the system of robots.*

Keywords: Humanoid, Wavelet, Motherboard, Light Deflation

I. INTRODUCTION

Robot is human things which are capable of doing all the work that can human perform but in a much lesser time than a human can take the place of a human. Robots are also a part of artificial intelligence and sensors. It can work semi-automatic or fully automatic in environment. Human like robots are known as humanoid. They can perform task like, talking, walking etc. without any guidance of a human. There are some semi-automated that have remote controllable functions.

Type of Robot: - There are 5 types of robots invented till yet and are in processes. As the Technology is evolving, it will definitely reach a place where machines will replace hominids. So, five types are

- Pre-Programmed Robots
- Humanoid Robots
- Autonomous Robots
- Tele-operated Robots
- Augmenting Robots

1.1 Advantages

- They can perform task without any break. So, it is very cost effective.
- It is made for doing the work and giving the highest standard product that are tough to be found by the human race.
- Robots increases the productivity rate of industry as compare to humans daily working, they have a certain time duration but robots can do work without taking breaks and leaves.
- Everyone can't work at a place with the environment but robots can do effort in any place without caring about the environment.

1.2 Disadvantages

- The biggest disadvantage of robots is that good potential people are getting jobless.
- Very high Investment on the robots for work.
- When you have a robot which is not totally automatic then you need to hire skilled staff for doing operation of the robots

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II. LITERATURE REVIEW

Medith Wooldridge Thring (1964) [16] assumed that around 1984 a robot would be developed. It would take over most household tasks. Such as cleaning the bathroom, scrubbing floors, cleaning the oven, doing laundry, washing dishes, dusting and sweeping, making beds etc.

Bill Gates (2007) [12] said "we may be on the verge of a new era, when the PC will get up from the desktop and allow us to see, hear, touch and manipulate objects in places where we are not physically present."

Sung et al. (2008) [11] represented that most users of a robotic vacuum cleaner has to make changes for their organization of their home. The tidier and less furnished the household is, the easier it is to make use of that robot vacuum cleaner.

Van Oost and Reed (2011) [6] said, when reflecting on deploying care robots must not be directly involve with a person —the entire socio-technical context must also be examined.

Azizi and Howard (2011) [5] described some of the factors that reduce the effectiveness of odometry-based methods and ways of improving their performance using models of the errors and of the vehicle. Floor spots or magnets are an extension of wire guidance which use floor-embedded magnets to localize the AGV at the magnet and correct for odometry errors that accumulate between magnets.

Acuña et al. (2012) [4] developed a path-planning method called dynamic artificial potential fields in which the planner allows the robot to navigate safely in highly dynamic environment even when obstacles move at higher velocities than the mobile robot. The method has been tested only in simulation and claims 100 % better results for the same scenarios than systems that do not incorporate prediction.

Angerer, Pooley, and Aylett (2010) [8]issued the use of a hierarchical multi-agent system for dynamically reconfiguring mobile robots to accomplish a range of variations of tasks in an automobile factory that arise due to customizable feature of individual vehicles.

Digani et al. (2013) [2] defined two-layer architecture. The first layer breaks the work area into sectors and uses a topological search algorithm to find paths from sector to sector. The second layer is responsible for planning paths within each sector and computes the actual trajectories that each vehicle will follow, taking into account conflicts that may occur at intersections.

Hildebrandt et al. (2010) [7] assumes that stock items are equipped with radio frequency identification (RFID) tags and that a set of mobile robots can both localize their own positions in the facility and determine the locations of stock items using the RFID tags.

According to Menegaldo et al. (2009) [10], robot is designed to inspect the outer surfaces of large oil ship hulls and floating production storage and offloading platforms. Magnetic locomotion hover over the hull is provided through magnetic tracks, and the system is controlled by two networked PCs anda set of custom hardware devices to drive motors, video cameras, ultrasound, inertial platform, and other devices.

Mihankhah et al.(1985) [15] for navigating and traversing obstacles (e.g., stairs). These types of robots could provide material handling or mobile manipulation in highly unstructured environments, such as shipyard dry docks, aircraft manufacturing, or other large, small-batch manufacturing projects.

Safsten and Gustavsson (2020) [1], data analysis specific to engineering science can be carried out using three general techniques: thematic analysis, content analysis and a hybrid technique combining various other techniques which are called qualitative data analysis.

Sharkey and Sharkey (2013) [3] also point to the danger of the objectification of care for senior citizens by using care robots. When humanoid learns tasks like feeding and lifting, the recipients may consider themselves as objects. They foresee the possibility that senior citizens may develop the idea that they have less control over their lives if they receive care from care robots compared to just receiving care from human care givers.

Evans (2010) [9] said, a real friendship between robots and humans is impossible, since friendship is conditional. Intimate friendship, therefore, is a kind of paradox: on the onehand, 'we want a friend to be reliable and not to let us down', but when 'we receive complete devotion we lose interest'.

According to Pesante-Santana &Woldstad (2000) [13], quality inspections consist of two main types: Sensory inspections which are performed by a trained human operator using human senses to assess the product's qualitative

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characters and physical inspections which comprises of measuring the quantitative characteristics, performed using measuring device.

According to Juran& Godfrey (1999) [14], generally there are two principles that surround quality control: self-control and self-inspection. Self-control is the process where the inspection operator has the idea of needs to be done and how it needs to be done.

2.1 Objective

- To propose a model for a humanoid face.
- To propose a system vision model for a humanoid.
- To propose a system sound sensing model for a humanoid.
- To propose a system feedback model for a humanoid.

2.2 Proposed Architecture

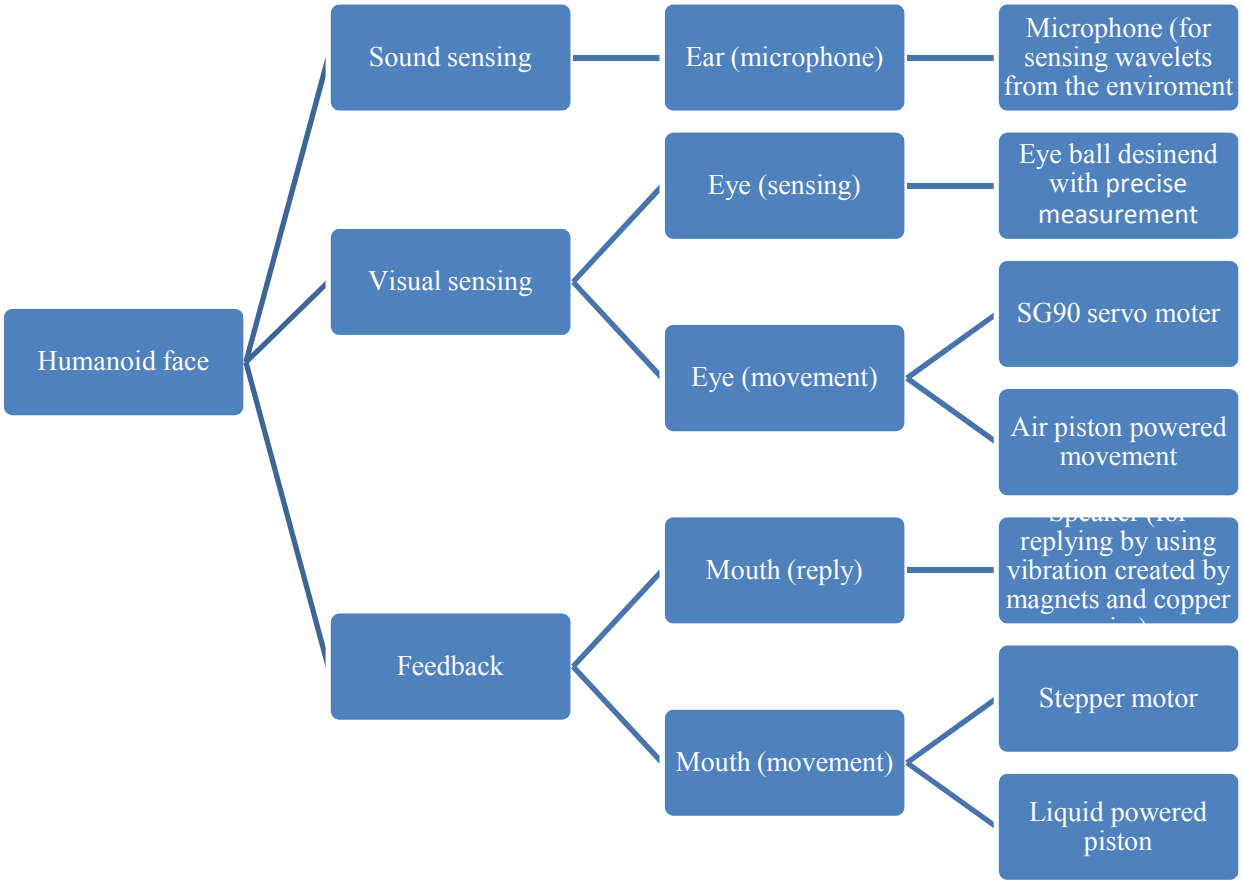

Fig.1. Classification of parts of humanoid face

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Parts of humanoid face:-

- Sound sensing
- Visual sensing
- Feedback

Sound Sensing

Fitting microphone in a simple ear like structure of the humanoid. Microphone will collect the wavelets and transfer it to the motherboard of the humanoid. Motherboard will remove interference, background and any unwanted frequency. And extract the perfect voice of the speaker. Then replace the system voice to clarify. And collect the perfect order of the speaker.

Fig.2. Processing of wavelets for functions

Visual Sensing

- Make eyeballs with the precise measurement as per the theory calculation part, then connecting eyeball to the one end of the bridge and gear like structure (which will provide eyeball up and down movement). After then connecting its one end to the steering wheel like structure (which will provide eyeball left and right movement).
- Using of air powered piston in place of rectums of the human eye. It will give the strength and functioning of the eye.

Due to this connection eyeballs will synchronize and move freely. Camera will collect the light colour combination (image) and transfer it to the motherboard of the humanoid. Motherboard will convert image as per its requirement. Example, while talking with a person his image will get the face details and get the points in between forehead and lock eyeballs in it (so, that it will pretend that the humanoid is interested to his words, which will create a positive expression towards the humanoid).

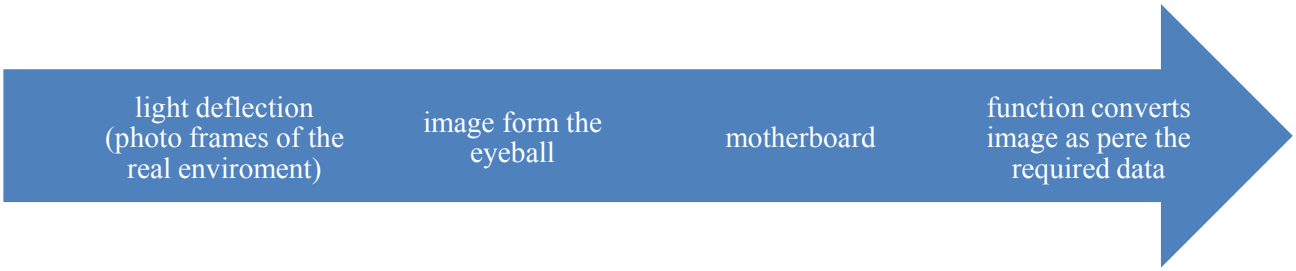

Fig.3. Processing of image for functions

Feedback

- Use speaker and fit it to 3d printed lower jaw of humanoid. And connect lower jaw to the upper jaw with gears and spring.
- Using of liquid powered piston in place of masseter muscles. It will give the strength and pressure for the humanoid.
- By utilizing data, which will be generated by sound sensing and visual sensing. Data is converted into optimal

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output. By extracting background noise and emotional state of person from the microphone and camera, then it adjusts its voice (adjusting voice is required because it is require as per the condition of the place and noise of the environment and the psychological state of the person, which will create a positive expression towards the humanoid).

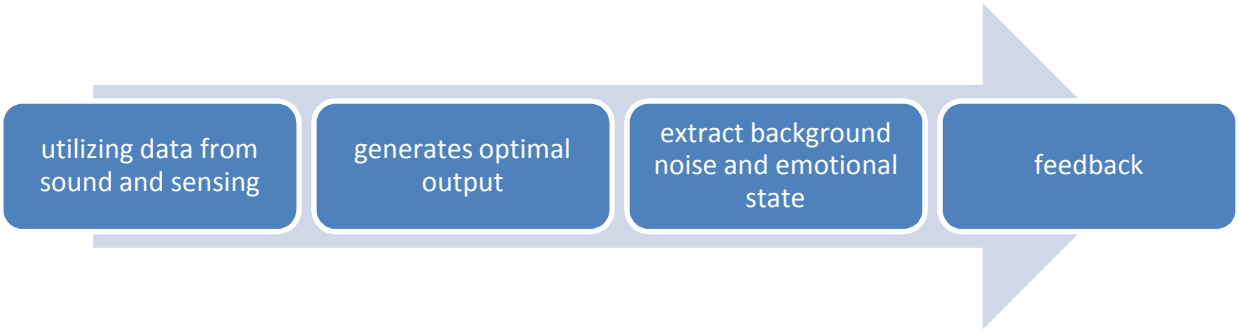

Fig.4 feedback

Theory Analysis

For visual sensing:-

For eyeball measurement:-

- Assuming the distance between lens l_1 and image formed is 1.5cm.
- Taking two concave lenses l_1 and l_2 with focus $f_1 = 0.25$cmand $f_2 = 0.5$cm respectively.
- For imaginary image forming between the lenses l_2 and l_1. Where image is formed by l_2

Focus= $f_2 = 0.5$cm = m = m

Case-1

If the object is kept at 100m
U = distance between object and lens = 100m
V= distance between form image and lens=?
V= 0.00500m
V=0.5cm

Case-2

If the object is kept at 100m
U = distance between object and lens = 25cm= m =m
V= distance between form image and lens=?
V= 0.00502m
V=0.502cm

- So, imaginary image will be formed at 0.5cm
- For imaginary object forming between the lenses l_2 and l_1. Where object is taken by l_1

Focus= $f_2 = 0.25$cm = m = m

If the object is kept at 100m

U = distance between object and lens =?

V= distance between form image and lens = 1.5cm = m = m

- So, imaginary object will be at right side of the lens at 0.3
- Therefore imaginary object and image are same. So, distance between two lens is 0.3cm + 0.5cm = 0.8 cm
- Total length of eyeball is 0.8 cm +1.5 cm + 0.5 cm (for excess length) =2.8 cm
- Average size of an human eyeball is from 2.1 to 2.9 cm

For eye movement:-

- Assumed length of the air powered piston is 0.04 m.
- Assumed diameter of the air powered piston is 0.007m.
- By Basic Stress Equation

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T → Shear Stress
For cylinder,
Volume =
Total Surface area=
T_{max} = where, T_{max} in maximum Stress
Assumed,
Radius, r = = 0.0035
Height, h = 4 cm = 0.04m
Total surface area=
= 2 * 3.14 * 0.0035 (0.0035 + 0.04) m^2
= 6.28 * 0.0035 (0.0435) m^2
= 0.02198 * 0.0435 m^2
= 0.00095613 m^2
= 0.00096 m^2
Volume = 3.14 * 0.0035 * 0.0035 * 0.04 m^3
= 0.0000015386 m^3
= 0.0000015 m^3
Stress = 0.003125 m = 0.0031 m
Pressure = stress * 1.422 psi = 0.0044 psi

- Pressure is equal to 0.0044 psi. It is maximum pressure in which the piston will work.
- Every piston work on all direction. Normal pressure applied in piston is 0.0022 psi.
- P1 for upper piston
- P2 for lower piston
- P3 for left piston
- P4 for right piston
- Assumed working of air powered piston:-

1. For upper movement of eyes:-
As assumed piston P1 should apply pressure 0.0017 psi and P2 pressure 0.0015 psi. P3 and P4 piston remains constant pressure 0.0022 psi.
2. For left movement of eyes:-
As assumed piston P3 should apply pressure 0.0017 psi and P4 pressure 0.0015 psi. P1 and P2 piston remains constant pressure 0.0022 psi.

For feedback

- Assumed length of the liquid powered piston is 0.04 m.
- Assumed diameter of the liquid powered piston is 0.007m.
- By Basic Stress Equation

T → Shear Stress
For cylinder,
Volume =
Total Surface area=
T_{max} = where, T_{max} in maximum Stress
Assumed,
Radius, r = cm = 1.4 cm = 0.014 m
Height, h = 4.5 cm = 0.045m
Total surface area=
= 2 * 3.14 * 0.014 (0.014 + 0.045) m^2
= 0.00518728 m^2
= 0.0052 m^2

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Volume =

$= 3.14 * 0.014 * 0.014 * 0.045\ m^3$

$= 0.0000276948\ m^3$

$= 0.000028\ m^3$

Stress = =

= 0.0107692308 m

= 0.011 m

Pressure = stress * 1.422 psi

= 0.015 psi

Calculation of force density,

f = pg

g = gravity constant = 10 m/s^2

Here, p = 0.015 psi

f = force density = 0.015 * 10 = 0.15 N

- Pressure is equal to 0.015 psi. It is maximum pressure in which the piston will work.
- Force is equal to 0.15 N. It would be maximum force applied by the piston
- Every piston work on all direction. Normal pressure applied in piston is 0.015 psi.
- Assumed working of liquid powered piston:-

Upper jaw remains constant in this application because as assumed upper jaw would be connected to the body constant. Lower jaw would work accordingly. While talking lower jaw will fluctuate between 0.003 to 0.013 psi and the force of the lower jaw while talking will be 0.15 N. Due to fluctuation it will match the speed of word while speaking.

III. FUTURE SCOPE

Robotics has a great future scope.

- Propose a model for a humanoid body structure.
- Propose a system language model for a humanoid.
- Develop software for the humanoid.

IV. CONCLUSION

As the world is getting converted into technology oriented with robot other top most in demand. All engineers in many companies work 24/7 to make robots as fast as possible. Most robots are working for people in industries, factories, warehouses, and laboratories. They are useful in many ways. For instance, it boosts economy because businesses need to be efficient to keep up with the industry competition. Because robots can do jobs better and faster than human can, e.g. robot can built, assemble a car. Robots cannot perform every jobs today robots roles include research and industry. There are many resources on robots and robotics everyone needs to read and get knowledge about it. It will similarly be valuable in contribution response to students on their occupation literacy, self-awareness and authorization for their growth.

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