

# Nursing Artificial Intelligence and Robotic Assistance (N.A.I.R.A)

Syed Abdul Ghouse<sup>1</sup>, Mohammed Khan<sup>2</sup>, Mohd Asif-Ur-Rahman<sup>3</sup>, Mohammed Haroon Ahmed<sup>4</sup>,  
Mohammed Abdul Hameed<sup>5</sup>, Abdul Razzak<sup>6</sup>, Mohammed Jameel Ahmed<sup>7</sup>, Mohd Yaseen Yousuf<sup>8</sup>  
<sup>1,2,3,4,5,6,7,8</sup>Students, Dept. of ECE, ISL Engineering College, Hyderabad, Telangana, India

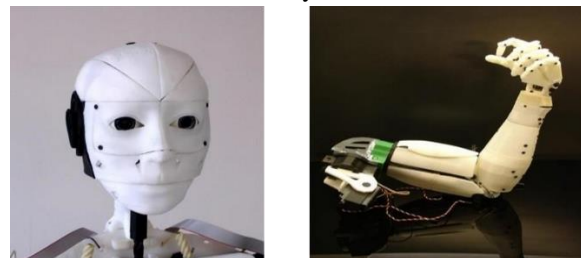
**Abstract** - The evolution of technology and sophistication in the field of robotics and automation system has restructured every field of life. Machines that offer greater efficiency combined with the precision of robotic system are minimizing human involvement in dangerous tasks and eliminating the limitations that bind the human body shape built to resemble that of human body. A design of NAIRA is not only for functional purpose, such as the study of Omni wheel mechanism for locomotion.

Locomotion of semi-humanoid robot with less number of actuators is a choice of interest as it leads to energy efficient design. The autonomous humanoid robot is programmed for autonomous operation and employs feedback loops to the controller which ensures proper operation. These robots do not require any human assistance once programmed. This paper presents a robot system for healthcare facility environments. Current healthcare robot systems do not address healthcare workflows well and our goal is to provide distributed, heterogeneous multiple robot systems that are capable of integrating with healthcare workflows and are easy to modify when workflow requirements change. The proposed system consists of three subsystems: A Receptionist robot system, a nurse assistant robot system, and a medical server. The roles of the receptionist robot and the nurse assistant robot are to do tasks to help the human receptionist and nurse. The healthcare robots upload and download patient information through the medical server and provide data summaries to human care givers via a web interface. We developed these healthcare robot systems based on our new robotic software framework, which is designed to easily integrate different programming frameworks, and minimize the impact of framework differences and new versions. We test the functionalities of each healthcare robot system, evaluate the robot-robot collaboration, and present a case study.

## INTRODUCTION



Despite the several research efforts, it is still an extremely challenging task to develop and implement intelligent motion algorithms to control a semi-humanoid robot, particularly with regards to adaptability, robustness and stability of the robot. Semi-Humanoid robots are now used as research tools in several scientific area's researchers study the human body structure and behaviour to build humanoid bots and on the other side the attempt to stimulate the human body leads to better understanding of it. It has been suggested that advanced robotics will facilitate the enhancement of ordinary humans.



The objectives of this research are:

- To design and control a semi-humanoid robot with simple algorithmic rules, for education and research purpose.
- To develop an efficiently stable robot with dynamic characteristics.
- To develop accurate face detection and GPS system with the aid of designed Application
- Addition of torso and eye mechanism in the Robot

### OVERALL ARCHITECTURE

MOMENTS:

The moment of Naira is divided in to two parts.

1. Locomotion
2. Torso

LOCOMOTION:

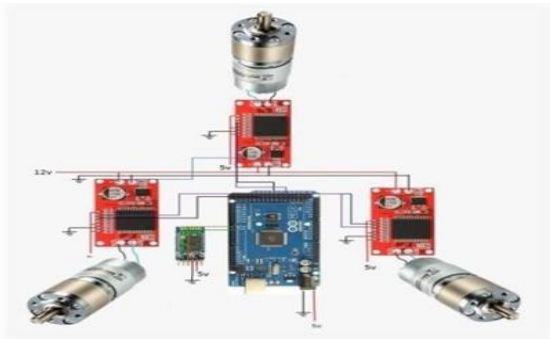


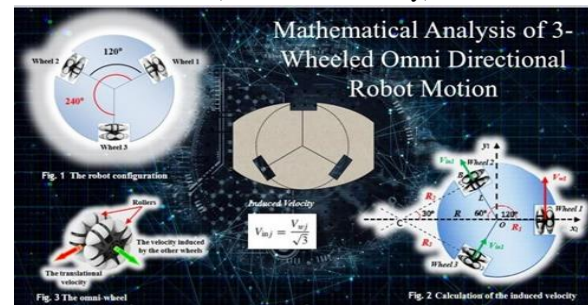
Fig- circuit diagram

The most important aspect in the design of a mobile robot is locomotion skills. The main objective of the robot is to move from one place to another in a known or unknown environment, taking into account the values of the sensors to achieve the desired targets. This means that the robot must rely on many other aspects, such as perception (the robot must use its sensors to obtain valuable data), localization (the robot must know its position and configuration), cognition (the robot must decide what to do to achieve its goals), and motion control (the robot must calculate its input forces on the actuators to achieve the desired trajectory). Most of the time, the mobile robot cannot take the direct path from its initial position to the final goal, which means that motion planning techniques must be used. In that order, the robot to navigate successfully, it must determine its position in the workplace. So, localization together with perception and motion control are key issues in robot navigation. Localization is closely related to representation. If an

accurate GPS system could be installed on a robot, the localization problem would be solved. The robot would always know where it was. But at the moment, this system is not available or is not accurate enough to work with. In any case, localization implies not only knowing the robot's absolute position on Earth but also its relative position with respect to a target position.

COMPONENTS:

- Omni wheels
- Sonar sensors
- Arduino mega
- Planetary Dc gear motors
- Motor driver-VNH22-SP302
- Power source (lithium-Ion battery)

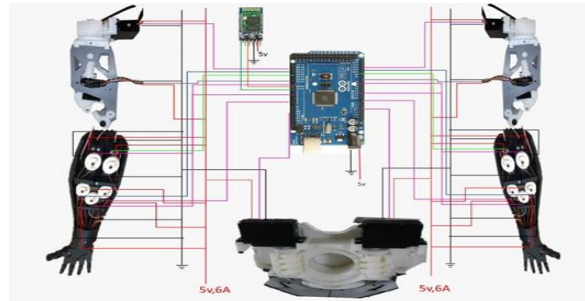


TORSO:

Semi-Humanoid Robot Torso mechanism:

A torso of a human-like (semi humanoid) mechanism is made to simulate the actual movement of the human body. The torso includes a unique combination of mechanism and steered rotary axes with drives arranged in geometry, enabling human-like movement. The construction is carried out in a way to provide mounting surfaces for accommodating other parts of the humanoid structure such as lower body, arms and head. The structure of this invention comprises five degrees of freedom. All degrees of freedom are derived from the rotational axes and are concentrated in the lower part of the torso, except the rear, which is located at the top of the torso. The lower part of the torso contains the first rotational stage, which takes care of the rotation of the torso around the vertical axis and is attached to the base so that it guides vertically upwards. The next axle is attached to the first axle so that it can perform the side tilting function. The following two axes are positioned to tilt the torso. This combination rotating back and forth of the mechanical structure is carried out in a unique way,

which allows the simulation of the movement of spine very much like that of a human. In this way, we perform a very realistic and effective movement, which is very similar to the movement of the human body (torso). The rear axle mounted on the top of the torso rotates the shoulder ring around the vertical axis. The movement of each axle is specially carried out through its own drive, which is attached to each joint of the torso and is controlled via a controller.



#### NAIRA APP:

MIT App Inventor is basically for creating Android Apps in the browser where we design how the app will look and function. It uses a graphical user interface (GUI) very similar to the programming languages (scratch programming language) which allows users to drag and drop visual objects to create an application that can run on android devices, while an App-Inventor Companion (The program that allows the app to run and debug on) that works on IOS running devices are still under development.

It basically consists of two parts:

1. App Inventor Designer
2. App Inventor Block Editor

#### 1. APP INVENTOR DESIGNER:

In App Inventor Designer we select the components of the app we are willing to design, while in App Inventor. The design editor for App Inventor allows developers to see how the app will appear on the device screen and adjust the form factor of the visualized device (e.g., phone or tablet). Adjustments to properties of the visual components, for example, background colour and size, are reflected in real time system.

#### 2 APP INVENTOR BLOCK EDITOR

In Block Editor we assemble program blocks that specify how the components should behave visually, fitting pieces together like pieces of a puzzle. After completing the above phases, we run our app directly

in Android phone by connecting it to the computer or we can run it on Android Emulator if Android phone is not available. Moreover, we can also download the app (.apk file) and install and run it Android device directly. In order to get access to the app we have a tab place at the centre of robot through which we can interact with the robot. While all the features of Naira make it look so cool but the most important feature of Naira is its ability to continuous monitor and to store that data, so that it can analyse and learn from its daily routine. for example, if Naira encounter an event, it will store it and all the subsequent events, and it will process all these info and come up with it is different results by using the concept of probability. From a software point of view, you would say Naira is a platform, like a laptop is a platform for something,” “You can run a lot of different software programs on that very same robot.” Naira has three different control systems, Timeline Editor, Sophisticated Chat System and Open Cog. Timeline Editor is basically straight scripting software. The Sophisticated Chat System allows Naira to pick up on and respond to key words and phrases. And Open. Cog grounds Naira’s answers in experience and reasoning. This is the system they are hoping to one day grow into AGI.



#### NAIRA ASSISTANT:

It is a chat bot. A chat bot is a program that communicates with you. Sometimes it is powered by machine learning (the chat bot gets smarter the more you interact with it) and Artificial Intelligence. Or, more commonly, it is driven using intelligent rules (i.e., if the person says this, respond with that).

The services a chat bot can deliver are diverse. The term chat bot is synonymous with text conversation but is growing quickly through voice communication. Consumers spend lots of time using messaging applications (more than they spend on social media). Therefore, messaging applications are currently the most popular way companies deliver chat bot experiences to consumers. Naira Assistant is a chat bot which has a set of custom commands stored. Along with this if any command is said it automatically does the Google search. There is a feature of machine learning in the app where any command can be trained. When a command is said it searches using the feature of Artificial Intelligence i.e., based on certain keywords.

#### FUTURESCOPE:

The project is presently controlled using Application controller and smart phone Bluetooth control. The robot could be interfaced with Amazon's Alexa and be used as a home assistant. Alexa's wide range of scope would permit the user to know the weather, play music etc. It could be connected to the internet with an IOT module and hence work in numerous ways.

- Further it can also be controlled using hand gestures, with the help of Kinect sensor.
- The Humanoid robot could also be given the feature of self-charging. The robot detects low battery and automatically plugs itself to the charging point.
- By accuracy in face recognition we can detect unknown person and strangers entering the house when an unknown person is detected then an alarm can be raised.
- It can assist in household work by Obstacle detecting by sensor image processing. The robot could help out in household chores.

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