

# SANDY: THE HUMAN ROBOT

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**Abstract** -The humanoid research is an approach to understand and realize the complex real world interactions between a robot, an environment, and a human. In general a human robot has a head, two arms and two legs. Our system can recognize a set of gestures. It is essential for the functional purpose, such as interacting with human tools and environments. This is human robot which closely resembles to human motion and behaviour. Human robots are meant to overcome the obstacle through the internally built sensors. In this work, we propose a vision and knowledge based gesture recognition system for human robot interaction. Our Robot mainly focuses on the gestures, with is movement in all direction, and makes its own direction to overcome the obstacle. Interaction between a robot and a human may take several forms, but these forms are largely influenced by whether the human and robot are in close proximity to each other. Hence the communication with the robot is remote controlled interaction. Simulation and experiments demonstrate that the proposed method can achieve maximum reduction in human efforts towards the work.

## I. INTRODUCTION

### 1.1 Overview

Robotics is a branch of engineering and science that includes electronics engineering, mechanical engineering and computer science and so on. This branch deals with the design, construction, and use to control robots, sensory feedback and information processing. These are some technologies which will replace humans and human activities in coming years. These robots are designed to be used for any purpose but these are using in sensitive environments like bomb detection, deactivation of various bombs etc. Robots can take any form but many of them have given the human appearance. The robots which have taken the form of human appearance may likely to have the walk like humans, speech, cognition and most importantly all the things a human can do. Most of the robots of today are inspired by nature and are known as bio-inspired robots.

Robotics is that branch of engineering that deals with conception, design, operation, and manufacturing of robots

- Robots will never harm human beings.
- Robots will follow instructions given by humans.

### 1.2 Proposed Idea

- Make the robot move forward and backward.
- Welcoming the guests by hand shaking.
- Upward and downward movement of hand.
- Opening and closing of fingers of both the hands.
- Making the robot to hold the object.
- Robot senses the obstacle and stops its movement by itself.

### 1.3 Project Objective

- To make both the hand movement up and down.
- To make all the five fingers movement at a time of both the hands.
- When there is an obstacle in front of the robot it stops its movement by itself.

## II. BLOCK DIAGRAM

### 2.1 Introduction

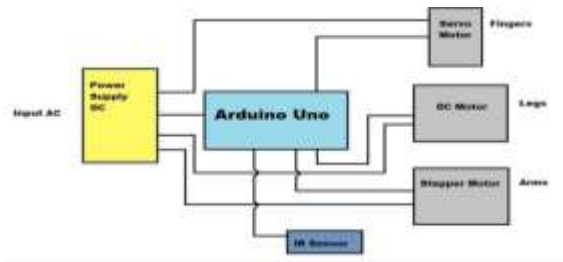


Fig.1 Block diagram.

### 2.2 Brief Description of Block Diagram

There are several motors which are used for the movements, the hand comprises of high torque servo motor which will be controlling the finger actions, the wrist movement will comprise of servo motor with gears provided for precise control, and the arm will be controlled by the stepper motor since it capable of providing smooth movement. The motors driven circuit will be employed by driver circuit which prevent damage to Arduino Uno and will also help in controlling motoring actions. The prosthetic is 3d printed which has good strength and durability.

The legs are driven by dc motors which will be incorporated with L298N driver for speed control with the help of microcontroller. An external supply will be used for powering up various equipment's. The robot chassis will be made up acrylic sheets which are flexible and more reliable to use. The software employed is Arduino IDE; Arduino IDE is open source software that is mainly used for writing and compiling the code into the Arduino module.

There will be obstacle detection system provided for the movement of robot which will prevent it from colliding with the object coming in its path. The feedback will be continuously provided by the sensors to the microcontroller. The sensor used for this will be IR sensor which will be consisting of transmitter and receiver for providing the feedback for the module. The sensor will be powered by Arduino Uno which provides 5V Vdc.

## III. HARDWARE IMPLEMENTATION

### 3.1 Arduino Uno

The Arduino Uno is an open source microcontroller board based on the Microchip ATmega328 microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits. The board has 14 digital I/O pins, 6 analog I/O pins, and is programmable with the Arduino IDE, via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery.



Fig.2 Arduino Uno

### 3.2 L298N Motor Driver

Double H driver module uses ST L298N dual full-bridge driver, an integrated monolithic circuit in a 15-lead Multi watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.



Fig.3 L298N Motor driver.

### 3.3 Stepper Motor with A4988 Driver

Stepper motors typically have a step size of 1.80 to 2000 steps per revolution this refers to full step. A4988 driver is used; it gives high resolutions by allowing intermediate steps. A4988 is a micro-stepping driver, higher micro-stepping results in smooth movement. Stepper motors provide accurate control for the movements. It can operate between 8V to 35V with maximum current of 2A. It is used for the control and movement of shoulder.

### 3.4 IR Sensor

The infrared (IR) sensor emits and/or detects infrared radiation to sense its surroundings. The active infrared sensors two elements: infrared source and infrared detector. Infrared sources include an LED or infrared laser diode. Infrared detectors include photodiodes or phototransistors. The energy emitted by the infrared source is reflected by an object and falls on the infrared detector.



Fig.4 IR sensor

### 3.5 MG995 Servo motor

A servo motor is a rotary actuator that allows for precise control of angular position, velocity and acceleration. It is a digital metal geared servo. This servo is use for medium –large size projects. It is of 55grams with 10kg/cm torque and the angle of 00-1800. It operates at 4.8 - 6V and 1-2A. It is used to control the movements of fingers and arms. The servo comes with pre-soldered female wires. The colour code of the wires is as follows: PWM (signal) is orange, VCC (power) is red, and GND (ground) is brown.



Fig.5 MG995 Servo motor

## IV. METHODOLOGY

This section deals with description of flow chart and working of the robot as per the flow chart.

#### 4.1 Description of the Flow Chart

The execution flow begins with start (Fig.6) from start the signal flows to the peripheral initialization. In the peripheral initialization the ports of following devices are initialized:

- IR sensor
- Servo motor
- Stepper motor
- DC motor

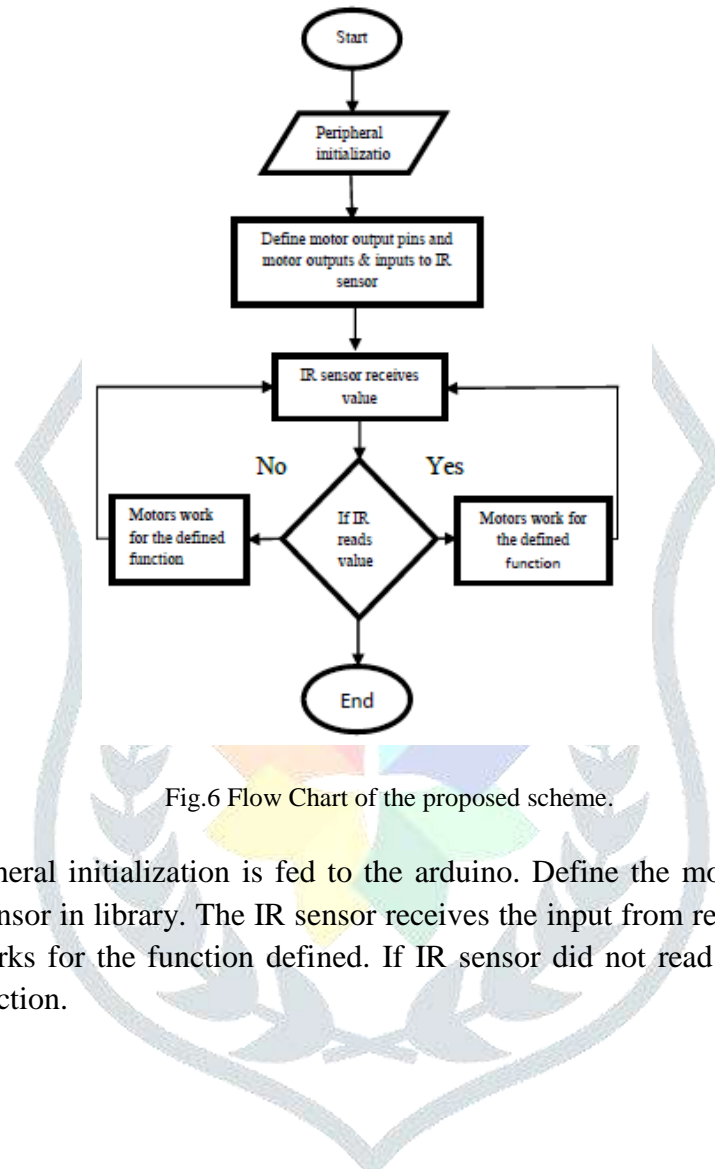


Fig.6 Flow Chart of the proposed scheme.

Signal from the peripheral initialization is fed to the arduino. Define the motor output pins and motor outputs & inputs to IR sensor in library. The IR sensor receives the input from remote. If IR sensor read the value then the motor works for the function defined. If IR sensor did not read the value then also motor works for the defined function.

## V. DESIGN

### 5.1 AutoCAD

AutoCAD is a commercial computer – aided design and drafting software application. This software is used to create 3D designs, electrical drawings and architecture drawings. Additional tools generate standard 2D designs, such as elevations and sections, from a 3D architectural model.



Fig.7 AutoCAD icon

### 5.2 3D Printer

3D printer is a device that builds three-dimensional object from a computer aided design (CAD) by successively adding material layer by layer. The most commonly used 3D-printing process is a material extrusion technique called Fused Deposition (FDM). FDM is the most inexpensive, which lends to the

popularity of the process. We used 3D printing to reduce the weight of the robot and for the fine structure. We used 3D printing only for the hands in the economic point of view.

### 5.3 PLA Plastic filament

PLA stands for polylactic acid which is made up of renewable resources like corn starch, sugarcane. It is placed in the build envelop of 3D printer. It is a thermoplastic polymer. It is a biodegradable polymer. It is the default filament of choice for most extrusion based 3D printers because it can be printed at a low temperature and does not require a heated bed.



Fig.8 PLA filament

### 5.4 Body design

The body is made up of card board sheet at the outer surface with inner aluminium frame as a supporting structure as shown below.

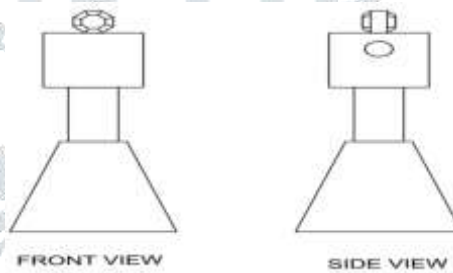


Fig.9 Body Design

## VI. ADVANTAGES AND APPLICATIONS

### 6.1 Advantages

- **Highly Reliable:** Our robot including hardware as well as software is highly reliable. This robot will satisfactorily perform the tasks for which it was designed for a specific time and in a specific environment.
- **Fit and Forget System:** Once the hardware, software and interfacing is done and it is installed in the proper location, then you hardly know it is there. It does not require repeated maintenance. One can completely forget the system once it is installed properly.
- **Scalability:** Arduino program can be erased and reprogrammed. Hence the system has the ability to be enlarged to accommodate growth.
- **Real-Time Data Acquisition:** Instantaneous acquisition of data is possible.
- **Safety:** Safety is the most obvious advantage of using robot. It can be used in the workplace, where the environment is not good for human life.
- **Speed:** The robot doesn't need any training or meetings so that it will speed up the process to be done.
- **Consistency:** The robot never needs to divide their attention. Automation is typically far more reliable than human. The efficiency of the work is always constant.
- **Perfection:** The robot will always deliver quality. Because it is manufactured and programmed for repetitive cycles with minimum errors.
- **Job creator:** since the work needs to be monitored and supervised it creates the job in case of large scale production

## 6.2 Applications

This robot can be used wherever the humans are working; to prevent unemployment suggested implementing as per the requirement. The application fields are as follows:

- Human care
- Educational institutions
- Airports
- Banks
- Hotels
- Bus stands

## VII. CONCLUSIONS AND FUTURE SCOPE

### 7.1 Conclusions

It can be concluded that robots can be used in wide range of applications. The robot can perform tasks assigned to it and can give better results. Our robot can be used for performing tasks as per our requirements which can be used for greeting, lifting object and object detection. Robotics is a fast emerging field which is used in industrial and many other utilities applications. The proposed system will provide reduction in the time regarded for doing a particular work.

### 7.2 Future scopes

There is no denying that Robotic technologies are all set to change the way things are done in the industries in which they are being implemented. Entrepreneurs are voicing a similar sentiment and are clearly optimistic about the use of robotics in various industrial segments. Robotics is mainly capturing industries like manufacturing, pharmaceutical, packaging and inspection. A bit of Robotics would also be seen in the healthcare sector primarily in the form of assistive and skill development. With development of AI and if integrated with this project it can be used to perform more complex tasks.

## REFERENCES

- 1] D. Perzanowski, A. C Schultz, W. Adams, E. Marsh, and M. Bugajska, “*Building a multimodal human-robot interface*”, *IEEE Intell. Syst.*, vol. 16, no. 1, pp.16-21, 2001.
- 2] Sandrahelsel (1), “*3D printed plastic robot*” New Delhi Institute, Jan 8 2015.
- 3] Devid wettergreen (1), “*Autonomous Guidance and control for an underwater robotic Vehicle*” RSISE AUSTRALIA UNIVERSITY, vol 1, October 1985.
- 4] Amit Kumar Pandey and rodolphe Gelin, “*A Mass-Produced Socialble Humanoid robot: Pepper*”, *IEEE Robotics and Automation Magazine*, pp (99). July 2018.
- 5] Namita Shinde, Shreya Srivastava, Vineet Sharma, Samarth Kumar, “*Paper of android controlled arduino based robot car*”, *International Journal of Industrial electronic and electrical engineering*, vol-6. March 2018.