ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

HUMANOID VISION ROBOT FOR DELIVERING THE INFORMATION

Kesanakurthi Sai Nikhil, Department of ECE Vignan's Institute of Information Technology (A), Duvvada, Visakhapatnam, Andhra Pradesh, India, nikhilkesanakurthi@gmail.com

Kundrapu Revanth Kumar, Department of ECE Vignan's Institute of Information Technology (A), Duvvada, Visakhapatnam, Andhra Pradesh, India, kumarrevanth23165@gmail.com

Golagani Pavan Kumar, Department of ECE Vignan's Institute of Information Technology (A), Duvvada, Visakhapatnam, Andhra Pradesh, India,golaganipawankumar@gmail.com

Guntuku Hari Krishna, Department of ECE Vignan's Institute of Information Technology (A), Duvvada ,Visakhapatnam, Andhra Pradesh, India, harikrishna16202008@gmail.com

Ashish Kumar, Department of ECE Vignan's Institute of Information Technology (A), Duvvada, Visakhapatnam, Andhra Pradesh, India, ashishkumar.ambastha@gmail.com

---

Abstract: Technology makes life easier " Here comes another technology to assist humans . Yes , It is a human assistance robot . Even though technology is developed a lot , we are still sending humans to accomplish some basic tasks like sending circulars to each class and also surveying all the classrooms is not an easy task for a single person . So we came up with a solution to send a Human Assistance Robot to complete our task . Here comes another technology to assist humans. It is a human assistance robot. We aim to make a robot that performs the following task : Our robot takes surveys of the classroom by taking pictures of the classroom in 3 different directions and it will upload the photographs to the cloud. After completion it will send an acknowledgement to the administrator. So without power we cannot operate any electronic device . Designing of a power module for the human assistant robot.

Keywords: Raspberry Pi 3,. Arduino Mega,GUI Interface, Bluetooth module, L239D Motor Driver, LCD Display, UltraSonic sensor.

I. Introduction

The field of humanoids AI, widely known because the current challenge for AI analysis, is attracting the interest of the many analysis teams worldwide. vital efforts are dedicated to the target of developing humanoids and spectacular results are created. mechanism any mechanically operated machine that replaces human effort, tho' it's going to not correspond with folks during appearance or perform functions in a human manner. By extension, AI is the engineering discipline managing the planning, construction, and operation of robots. Developing humanoids poses fascinating issues within the realization of manipulation capability, that remains one of the foremost complicated issues in AI. For its scientific content and for its utility in most AI applications, the matter of manipulation has been deeply investigated and plenty of results

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

square measure already out there, each as hands and sensors and as management schemes.

Objectives of the Present Work :

The data gap within the existing literature summarized higher than has helped to line the objectives of this analysis work that are made public as follows:

1. Fabrication of Humanoid robot in order to do the miscellaneous work by using Admin and User interface.

2. To work on the motion control of robot and to work on structure of robot

3. To make a power module board for our robot to recharge the battery.

4.To make the robot reach its destination on its own visualization and make its own path.

II. Overview of modules :

Designing of information delivery:

Even though technology is developed a lot, we are still using humans to accomplish some basic tasks like sending circulars to each class is not an easy task for a single person. so we came up with a solution and designed an Information Delivery Robot to deliver Information.

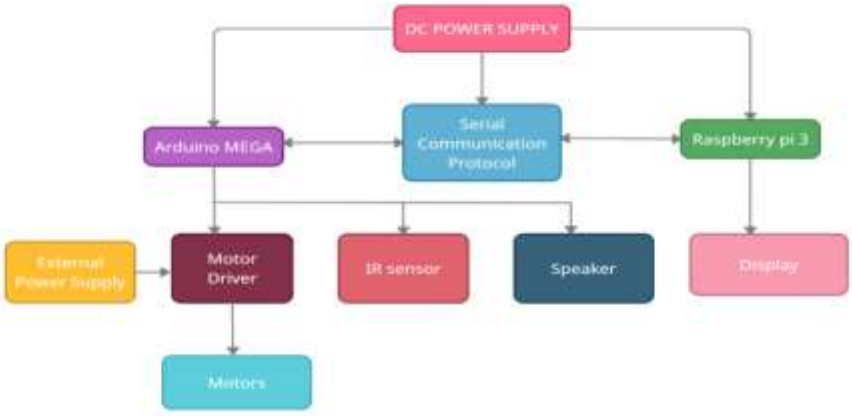
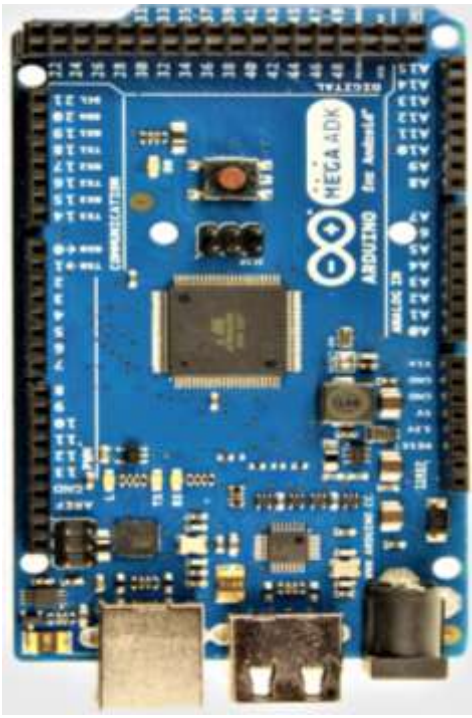


Figure 1: Design of Information Delivery

In this Figure 1 depicts the process of designing the Information delivery for the humanoid robot.In this we use google cloud as the serial communication portal for storing the data like pictures, documents,etc.,.In this we use the L293D Motor Driver in the Motor driver system.

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

ARDUINO MEGA:



The below Figure 2 describes the structure of ArduinoMega.The Arduino Mega is a microcontroller board based on the Atmega 2560. It is also called Mega 2560. It consists of 54 digital input/output pins (of which 15 pins can be used as PWM outputs, 16 pins can be used as analog inputs,4 pins can be used as UARTs (hardware serial ports), Remaining can be used as a16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. We can simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Mega 2560 board is compatible with most shields designed for the Arduino Uno and the former boards Duemilanove or Diecimila.The Mega 2560 is an update to the Audino Mega, which it replaces.

Figure 2 : Structure of Arduino Mega

RASPBERRY PI 3:

Figure 3: Raspberry pi 3 pin layout

Figure 3 represents the pin layout of the raspberry pi 3.Raspberry pi 3 is the Latest Version of Raspberry pi computer. Raspberry pi 3 can be called a Mini Computer.Every people use the Raspberry pi to learn the programming skill sets, to build the Hardware projects , to do Home Automation, to implement the Edge computing and Kubernetes clusters, and Even it is used in the Industrial Applications. It can run the official Raspbian Operating system,Ubuntu mate,Snappy ubuntu core,the non Linux based Risc operating system.It can run the Windows OS (Windows 10 or 11) but it takes more time to install the OS into raspberry pi board.It includes some features like 256 MB SDRAM Memory,Single 2.0 USB Connector, HDMI composite RCA Video Out,3.5 mm Audio Jack for Audio out, SD ,MMC, SDIOCard slot on Board

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

storage,Graphic card, GPU,Ethernet Port,GPIO Pins, Xbee Socket, UART,Power source connector.

Figure 4: Structure and Design of Raspberry pi 3

ULTRASONIC SENSOR :

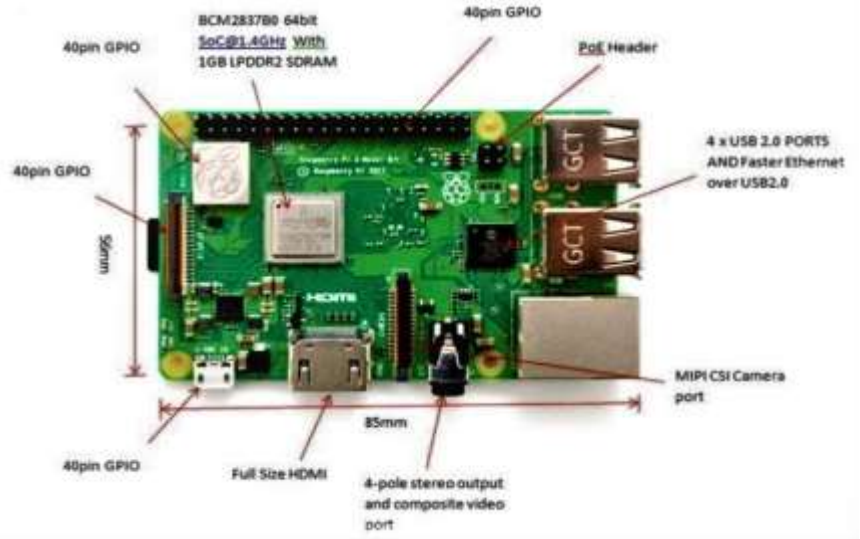


Figure 5: Ultrasonic Sensor

The Figure 5 represents the pictorial representation of the Ultrasonic sensor. An Ultrasonic sensor is an electronic device that is used to detect and measure the distance of an object by discharging ultrasonic sound waves on it and the Sensor converts the reflected sound wave into the electrical signals.The Ultrasonic waves travel faster than the speed of sound waves (i.e the sound that humans can hear). **Ultrasonic sensors mainly consist of two parts :** They are the Transmitter (It emits the sound waves using the piezoelectric crystals) and the Receiver (It encounters the sound waves after it has transited to and from the target object). To measure the distance

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

between the sensor and the object, the sensor will measure the time it takes between the transition of the sound by the transmitter and contact with the receiver. the formula for measuring the Distance i.e, **D=½(T*C)** (Here D is Distance, T is Time taken for transition, and C is the speed of sound waves ~ 343 meters/second).In the sensor we consist of four pins like VCC(power), GND (Ground), Echo(Receiver), TRIG(trigger).

L239D MOTOR DRIVER:

The L239D motor driver is a motor driver IC.the L239D is a 16 pin Motor Driver IC. It can drive two motors at a time simultaneously. L293D IC may be a twin H-bridge motor driver IC. One H-bridge is capable of driving a dc motor in bidirectional manner.It is a current enhancing Integrated circuit, as here the output from the sensor is not able to drive motors itself. So the L293D motor driver is used for this purpose.It receives signals from the Raspberry pi and transmits the relative signals to the both motors.it has two voltage pins,
One for drawing current for working of the L239D and other is to apply voltage for motors.The L293D motor driver has some features like Supply VoltageRange 12V.

Figure 6: L239D MOTOR DRIVER

DC GEARED MOTORS:

Figure 7 represents The DC motor which is used as a DC servo motor generally has a separate DC source in the field of winding & armature winding. The management may be archived either by dominating the coil current or field current.. Field control includes some advantages over armature control. The DC servo motor provides a very accurate and fast response to start or to stop command signals due to the low armature Inductive Reactance.

Fig 7: Johnson DC Motor

BATTERY:

They are cheap and seen mostly in cars and vehicles to power the lighting systems in it. These are more preferable in the products where the size/space and weight doesn't matter. These come with the nominal voltage starting from 2V to 24V and

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

most commonly seen as 2V, 6V, 12V and 24V batteries. It has a Power density of 7 Ah /Kg.

Advantages:

- Cheap in cost
- Easily rechargeable
- High power output capability

Figure 8 : Battery

DESIGNING STRUCTURE AND BASE OF VISION HUMANOID ROBOT :

Initially we have taken a 3/4th inch square rod of galvanized steel material., since it can sustain lateral and sudden loads. We have made a square base of 40*40 cm dimension by using electrode welding process.As we see in Figure 9,we can observe that the steel rods are cutted with a required length and dimensions. After completion of cutting the rods those are welded with a required Angle and Shape of the structure for the Robot. The specimen is designed and tested using ANSYS software by taking approximation conditions applied on the body.The Structural analysis(Figure 10) and Equivalent(Von-mises) stress of base (Figure 11) of the Humanoid Vision Robot is calculated using the ANSYS Software.

Figure 9: Cutting the Rods

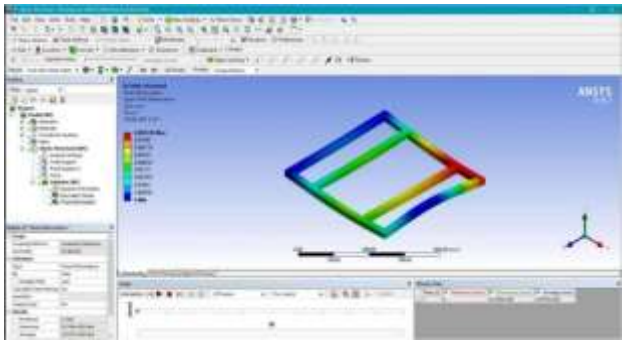


Figure 10: The Structural analysis of the Humanoid Robot

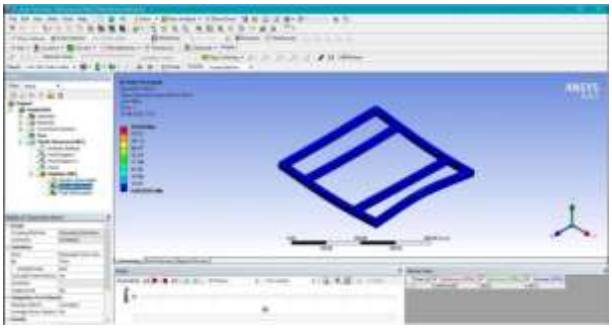


Figure 11: Equivalent(Von-mises) stress of base of the Humanoid Robot

DESIGNING OF POWER MODULE :

The Power management team will be working on the power supply section which will be a key factor for the robo to withstand for a maximum amount of time, once after it is charged. So, we created an automatic charging circuit to charge the battery and choose a battery which will satisfy the voltage and current specifications of components in the robo. In addition to that we will

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

be able to control our robot for Locating Objects.

Figure 12: Block Diagram of Power Module

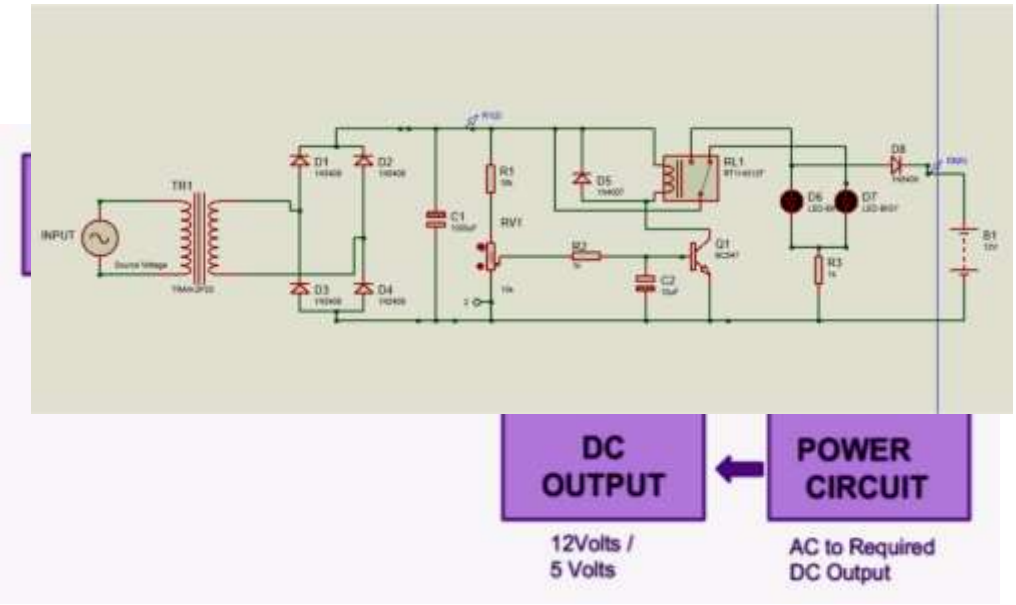


Figure 13: Circuit Diagram of Power module

Figure 12 represents the Block diagram of the Power Module. Output is connected to Motor drivers which drive motors ,Bluetooth module and IR sensors are connected to Arduino Mega , motors require 12V DC supply for working and sensors ,camera module is connected to Raspberry PI, require 5V DC power supply which will be supplied by battery.Arduino Mega and Raspberry PI are connected to each other through a communication protocol.Figure 13 shows the circuit diagram of Power Module, we had done the simulation of circuit using the Proteus software and coding part is done using the Microchip studio. The PCB layout is also designed using the circuit in the proteus software. In this we design the power module on the pcb board by following the PCB Designing steps.

Steps to Implement the PCB Board :

The Figure 14 is the Layout Design of PCB Board

Step 1 – Designing of circuit

Step 2 – Printing the design

Step 3 – Cut the copper plate for the circuit board.

Step 4 – Print the PCB design on a copper board.

Step 5 – Etching (Removing Unwanted Copper)
Step 6 – Drilling the Holes to place components

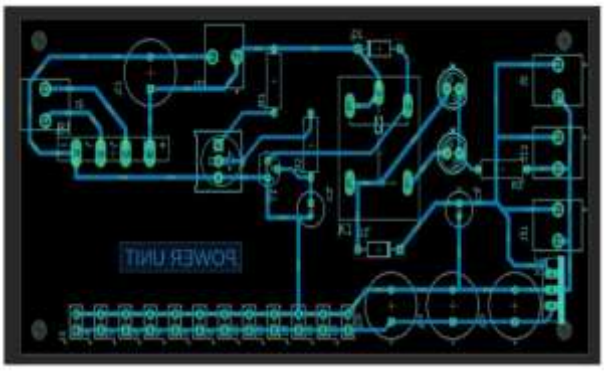


Figure 14: Layout Design

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

Step 7 – Placing the components and soldering.

MOTION CONTROL OF THE ROBOT :

The Figure 16 shows the operation of the motion control of the Robot.We use the L293D Motor Driver for giving power supply and moving instructions for the DC Motors.The inputs of motor Driver (IN1,IN2,IN3,IN4) are connected to Microcontroller and the Outputs (OUT1, OUT2, OUT3,OUT4)are given to the motors. The Operation of the Motors with respect to the input.The inputs are given by Raspberry pi3 to the Motors through L293D Motor driver. Here the OUT1 and OUT2 are connected to Motor 1and the OUT 3 and OUT4 are connected to Motor 2. By giving different inputs we can perform Clockwise rotation and Anticlockwise rotation of Motors.

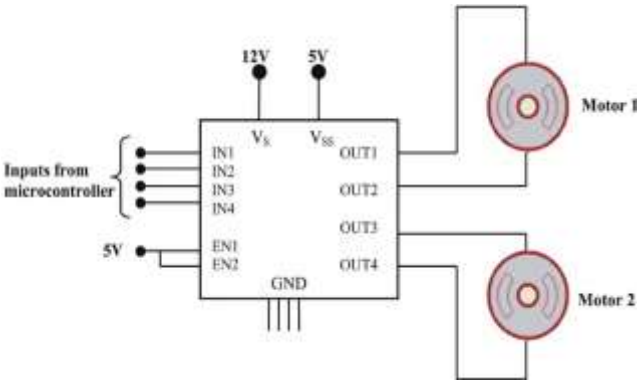
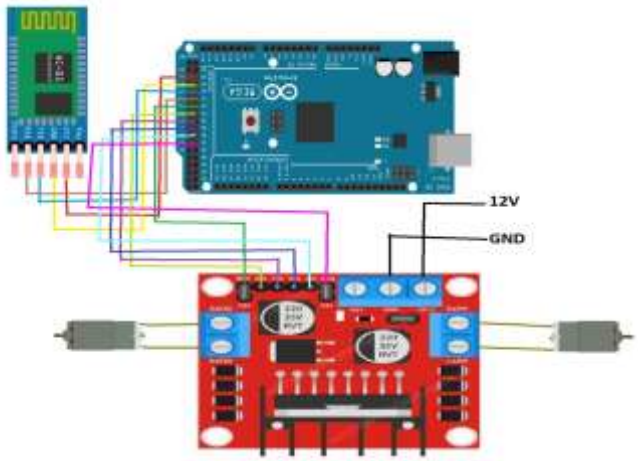


FIG 15: CIRCUIT DIAGRAM OF THE MOTION CONTROL OF ROBOT:



KEY	MOTION DIRECTION
a	forward
b	backward
c	right
d	left
e	stop

FIG 16: Keys and Motion Direction

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

Figure 15 describes the Circuit diagram of the motion control of the robot, As we used Arduino Mega and the bluetooth module to control the motors through the L293D motor driver.As we see in Fig 16, it gives information about the keys and the motion Direction of motor wheels.

RESULTS :

Figure 20: Structure of the Humanoid Vision Robot

Figure 21: Motion control output of Humanoid Robot

Figure 22: Designed Printed Circuit Board of Power Module

CONCLUSION :

The vision humanoid robot will be able to extract the information from the cloud which has been uploaded by the administration department. This information can be in the form of audio or image file. The vi-hu robot will

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

travel each and every class and convey the information that passes through it. The touch attached to the VI- HU Robot can display the image or text that has been uploaded by the administration. The faculty can enable the text format or audio format circular in the display. The VI-HU Robot can also take every class and take the images to class rooms by uploading images to the cloud and the administration department can authorize the images.

REFERENCES:

[1] Rahman RAA, Akhtar HF (2015) Use of humanoid robots in children with cerebral palsy: the ups and downs in clinical experience. Procedia Comp Sci 76: 394-399.

[2] Alemi M, Ghanbarzadeh A (2016) Clinical application of a humanoid robot in pediatric cancer interventions. Int J Soc Robotics 8: 743-759.

[3] Beran TN, Ramirez SA, Vanderkooi OG, Kuhn S (2013) Reducing children's pain and distress towards flu vaccinations: a novel and effective application of humanoid robotics. Vaccine 31: 2772-2777.

[4] Bäck I, Kallio J, Perälä S, Mäkelä K (2012) Remote monitoring of nursing home residents using a humanoid robot. J Telemed Telecare 18: 357-361.

[5] Kamide H, Kawabe K, Shigemi S, Arai T (2013) Development of a psychological scale for general impressions of humanoids. Adv Robotics 27: 3-17.

[6] Malik NA, Yussof H, Hanapiah FA, Rahman RAA, Basri HH (2015) Human-robot interaction for children with cerebral palsy: reflection and suggestion for interactive scenario design. Procedia Comp Sci 76: 388-393.

[7] Henkemans OAB, Bierman BPB, Janssen J, Looije R, Neerincx MA, et al. (2017) Design and evaluation of a personal robot playing a self-management education game with children with diabetes type 1. Int J Human-Comp Stud 106: 63-76.

[8] Costa S, Lehmann H, Dautenhahn K, Robins B, Soares F (2015) Using a humanoid robot to elicit body awareness and appropriate physical interaction in children with autism. Int J Social Robotics 7: 265-278.

[9] Huskens B, Palmen A, Van der Werff M, Lourens T, Barakova E (2015) Improving collaborative play between children with autism spectrum disorders and their siblings: the effectiveness of a robot-mediated intervention based on Lego® Therapy. J Autism Develop Disorders 45: 3746-3755.

[10] Vandemeulebroucke T, De Casterlé BD, Gastmans C (2018) How do older adults experience and perceive socially assistive robots in aged care: a systematic review of qualitative evidence. Aging Ment Health 22: 149-167.

[11] Gaudiello I, Zibetti E, Lefort S, Chetouani M, Ivaldi S (2016) Trust as indicator of robot functional and social acceptance. An experimental study on user confirmation to iCub answers. Comp Human Behavior 61: 633-655.

[12] Shamsuddin S, Yussof H, Ismail LI, Mohamed S, Hanapiah FA, et al. (2012) Humanoid robot NAO interacting with autistic children of moderately impaired intelligence to augment communication skills. Procedia Engineer 41: 1533-1538.

ISSN: 2278-4632
Vol-12 Issue-01 No.01: 2022

[13] Mann JA, MacDonald BA, Kuo IH, Li X, Broadbent E (2015) People respond better to robots than computer tablets delivering healthcare instructions. Comp Human Behavior 43: 112-117.