ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 6, June 2017

Measuring Conceptual Object Distance through Sensors using Raspberry pi

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ABSTRACT: Now-a-days, computer is not only a luxury but also a necessity for every person in today's world. Raspberry pi is a credit-card sized computer aimed at providing a computer to every person in the world. There are thousands of sensors in an industry with different usage, such as, pressure transmitters, flow meter, temperature transmitters, level transmitters, and so on. In this paper the distance of an object is calculated by the use of ultrasonic sensor using Rasberry pi. For this Python language is used. The Raspberry Pi can be used instead of a personal computer, but with some limitations due to its limited processing power. The ultrasonic sensor offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. From 2 cm to 400 cm or 1" to 13 feet. It operation is not affected by sunlight or black material It comes complete with ultrasonic transmitter and receiver module. In this paper we will learn about the basics, hardware and its implementation of ultrasonic sensor using raspberry pi board..

KEYWORDS: Rasberry Pi, Ultrasonic sensor

I. INTRODUCTION

This paper is basically based on measuring the distance of an object by the use of ultrasonic sensor. For this purpose raspberry pi is used. Initially this was done by using microprocessor, microcontrollers etc. The raspberry pi board is a portable. The Raspberry Pi is a low cost, credit-card sized single board developed at United Kingdom. It was designed and manufactured by Raspberry Pi Foundation from UK with the intention of stimulating the teaching of basic computer science in schools students and every other person interested in computer hardware, programming and DIY (Do-it Yourself) projects. It acts like a computer when plugs into a computer monitor or TV, and uses a standard keyboard and mouse. The most important is it is Linux based OS. This small computer features amazing HD (high-definition) quality, video playback, also sports high quality audio and has the capability to play 3D games. The device use the ARM processor which does nearly all of the hard work in order to run the Raspberry Pi. RASPBIAN, PIDORA, OPENELEC, RASPBMC, RISC OS, and ARCH LINUX these are few software's which are used. All this software's can be downloaded easily and these are free from the official forum under the NOOBS (new out of the box software) category. It supports Python as the main programming language for functioning and coding. It also supports BASIC, C, C++, JAVA, and Perl and Ruby languages.

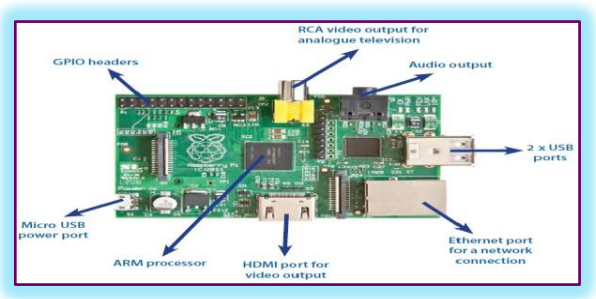

Fig.1 a) An overview of Rasberry pi

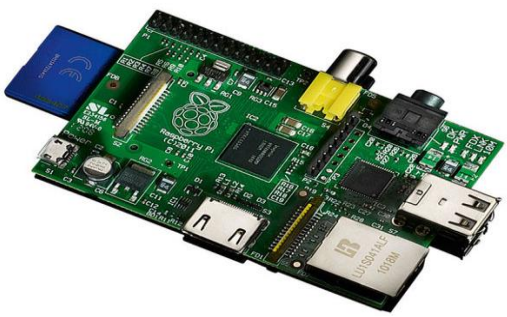

Fig.1 b) Basic modelof Rasberry pi

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II. RELATED WORK

The idea behind a tiny and affordable computer for kids came in 2006, when Eben Upton, Rob Mullins, Jack Lang and Alan Mycroft, based at the University of Cambridge's Computer Laboratory, became concerned about the year-on-year decline in the numbers and skills levels of the A Level students applying to read Computer Science. From a situation in the 1990s where most of the kids applying were coming to interview as experienced hobbyist programmers, the landscape in the 2000s was very different; a typical applicant might only have done a little web design. The foundation later plans to propose a $25 model with 128 Mbytes RAM, one USB port with no Ethernet controller. Both models have RCA and High-Definition Multimedia Interface outputs that enable users to plug the machines into a TV. Mice, keyboards, and other input devices could connect via a USB port. The computers won't include a hard disk or solid-state drive but instead will use an SD memory card to boot up and store data. The 45-gram machines will measure 85.6 × 53.98 × 17 millimeters, not including the SD card and connectors, which will project a bit over the edge. For one computer takes three to four weeks. The foundation expects an initial production runs of 10,000 machines.

III. HARDWARE METHODOLOGY

A) Raspberry Pi Board Description

The raspberry pi board which is used for this development isredit card size Computer having1.2Ghz ARM v8 Broadcomm CPU+GPU and 1GB RAM on Model B+ (1GB on Model B).It has 4 USB, Audio out, LAN port. It also supports HDMI and Composite video Out, GPIO pins.It has also ain built Wi-Fi and Bluetooth.

The pins of ultrasonic sensors like trigger, echo, vcc and ground are connected to the board as GPIO pins and power supply pins.The following fig shows the connection.

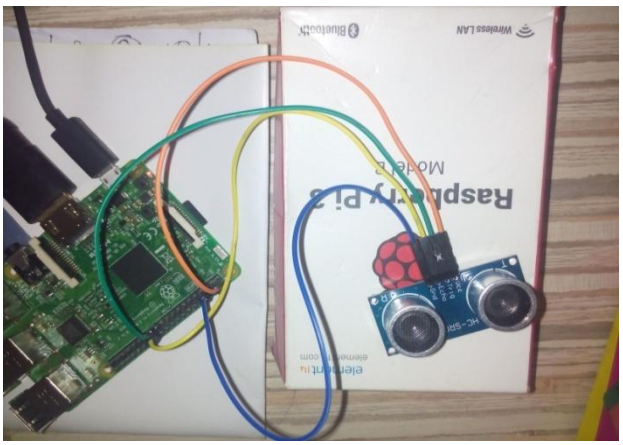

Fig.2 a) Connection of raspberry pi with ultrasonic sensor

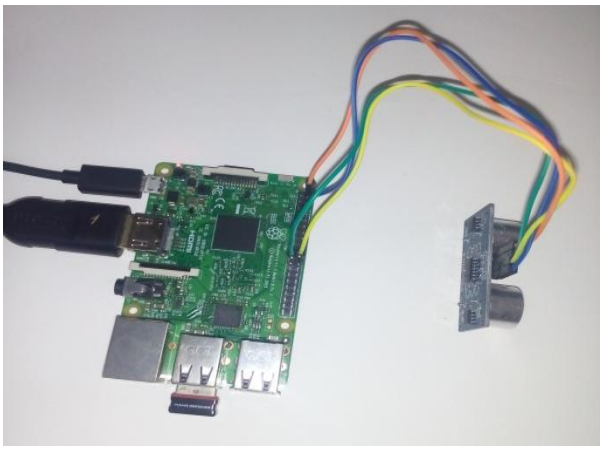

Fig.2 b) Position of ultrasonic sensor

B) Ultrasonic Sensor:

The ultrasonic sensor is a simple button input. It can be used as voltage dividers and calculation involving echo.The ultrasonic sensor used is HC-SR04 whose range is from 2cm to 500cm and resolution is 0.3cm.It works on the frequency of 40 kHz with the cyclic period of 50 ms.

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Fig.3 a) Ultrasonic sensor HC-SR01

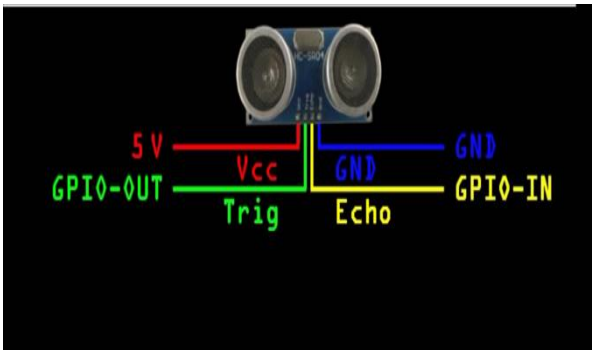

Fig.3 b) Pin out of Ultrasonic sensor HC-SR01

IV. SOFTWARE METHODOLOGY

For this development we use Python language. Python is a high-level, interpreted, and interactive and object oriented-scripting language.Python was developed by Guido van Rossum in the late eighties and early nineties at the National Research Institute for Mathematics and Computer Science in the Netherlands.Python is a broad standard library,interactivemode,portable,extendable,DatabasesGUI Programmingand scalable.
The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python Web site. The Python interpreter is easily extended with new functions and data types implemented in C or C++ (or other languages callable from C). Python is also suitable as an extension language for customizable applications.In this paper we are writing the code for measuring the distance of an object in python languge.Although it is a simple code it can be further modified for calculating the average distance.

Proposed Algorithm:

1. Initialize the different ports for input and output.
2. Assign the values 0 and 1for ports (True and false)
3. Assign the ports as trigger and echo
4. Give the values to start and stop
5. Write the formula for the distance of start and stop time of an object.
6. Print the message.
7. Print the distance accordingly.

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V. RESULTS

When we run the program on python it will show you the result of your object which appears on screen as follows:

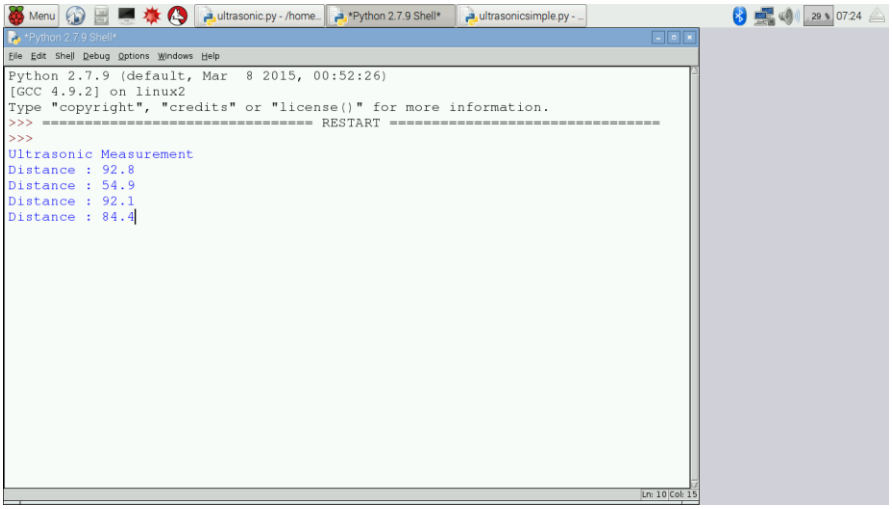

Fig.4 Output window showing different values of the distance by moving the object

This window shows the results of various values of the distance. As we move the object the distance is varying.

VI. CONCLUSION AND FUTURE SCOPE

This paper concludes that we can measure the distance of an object by the use of raspberry pi by writing a simple code in python language. The same technique can be used to find the average of the distance of an object if we move the object. The raspberry pi can also be used for internet of things like controlling the devices by remote access.

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BIOGRAPHY

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