The Real Time Temperature Sensing using Raspberry PI

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Abstract

This paper presents the detection of real time temperature employing Raspberry Pi. Temperature has an impact on all the activities surrounding us be it withering of the leaves, the brew of the coffee etc. The variation of the temperature plays a main role in field of electronics. A precise determination of temperature is a vital factor in countless industries and different fields of science. The temperature monitoring is crucial in lot of industries, like food industry, the workshop, and pharmaceutical industry and in environmental monitoring. The sensed temperature can be displayed in Raspberry pi kit using command.The proposed method aims at continuously monitoring the real time temperature in a cost effective way by setting fixed intervals.Here the monitoring node is raspberry pi. The Sensor utilized here is DS18B20 1-wire digital temperature sensor. This sensor come in a tiny three pi package like a transistor. The temperature is sensed using the digital sensor DS18B20 and is read ,stored and displayed by the raspberry pi kit. Other sensors like humidity, atmospheric pressure or vibration can be clubbed with this system with ease to measure the atmospheric parameters.

Keywords: Python, Raspberry pi, Temperature sensor

I. INTRODUCTION

Temperature has an impact on all the activities surrounding us. A precise determination of temperature is a vital factor in countless industries and different fields of science. The temperature monitoring is crucial in lot of industries, like food industry, the workshop, and pharmaceutical industry and in environmental monitoring.Analog and digital Temperature sensors are avalaiable for sensing temperature for commercial purpose.. Temperature sensors possessing temperature-dependent properties that can be measured electrically contain resistors, semiconductor mechanisms such as diodes, and thermocouples. This project aims at monitoring the real time temperature in a cost effective way. Here the monitoring node is raspberry pi. Programming language used for raspberry pi is Python. The Sensor utilized here is DS18B20 1-wire digital temperature sensor. This sensor come in a tiny three pi package like a transistor. The sensor is interfaced with the raspberry using jumper wires.The temperature is sensed using the digital sensor DS18B20 and is read stored and displayed by the raspberry pi kit. Other sensors like humidity, atmospheric pressure or vibration can be clubbed with this system with ease to measure the atmospheric parameters.

II. RASPBERRY PI

A. Raspberry Pi

The Raspberry Pi[5] is a low cost,credit-card sized computer capable of computing, and uses Graze and Python languages.It can be plugged into a computer monitor or TV, and uses a keyboard and mouse as input devices. It is capable of replacing a desktop computer, from browsing the internet ,CAD modelling,frolicking high-definition video and games, and word-processing,.To use a raspberry pi for various application an SD Card,display and connectivity cables,keyboard and mouse,power supplyand internet connection are required.The features of Raspberry pi[5] includes-The Broadcom BCM2835 ARM11 700Mhz 'System on Chip' Processor,Integrated Video core 4 Graphics Processing Constituent (GPU) capable of frolicking Maximum 1080p Elevated

Meaning Blu-Ray Quality Video,512Mb SDRAM,The free, flexible, and exceedingly builder approachable Debian GNU/Linux Working System,2 x USB Ports,HDMI Video Output,RCA Video Output,3.5mm Audio Output Jack,10/100Mb Ethernet Port for Internet Access,5V Micro USB Domination Input Jack,SD, MMC, SDIO Flash Recollection Card Slot,40-pin 2.54mm Header Progress Slot .Figure 1 shows the raspberry pi kit.and the interfaces .Figure 2 shows the pin details and the variants of the kit.

Fig. 1: Parts of Raspberry Pi Kit and the interfaces[2]

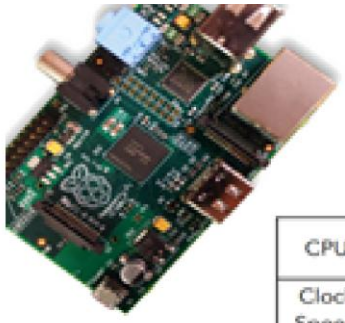
B. Plugging Into Raspberry Pi:

For plugging in to raspberry pi [6]the following steps has to be followed

(1) To start slot the SD card into the SD card slot on the Raspberry Pi.
(2) Plug in the USB keyboard and Mouse into the USB slots on the Raspberry Pi.
(3) Make sure that the monitor or TV is coiled on, and the right input is selected.(e.g. HDMI , DVI, etc.)
(4) Link the HDMI cable from the Raspberry Pi to the monitor
(5) If the Raspberry Pi has to be linked to the internet, plug in an Ethernet cable into the Ethernet seaport consecutive to the USB seaports.

C. Logging Into Raspberry Pi[6]:

(1) Once the Raspberry Pi has finished the boot procedure, a login punctual will appear. The default login for Raspbian is username pi alongside the password raspberry. After logged in discern the order line promptpi@raspberrypi~$will be displayed.
(2) To use the graphical user interface,use startx command and press Go in the keyboard.



Raspberry Pi

	Model A	Model B
CPU	Broadcom ARM11 SoC	Broadcom ARM11 SoC
Clock Speed	Up to 1GHz ClockSpeed*	Up to 1GHz ClockSpeed*
Memory	256 MB	512 MB
USB	1 USB Port	2 USB Ports
Network	None	Onboard Ethernet

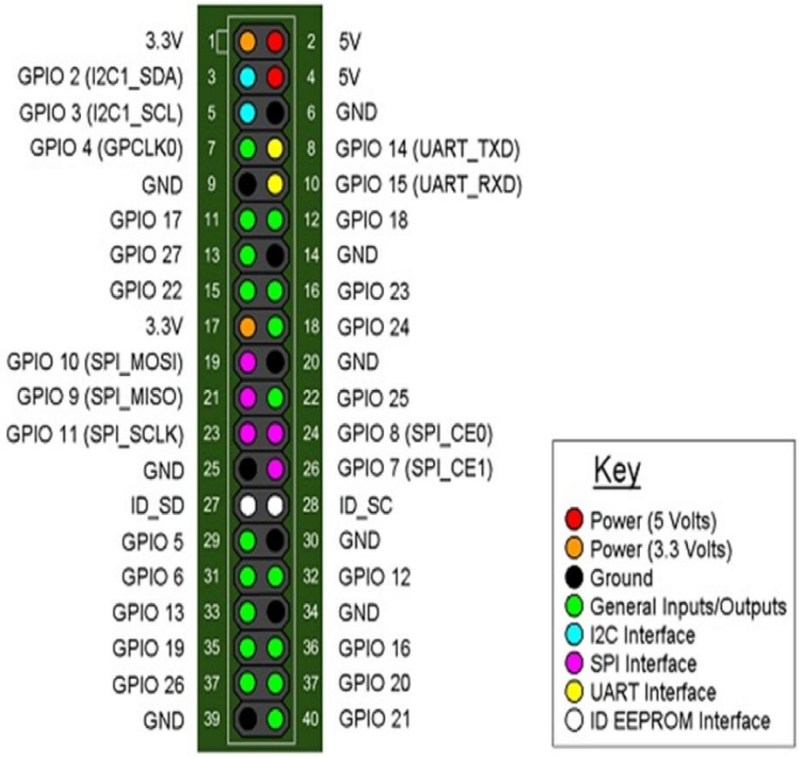


Fig. 2: The pin details and the variants of the kit[3]

III. TEMPERATURE SENSOR (DS18B20)

DS18B20 [9] is a Programmable Resolution 1-Wire Digital Temperature sensor in which all data is dispatched down in one wire, making it useful for microcontrollers such as the Raspberry Pi, as it merely needs one GPIO pin for sensing. In addition to this, most 1-Wire sensors will come witha exceptional serial program that can link several constituents in to one microcontroller. Since the Raspberry Pi has no ADC (Analog to Digital Converter) ,the digital temperature sensor DS18B20 is a good choice for Temperature sensing.The DS18B20+ has a layoutsimilar to that of transistor TO-92 package, with three pins: GND, Data (DQ), and VDD.. The features of DS18B20 are Power Supply ranging from 3.0V to 5.5V , Temperatures measuring range from -55°C to +125°C (-67°F to +257°F) with ±0.5° and unique 1-Wire interface.Most important feature is that it requires no external components.Figure 3 shows the pin details ,variants of DS18B20

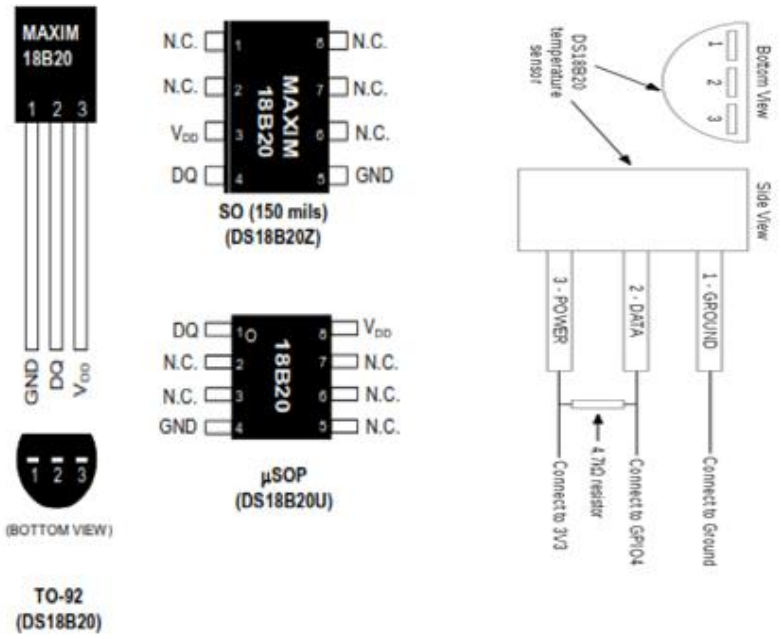


Fig. 3: The pin details, variants of DS18B20[4]

IV. PROPOSED SYSTEM

The sensed temperature can be displayed in Raspberry pi kit using command.The proposed method aims at continuously monitoring the real time temperature in a cost effective wayby setting fixed intervals. Here the monitoring node is raspberry pi. The Sensor utilized here is DS18B20 1-wire Temperature Sensor. This sensor come in a tiny three pi package like a Transistor and is a precise Digital device.The sensor is connected to the raspberry pi kit using jumper wire.The raspberry pi kit can be used to store and display the real time temperature.The raspberry kit is programmed using python language. The block diagram of the proposed method is shown in figure 4.The algorithim for sensing,storing and displaying the data is given below.The atmospheric temperature is displayed in degree celcius and farenhiet

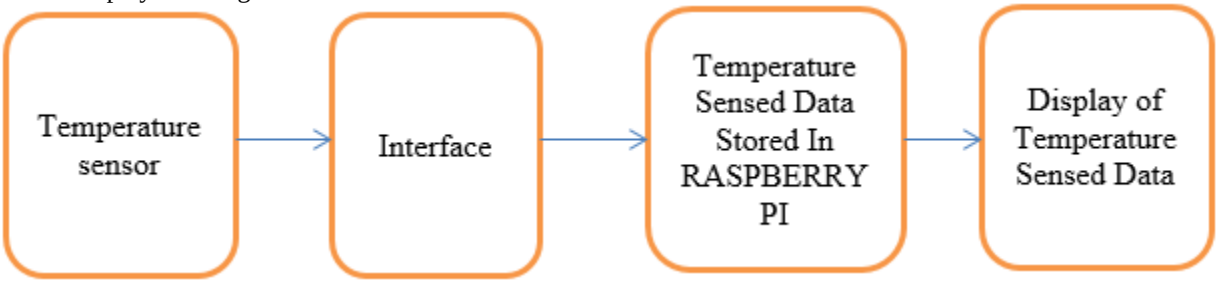


Fig. 4: Block Diagram of the proposed method

A. Algorithm:

Step1 – Booting the KERNEL
Step2 – Connecting the Temperature Sensor
Step3 – Reading the Sensor from the Terminal
step4 – Reading the Temperature from Python program

B. Python[10] Program Algorithm:

Step1 – Install 1-wire drivers and interfacing alongside the sensor
Step2 – Set the time intervals
Step3 – Set the drivers
step4 – Create the output file to store the temperature
Step5 – Create variable for Temperature
Step6 –Display the temperature readings from the sensor

V. IMPLEMENTATION

The components required for the implementation are Digital temperature sensor DS18B20,Resistor4.7kΩ, Breadboard, Jumper Wires, Connecting Wires and Raspberry Pi kit. The resistor is utilized as a 'pull-up' for the data-line. It ensures that the 1-Wire data line is at a described logic level, and limits interference from mechanical sound if the pin is left floating. Jumper wires is used for interfacing raspberry and sensor..Connect GPIO GND [Pin 6] on the Pi to the negative side of the breadboard and link GPIO 3.3V [Pin 1] on the Pi to the positive side on the breadboard.Next step is toinsert the DS18B20+ into the breadboard, Connect DS18B20+ GND [Pin 1] to the negative side of the breadboard and + VDD [Pin 3] to the positive side of the breadboard.Next step is to place one arm of 4.7kΩ resistor to DS18B20+ DQ [Pin 2] and other end to the positive side of the breadboard.Finally, link DS18B20+ DQ [Pin 2] to GPIO 4 [Pin 7] alongside a jumper wire.

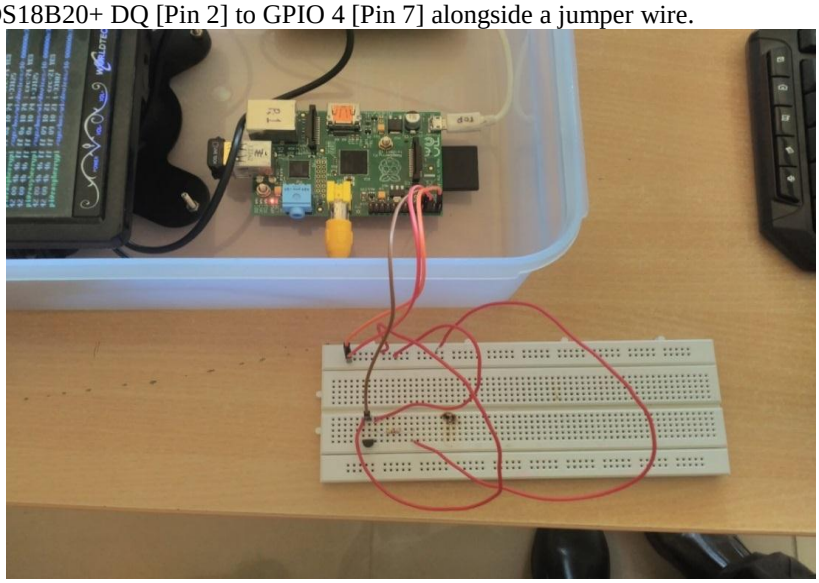


Fig. 5: Set up of temperature sensing using Raspberry pi kit

VI. RESULTS

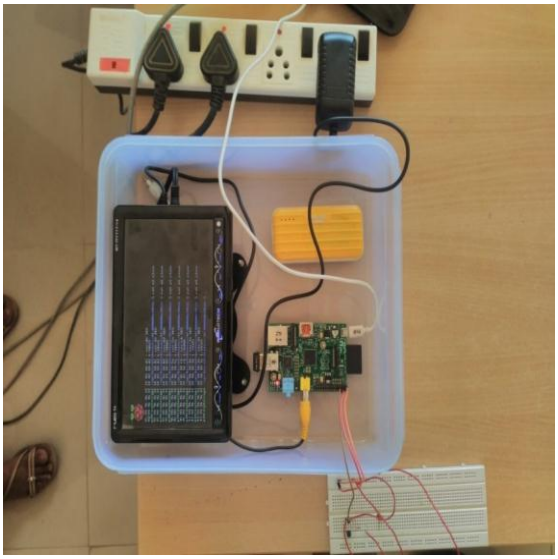


Fig. 6(a): Implementation set up

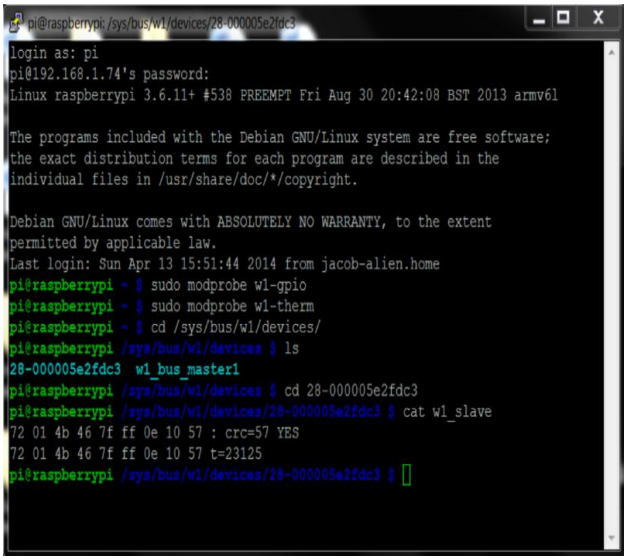


Fig. 6(b): Temperature sensing using command line

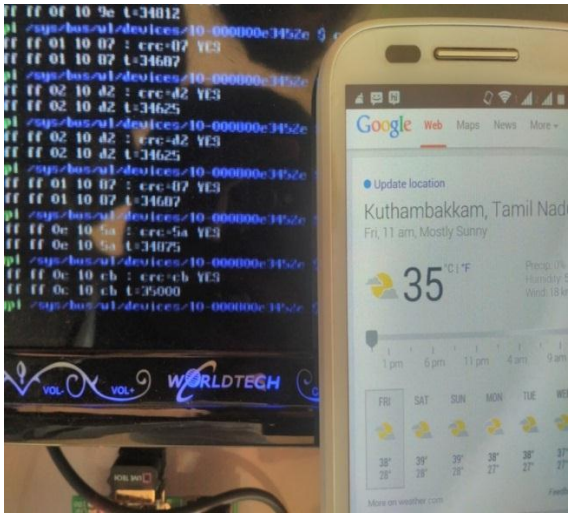
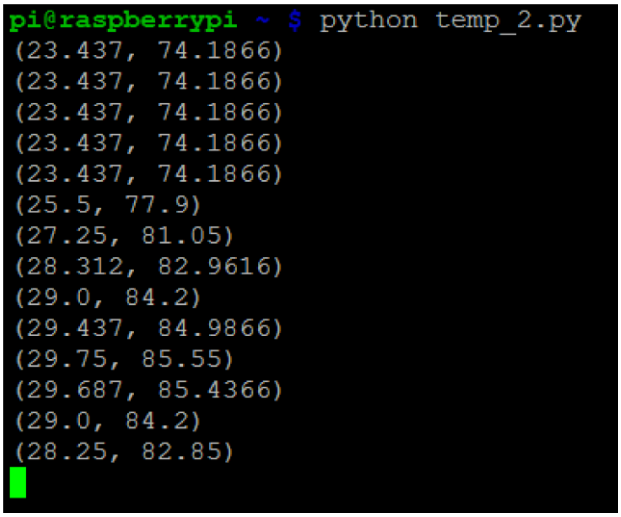


Fig. 6(c): Comparison of sensed temperature using



6(d) Display of temperature in Degree Celcius and Farenhiet raspberry pi and mobile device

VII. CONCLUSION & FUTURE WORK

This project presents the Real time Temperature sensing using Raspberry Pi .Other supplementary sensors like Piezo Vibration Sensor , Humidity sensor ,Barometer Sensor , Presser Sensor , DHT Sensor can be connected to the Raspberry Pi kit making it effectively storing and displaying atmospheric conditions in real time. The detected data can be transferred from Raspberry pi to the Laptop and in the subsequent pace it can be stored into the cloud from Laptop for remote monitoring and further reterival.

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