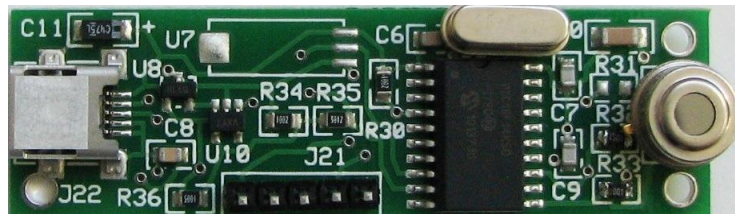




LookingForSolutions.com



**Non-Contact Infrared Temperature
Ambient Temperature / Relative Humidity
Sensors to USB Output
Models LFS108C & LFS108D**

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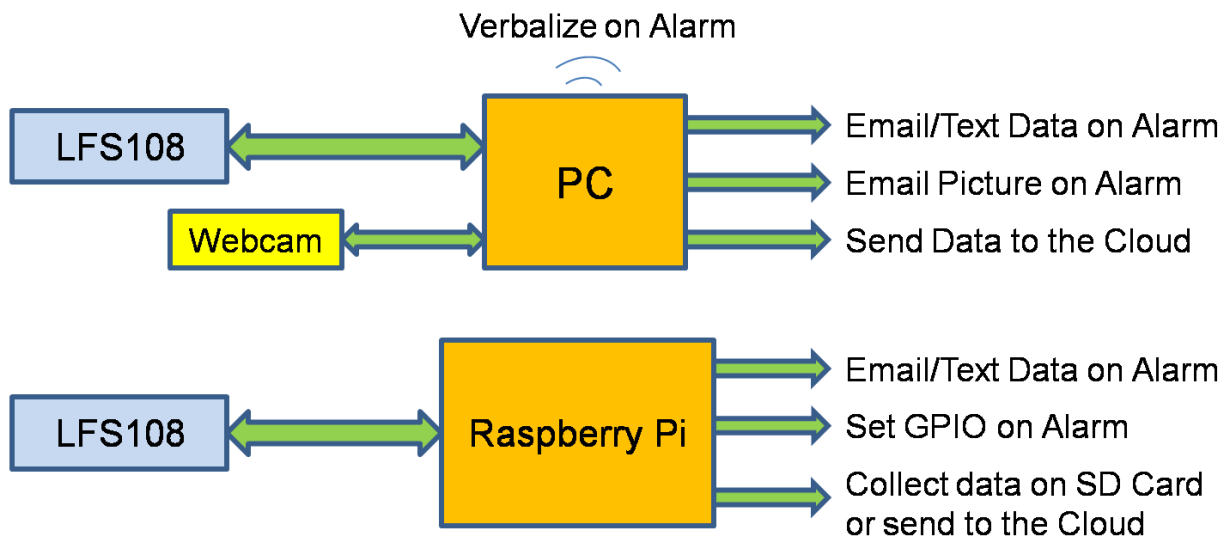
Quick Start

To quickly setup and start your board, follow the steps below:

- Download the software (LFS108C.zip or LFS108D.zip) from the website to your desktop.
- Unzip the file. Run setup.exe to install the software.
- Connect the board to your PC USB port via USB cable provided.
- The PC should recognize the board and install the USB drivers. Otherwise, go to Device Manager/Ports to install the USB driver which is located on your desktop.
- Now you can run the PC software and communicate with the board.

Other Options

If you are not using a PC, you can connect the board to a Raspberry Pi computer board. Communicate with the board using the sample Python code provided. You can collect data from the board, or send data to the cloud, email data on alarm, etc.



1- Introduction

LFS108C is a non-contact infrared & ambient temperature sensors to USB output. LFS108D is a non-contact infrared & ambient temperature and relative humidity sensors to USB output. Each model has its own PC application. Simply download the software from the web site LookingForSolutions.com. Save the zipped file onto your desktop. Unzip the file. Run setup.exe to install the software. The software will place a shortcut of the program on the desktop. Save the USB driver directory (from the zipped file) on the desktop.

Second, connect the board to your PC USB port with the cable provided. The PC will recognize the board and will start installing the USB drivers. You can view the COM port by going to the Device Manager/Ports. You can also install the USB drivers from the Device Manager/Port/Driver/Update Driver and point the PC to the USB driver directory on the desktop. Now you can run the software from the shortcut on the desktop.

Figure 2 shows the main screen for LFS108C. Figure 3 shows the main screen for LFS108D. You can set the COM port and the Chart Speed (Time interval per data point) from the drop down menus. Click the Start button. The program asks for the name of data file to be saved. You can name your data file (Filename.txt or Filename.csv) and the location where you want to save it. Click the Save (or Cancel) button. The program will start reading and displaying the infrared temperature, ambient temperature, and relative humidity (LFS108D) from the board and provides a line graph of the parameters. It also shows the model number of the board and the running Elapsed time.

The program keeps track of the Maximum and Minimum values of infrared temperature, ambient temperature, and relative humidity (LFS108D) since the start of the session which can be reset individually by pressing the corresponding Reset button. The infrared / ambient temperature can be displayed and saved in either Degrees Fahrenheit or Celsius by pressing the temperature engineering unit button. You can display High & Low alarm lines over the temperature graph lines.

Live Video - There is a Live Video button on the upper right corner of the screen. Clicking the button will open a new window connecting you to the built-in webcam of your PC or an external webcam connected to the PC USB port. If there are multiple webcams, you will see a drop down menu to select the one you want to connect to. Once connected, you will see a live video of the event through the selected webcam. This feature allows monitoring an event live and take a picture of the event when there is an alarm condition. The picture and the corresponding data can also be emailed to alert the user. Figure 1 shows how the webcam is setup.

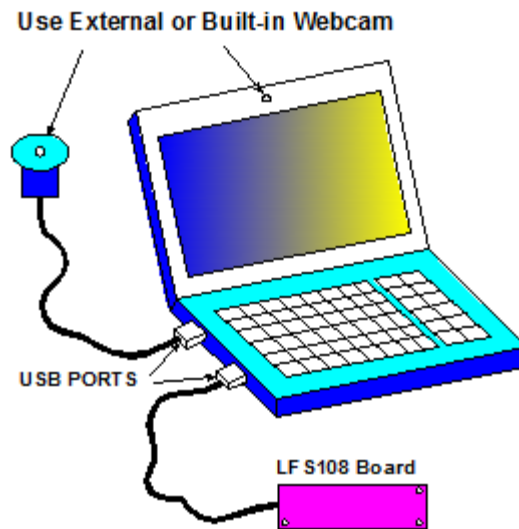


Figure 1 – Typical Webcam Setup

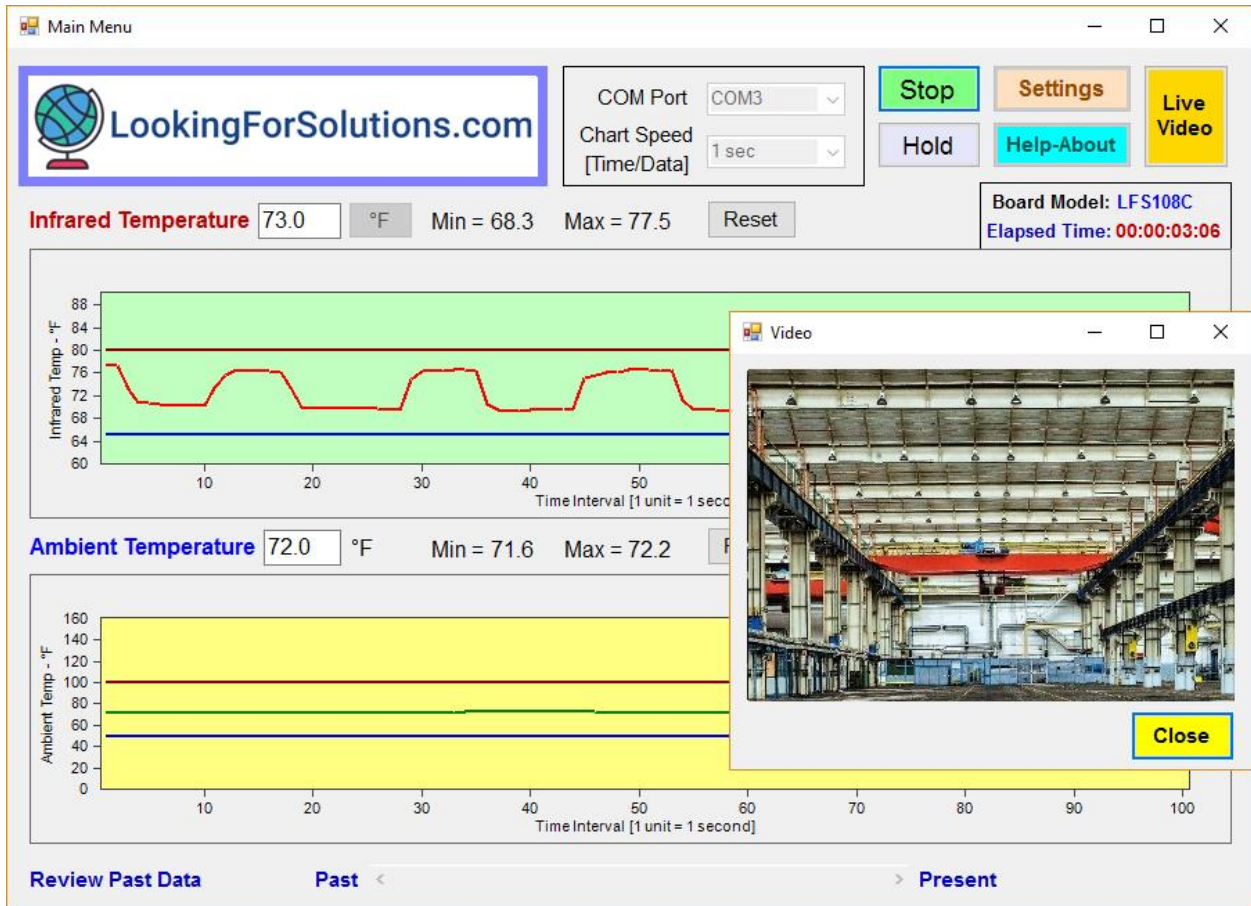


Figure 2 – Main Screen, LFS108C – Real Time

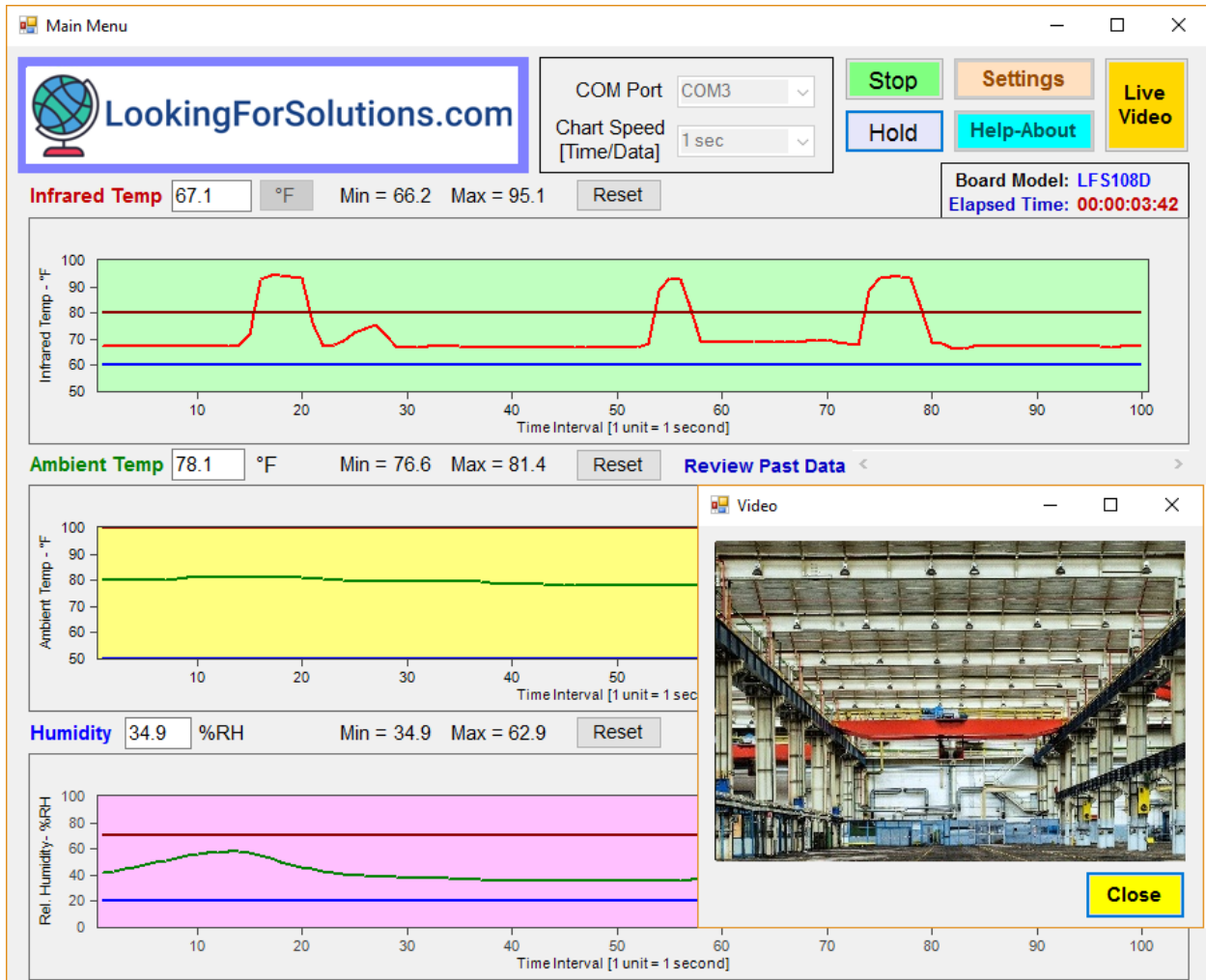


Figure 3 – Main Screen, LFS108D – Real Time

Review Past Data - Clicking the Hold or Stop button will stop the monitoring. You can now review the past data by scrolling through the line graphs back and forth in time as shown in Figures 4 & 5. Clicking the Hold button temporarily will stop the monitoring, you can continue by clicking the Go (Same) button. Clicking the Stop button will stop the monitoring permanently. You will need to start a new monitoring session by clicking the Start button.

When saving a data file (.txt or .csv), the program opens a file and saves up to 20,000 sets of data with date/time stamping, before closing the file and opening a new one.

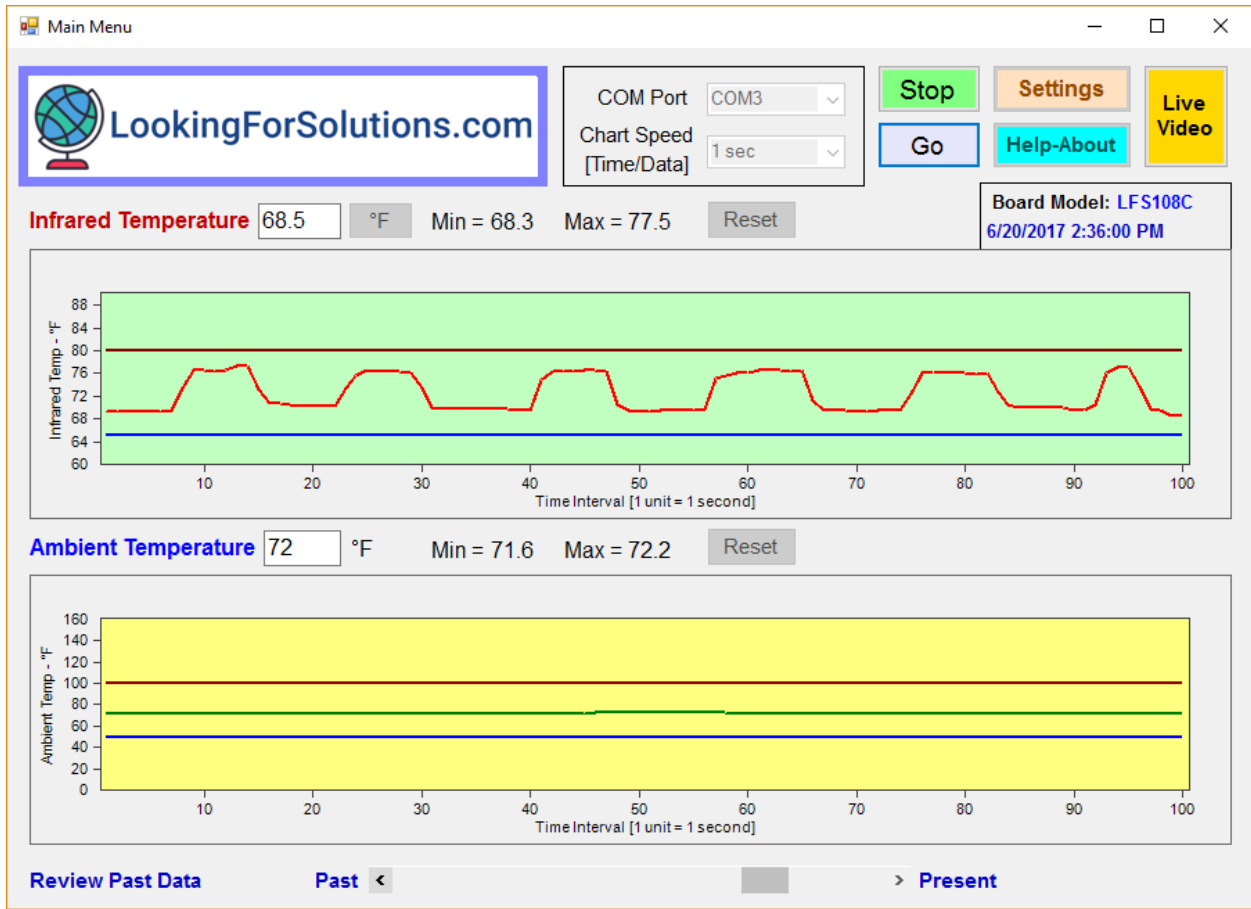


Figure 4 – Main Screen, LFS108C – Review Past Data

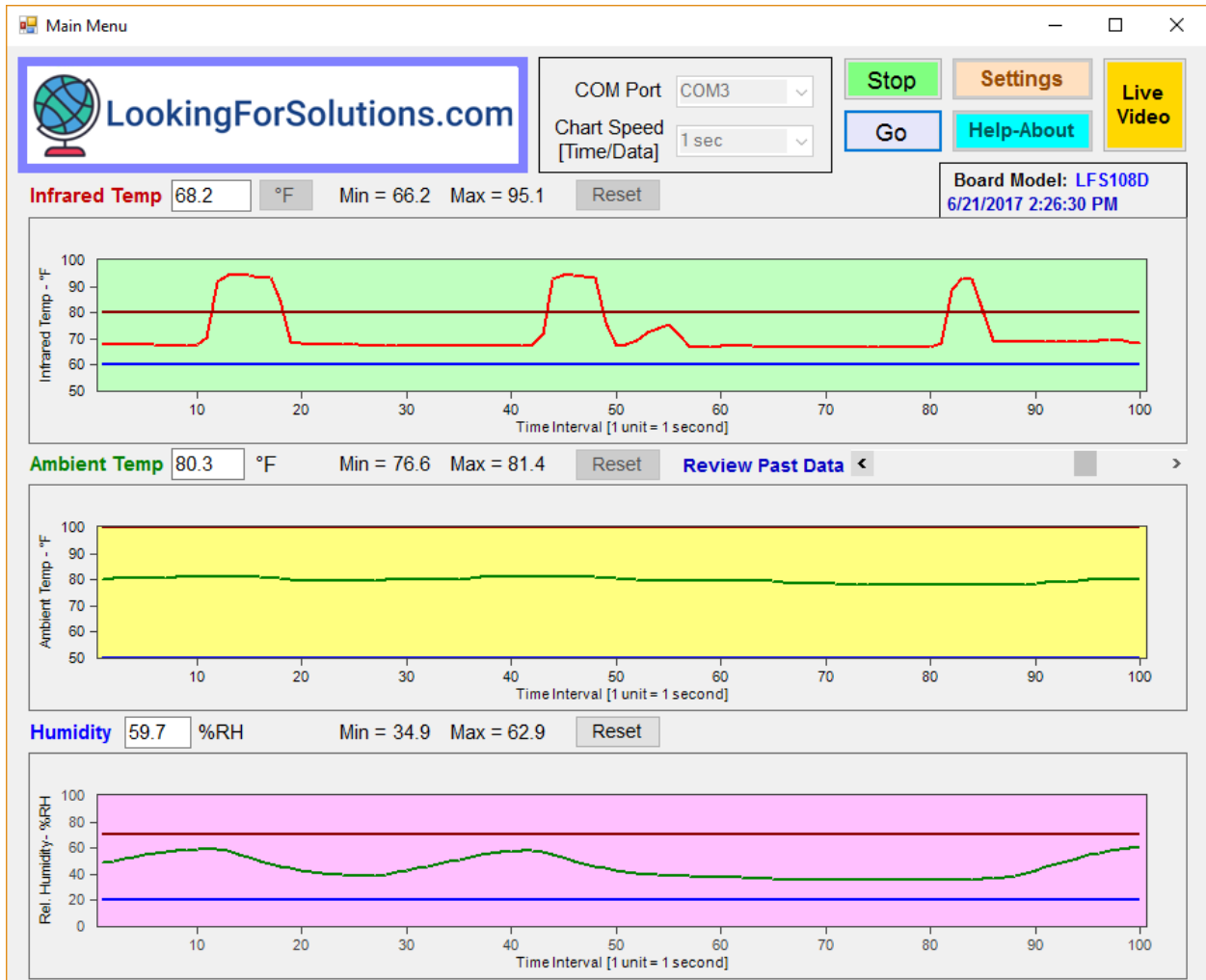


Figure 5 – Main Screen, LFS108D – Review Past Data

Help-About - Clicking the Help-About button will open a new window showing the board picture, firmware version, hardware version, serial number, and the PC software version as shown in Figure 6.

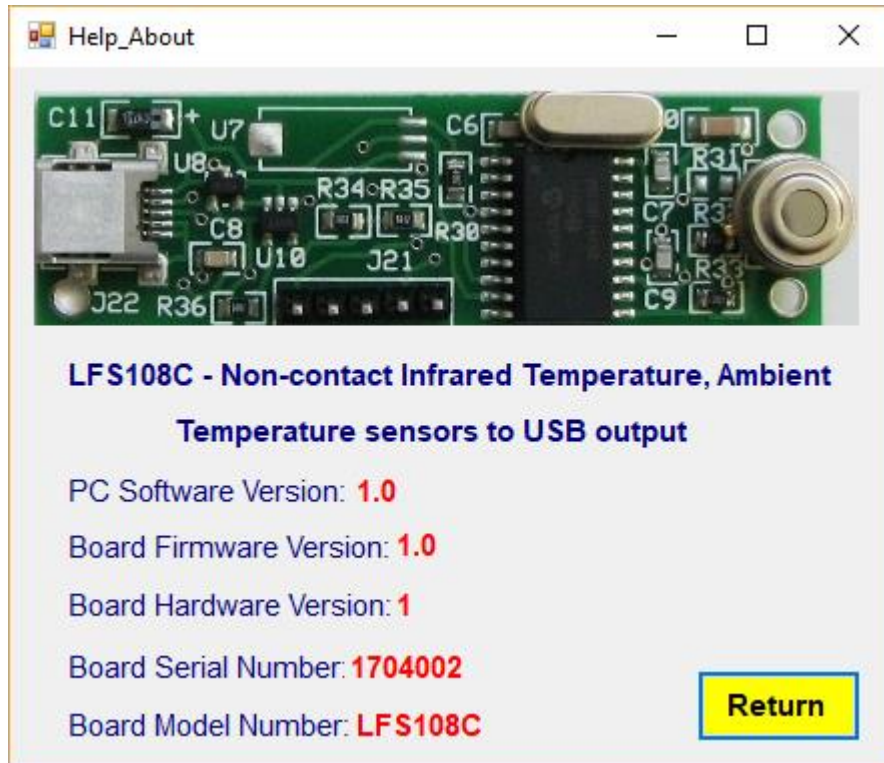


Figure 6 – Typical Help-About Screen

2- Settings Menu

Figures 7 & 8 show the Settings Menu. Here is a list of functions you can perform:

- Set the Target surface Emissivity – Infrared Temperature measurement
- Re-scale the Temperature Y-Axis.
- Re-scale the Relative Humidity Y-Axis.
- Set High and Low Alarm set points for Temperature.
- Set High and Low Alarm set points for Relative Humidity.
- Calibrate the board for Infrared Temperature, Ambient Temperature & Relative Humidity
- Record (Save) data to a file on alarm conditions.
- Email Data/Picture on alarm conditions. Send a test email.

- Send Text Message on alarm condition. Send a test Text Message.
- Send data to the Cloud – IoT (Thingspeak.com)
- Take a Picture on alarm condition
- Verbalize on alarm condition

Infrared Temp-Y Axis Re-scaling
 Max. Value 90
 Min. Value 60

Ambient Temp-Y Axis Re-scaling
 Max. Value 160
 Min. Value 0

Infrared Temp - Alarm Points
 High Alarm 80
 Low Alarm 65

Ambient Temp - Alarm Points
 High Alarm 100
 Low Alarm 50

Sensor Board Calibration OFF
Infrared Temp - °F
 Temp @ 212°F(100°C) Calibrate
 Temp @ 32°F (0°C) Calibrate
Ambient Temp - °F
 Ambient - °F 72.0 Calibrate
 Restore Factory Calibration

Target Surface Emissivity 0.95

Send an Email or Text Message on Alarm Condition
 Title of Email / Message LFS108C Testing
 Sender's email address xxxxxxxx@yahoo.com
 Recipient's email address xxxxxxxx@gmail.com
 Sender's email password
 Recipient's Cellular carrier AT&T
 Sender's smtp mail server smtp.mail.yahoo.com
 Recipient's ten digit cell phone number 1234567890
 Port Number 25 SSL False
 Send Test email Send Test Text Message

Email Data/ Picture on alarm **Send Data to the Cloud - IoT**
 Send a Text Message on alarm **(Thingspeak.com) API Key** abcdefgh12345678
 Record Data on Alarm conditions **Verbalize on Alarm Condition** Speech
 Take a Picture on Alarm conditions

Note: To Send an email or Text Message or send data to the Cloud, the PC must be connected to the Internet

OK-Save Cancel

Figure 7 – Settings Menu, LFS108C

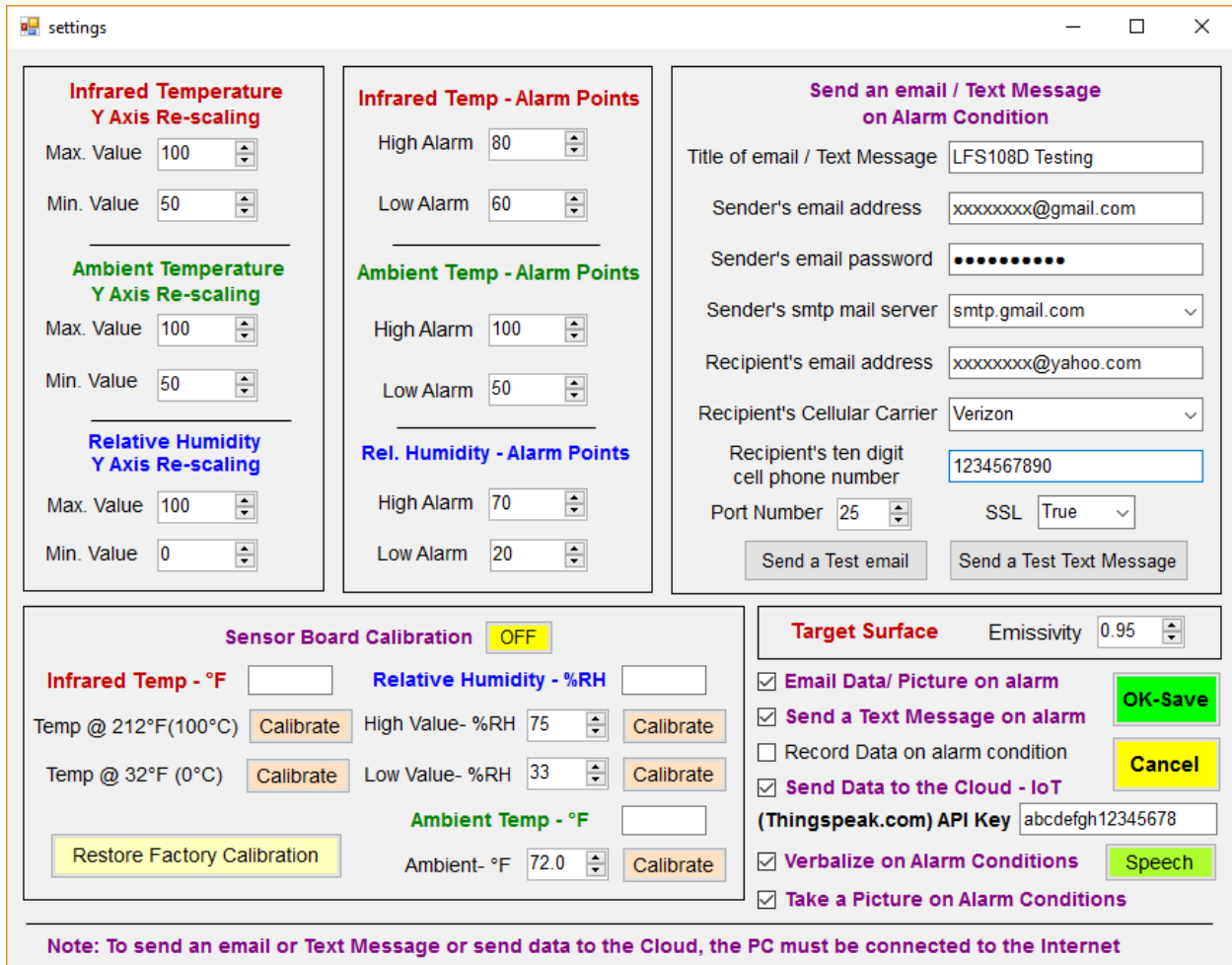


Figure 8 – Settings Menu, LFS108D

2.1- Sensor Board Calibration

You need to Turn ON the calibration function by clicking the OFF button. The current Temperature and Humidity values will be displayed in the text boxes

Infrared Temperature – You can calibrate the board for infrared temperature at two fixed points, 0 °C (32 °F) and 100 °C (212 °F). Aim the sensor to a 0 °C temperature controlled plate and click the Calibrate button. You will see a windows popup “Low IR Cal OK” to confirm the calibration. Aim the sensor to a 100 °C temperature controlled plate and click the Calibrate

button. You will see a windows popup “High IR Cal OK” to confirm the calibration. Make sure the target plate fills the optical field of view of the IR sensor (90 Degrees).

Temperature – You can calibrate the board for ambient temperature at one point.

Set the calibration point in °F based on a known ambient temperature. Click Calibrate button. You will see a windows popup “Temp Cal OK” to confirm the calibration.

Humidity (LFS108D) – You can calibrate the board for relative humidity at two points. Place the board in a known humidity chamber. Set the humidity chamber to a low humidity like 33%. Set the Low value humidity to 33%. Click Calibrate button. You will see a windows popup “Low Humidity Cal OK” to confirm low humidity calibration. Set the humidity chamber to a high humidity like 75%. Set the High humidity value to 75%. Click Calibrate button. You will see a windows popup “High Humidity Cal OK” to confirm high humidity calibration.

In case you made a mistake or want to go back to the original factory calibration, simply click “Restore Factory Calibration”. You will see a windows popup “Reset Factory Cal OK” to confirm.

2.2- Record Data on Alarm conditions

If you select this Checkbox, the program only saves data to a file when there is an alarm condition due to temperature or relative humidity.

2.3- Email Data/ Picture on alarm condition

If you select this Checkbox, the software application can send an email every time there is an alarm condition based on the Infrared / ambient temperature or relative humidity. Check “Email Data/ Picture on alarm” checkbox and fill in the following items:

- Sender’s email address and password.
- Sender’s smtp mail server. Either select from the drop down list menu, or type in your specific mail server if it is not in the list.

- Port number and the SSL. It is already set for gmail & yahoo accounts.
- Message title and the Recipient's email address.

You can send a test email to make sure it is functional. Click OK-Save button to save settings and exit.

2.4- Sending Text Message on alarm condition

The software can send a text message to a cell phone every time there is an alarm condition based on the infrared / ambient temperature or relative humidity. Check "Send a Text message on alarm" checkbox and fill in the following additional items:

- Recipient's Cellular Carrier
- Recipient's cell phone number.

You can send a test Text Message to make sure it is functional. Click OK-Save button to save settings and exit.

2.5- Send Data to the Cloud – IoT (Thingspeak.com)

The software can send Infrared / ambient temperature, and relative humidity data to Thingspeak.com web site for data storage and data visualization.

You need to create an account with Thingspeak.com. After login process, create a new Channel. The Channel can be either Public or Private. Fill in the Channel settings such as Name, Description, Field 1 (Infrared Temperature), Field 2 (Ambient Temperature), and Field 3 (Relative Humidity). Go to API keys tab and look for "Write API Key". Copy the API key code.

Go back to the settings menu software. Check off the "Send Data to the Cloud - IoT" checkbox and enter (Paste) the API key in the text box. Click OK and go back to the main menu. Make sure the Chart speed selection is set to 30 seconds before starting the session.

Thingspeak.com provides many features such as data visualization and export, MATLAB analysis and Tweet alerts. Figure 9 shows a typical Thingspeak.com screen.

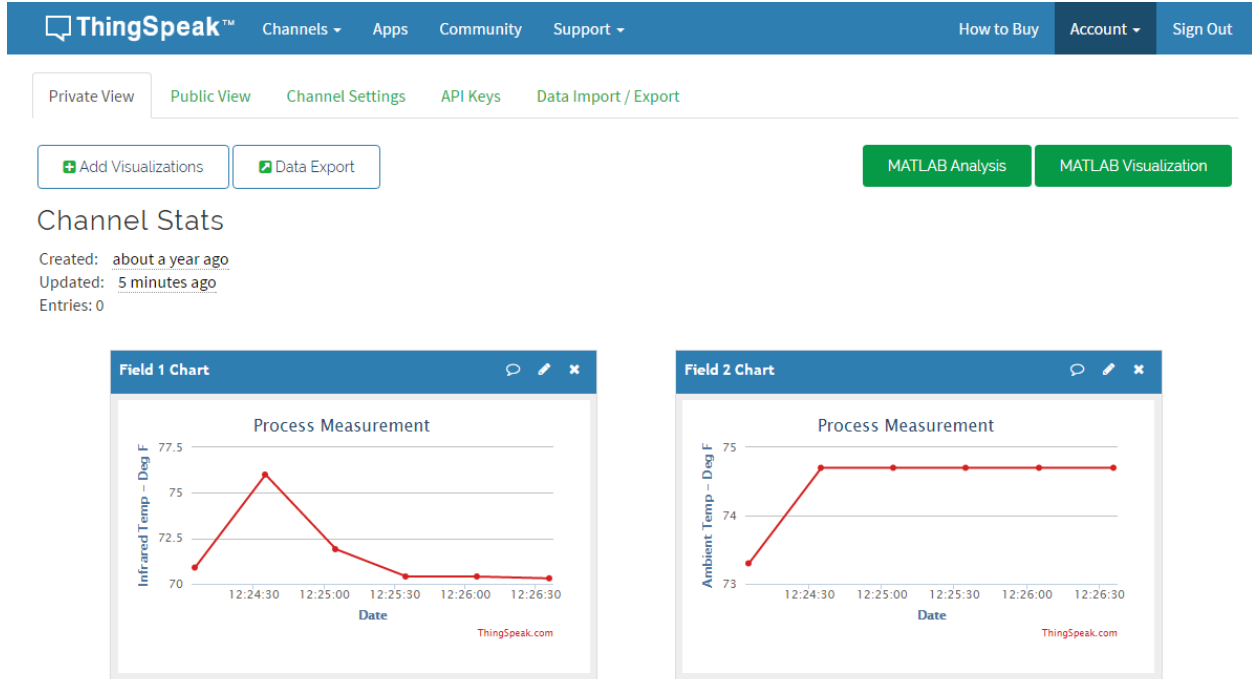


Figure 9 – Typical Thingspeak.com Screen

2.6- Verbalize on Alarm conditions

The software can announce a message when there is an alarm condition based on the Infrared / ambient temperature or relative humidity. Check “Verbalize on Alarm conditions” checkbox and click on the Speech button will open a new window that shows the default alarm messages. You can either use the default messages or make your own messages. You can click Test Voice Message button to test the voice function. Figure 10 shows the Speech window screen.

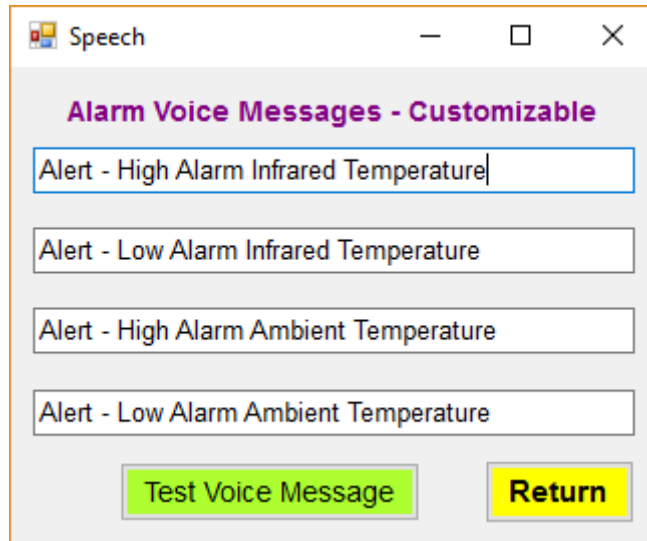


Figure 10 – Typical Speech Screen

2.7- Take a Picture on Alarm conditions

You can take a picture of the event via the connected webcam when there is an alarm condition. When you start a monitoring session, you need to create a jpeg file and click on Live Video button to start the live video. Every time there is an alarm condition, the software takes a picture of the event and saves it under the jpeg file name. There could be multiple alarm conditions in a session, so multiple jpeg files will be created to save pictures. If "Email Data/Picture on alarm condition" checkbox is checked, the picture and the corresponding data will be emailed when an alarm condition occurs.

3- Saving Data to the Storage Cloud

You can save the infrared / ambient temperature, and relative humidity to any storage cloud service such as Google Drive, One Drive, Dropbox, etc. as follows:

- Install the storage cloud service app on your PC as well as your smart phone or Tablet.
- Run our PC application, and Start the data monitoring/logging session.
- Create a data file under the cloud storage folder (Google Drive, One Drive, etc.), name the data file, and click Save.

Your data file is now created in the cloud storage folder. After closing the data file, you can review the data from your smart phone or tablet.

4- Specifications

Infrared Temperature

| | |
|-----------------------------|---|
| Range | -40 to 370 °C (-40 to 700 °F) |
| Accuracy | 1°C (2 °F) |
| Resolution | 0.1 Degree |
| Optical Field of view (FOV) | 90 Degrees – Distance to Spot size (D:S) = 1:2 |
| Emissivity | Adjustable from 1.00 to 0.10 in 0.01 steps |
| Wavelength Bandwidth | 5.5 to 14 um |
| Configurations | Straight Line of sight, Right Angle Line of sight, Remote (48") |

Ambient Temperature

| | |
|------------|----------------------------|
| Range | -15 to 85 °C (5 to 185 °F) |
| Accuracy | 1.4°C (2.5 °F) |
| Resolution | 0.1 Degree |

Relative Humidity (LFS108D Only)

| | |
|----------------------------|--|
| Range | 0 to 100 %RH |
| Accuracy | 3.5 %RH |
| Resolution | 0.1 %RH |
| Sampling Time | 125 msec, 0.5 sec, 1 sec, 5 sec, 10 sec, 30 sec |
| Recording Interval | 125 msec, 0.5 sec, 1 sec, 5 sec, 10 sec, 30 sec |
| Recorded value | Average value of incoming samples at 2 samples/sec |
| Initial Warm up Period | 2 minutes |
| PC Software | Windows 7, 8, 10 |
| Maximum data file | 20,000 sets of data per file |
| Review Past Data on screen | 250,000 sets of data |
| Serial Communication | 19,200 BPS, 8 bit, 1 Stop bit, No Parity |
| Power | USB 2.0 |
| Webcam | Logitech C270 or Equivalent |

Dimensions 2.35 x 0.70 inches (59.7 x 17.8mm)
 Export Classification EAR99

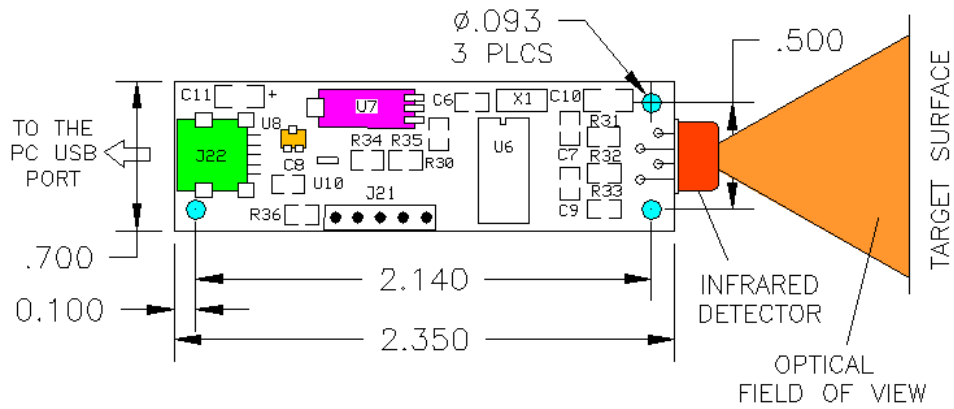


Figure 11 - General Dimensions, LFS108C / LFS108D

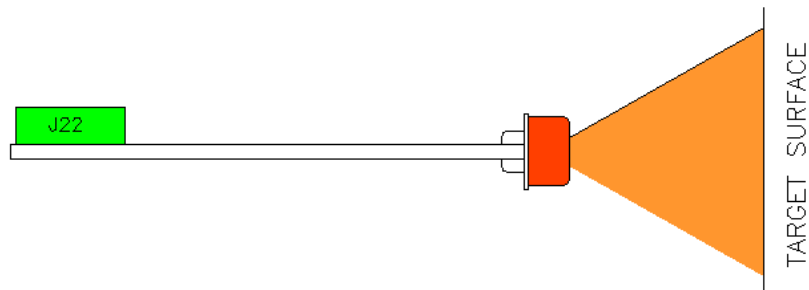


Figure 12 – Straight Line of sight, LFS108C1 / LFS108D1

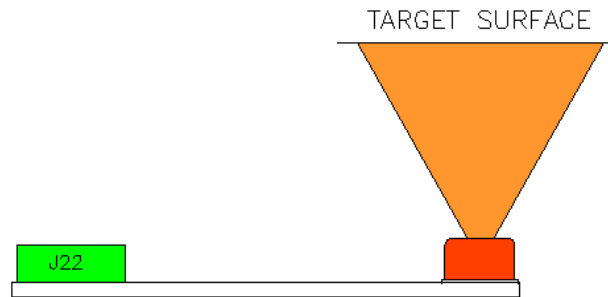


Figure 13 – Right Angle Line of sight, LFS108C2 / LFS108D2

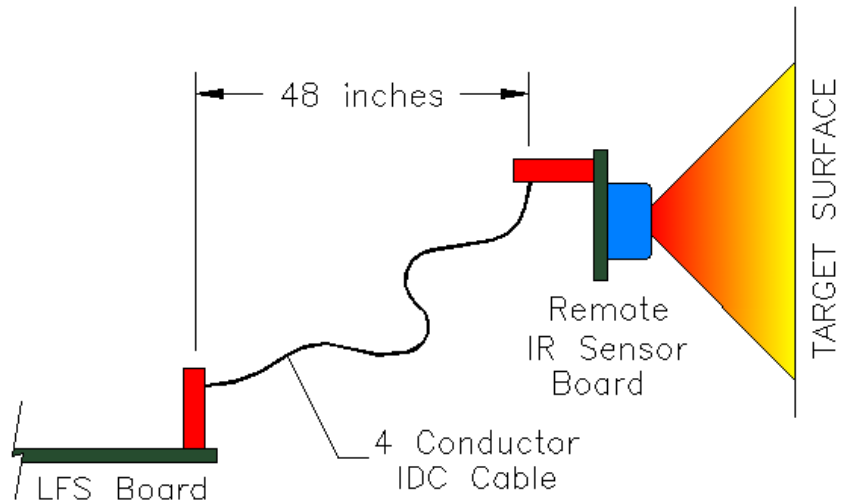


Figure 14 – Remote Sensor, LFS108C3 / LFS108D3

Note: The target surface must be larger than the Infrared detector Optical Field of View (FOV)

5- PC Commands

The following is a list of PC commands used to communicate with the board (CR means Carriage Return):

GETID<CR> - Read the Board ID (Model number)

GETSN<CR> - Read the Board Serial Number yywwxxx

GET1<CR> - Read the Ambient Temperature from the board. It provides the temperature in degree F times 10. For example if the temperature is 72.5 °F, it will send 725.

GET2<CR> - Read the Relative Humidity from the board. It provides the humidity in %RH times 10. For example if the humidity is 42.5%RH, it will send 425.

GET3<CR> - Read the Infrared temperature from the board. It provides the temperature in degree F times 10. For example if the infrared temperature is 236.7 °F, it will send 2367.

6- Troubleshooting

Here is a list of items you need to be aware of if you get into problems:

- During the software installation, the Windows operating system may indicate “Unknown Publisher” or un-trustworthy source, please ignore and install the software. Our software has a Digital Signature and comes from a trusted source.
- Make sure the PC does not go to sleep mode, otherwise you will lose USB communication to the board. Make sure the PC sound is enabled to be able to use the verbalization (Speech) feature.
- Make sure your PC is connected to the internet if you are planning to use features like sending emails, text messages, or data to the cloud.
- Check your antivirus program for any blocking of the application to the internet.
- Check your wireless router for any blocking of the application to the internet.

Yahoo and Gmail accounts have additional security features that does not allow a third party app (Like our app) access the account. In order to access the account from our app, additional steps need to be taken as follows:

Yahoo Accounts:

You need to login to your Yahoo account and under Account Security add our app (LFS108CD) and generate a Password. Then use that Password in our app for the account Password in the settings menu. Leave Port number as 25.

Gmail Accounts:

Sign into your Google account. Under Security, there is a section called “Less secure app access”. You need to turn this ON. This allows you to access your Gmail account from our app. Leave Port number as 25.

7 – Third Party Software & Devices

You can interface and communicate with our products from [National Instruments Labview](#) software platform. We provide sample program for your evaluation. Figure 14 shows a typical Labview screen. You can interface and communicate with our products from single computer boards such as [Raspberry Pi](#). We provide sample Python program for your evaluation.

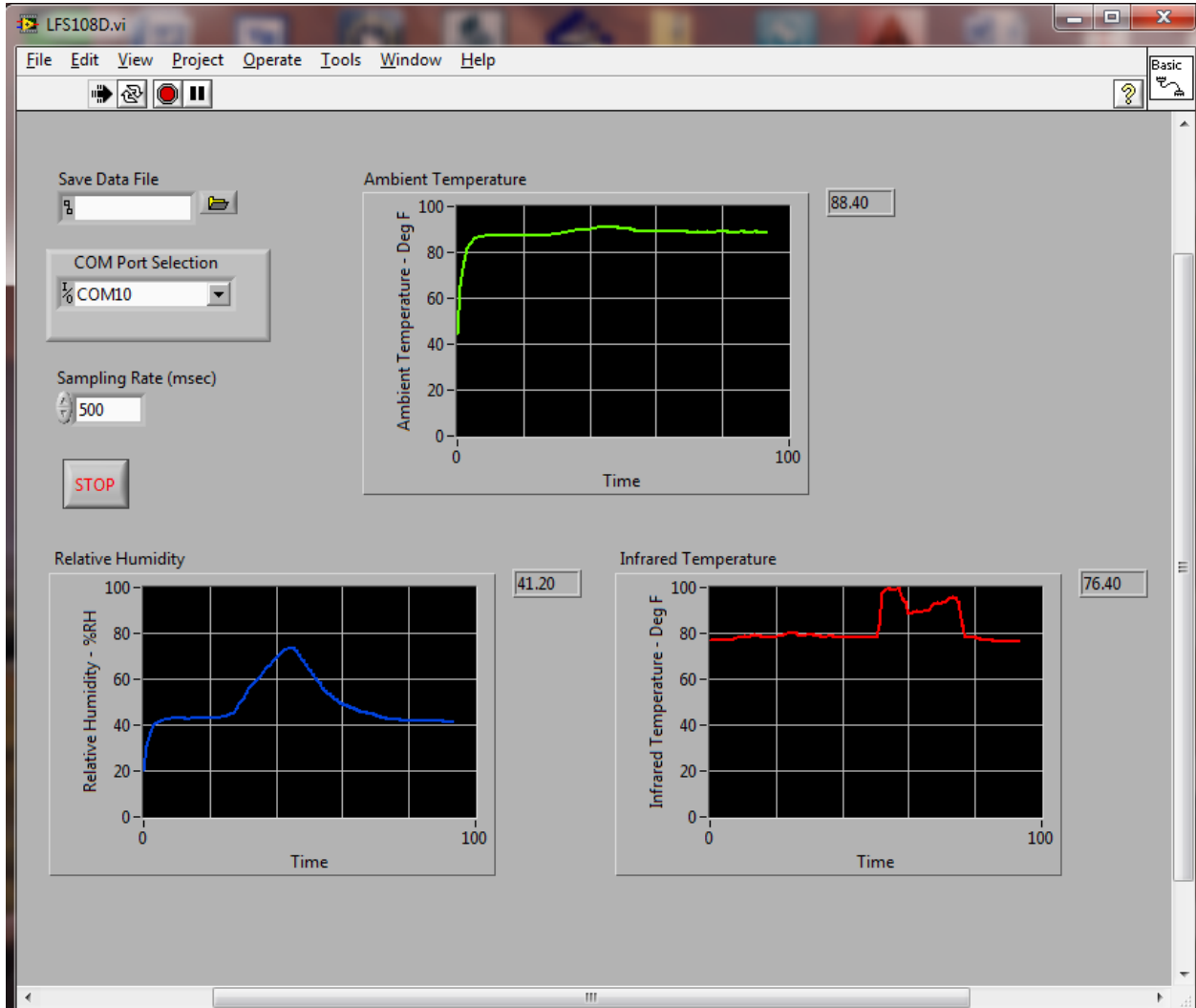


Figure 15 – Typical Labview screen