



SMART HOME AIR HEATER CONTROL AND MONITORING

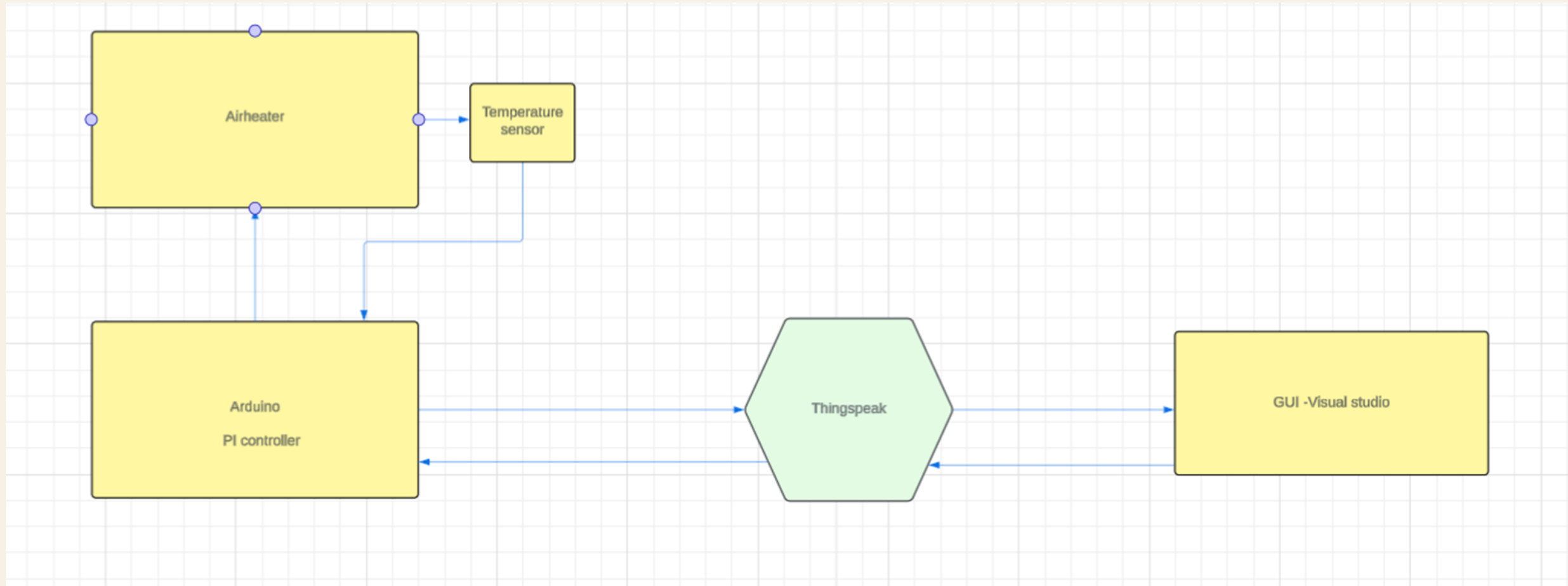
By Ola Reda



SYSTEM DESCRIPTION

- PI controller in Arduino
- Air heater simulator
- Thingspeak to monitor room temperature
- GUI to read and write to Arduino (to control air heater)

SYSTEM SKETCH DIAGRAM

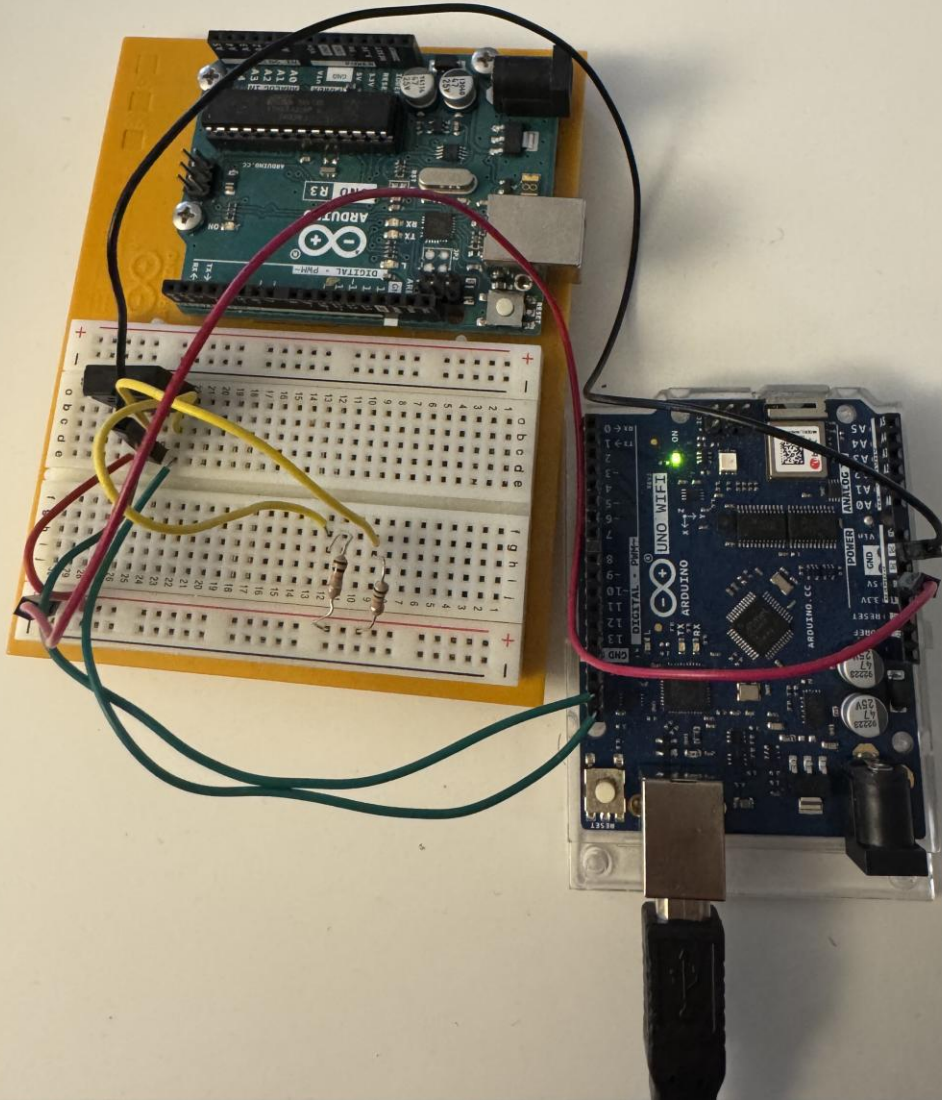




Method

- An Arduino program is used to mathmatically simulate a real Air heater.
- Arduino is used to implement PI-controller.
- Low pass filter was not needed since it is a simulator .
- PWM pins are used in addition to RC filter to get out Analog output of Arduino.
- Arduino wifi ref 2 was used to send data to Thingspeak using wifi.
- GUI in visual studio is created as HMI- human machine interface.
- Communication between GUI and Arduino is through Thingspeak.
- The communication includes reading and writing PI setting from user and showing results.

AM2320 Digital Temperature and Humidity

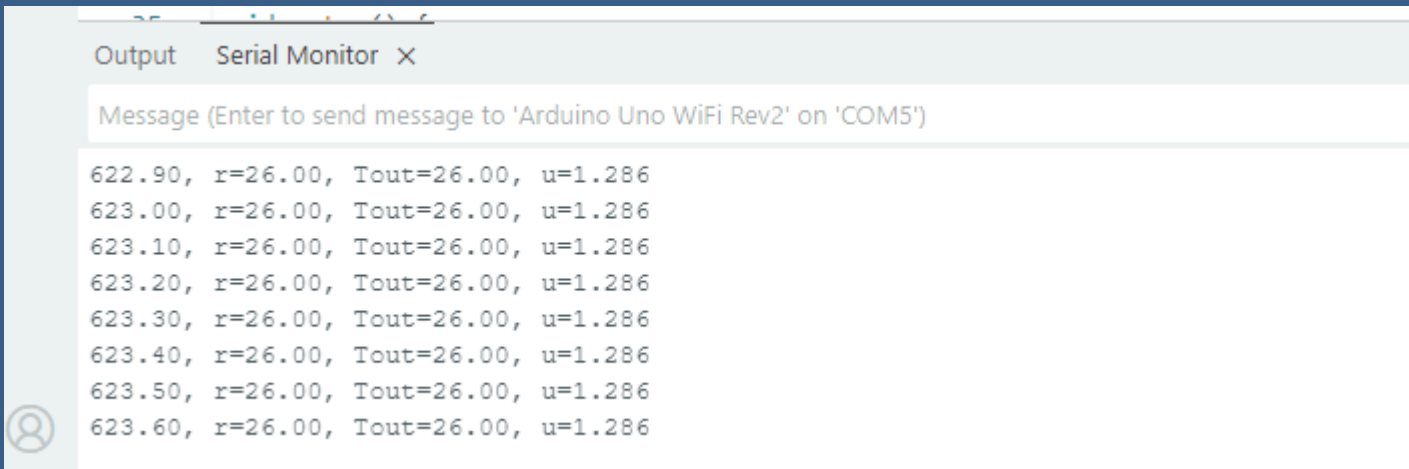




DEMO

ARDUINO PI-CONTROLLER

The setpoint is achieved.
The input (u) is between 1-5 V

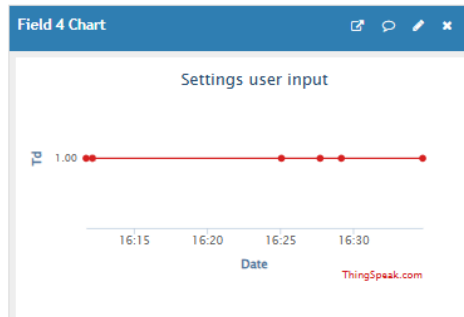
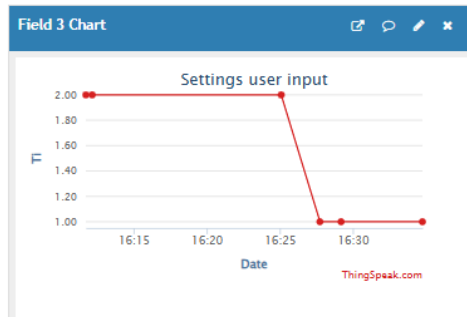
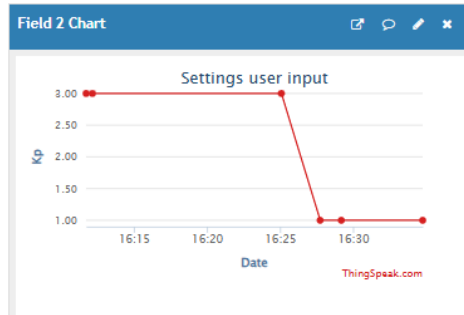
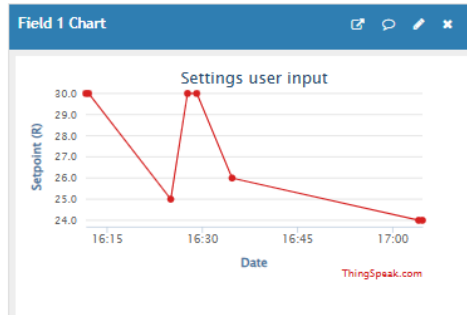
A screenshot of the Arduino IDE Serial Monitor window. The window has a title bar with 'Output' and 'Serial Monitor' tabs, and a close button 'X'. Below the title bar is a text input field with the placeholder 'Message (Enter to send message to 'Arduino Uno WiFi Rev2' on 'COM5')'. The main area of the window displays a list of data points, each on a new line. The data points are: 622.90, r=26.00, Tout=26.00, u=1.286; 623.00, r=26.00, Tout=26.00, u=1.286; 623.10, r=26.00, Tout=26.00, u=1.286; 623.20, r=26.00, Tout=26.00, u=1.286; 623.30, r=26.00, Tout=26.00, u=1.286; 623.40, r=26.00, Tout=26.00, u=1.286; 623.50, r=26.00, Tout=26.00, u=1.286; 623.60, r=26.00, Tout=26.00, u=1.286. A small user icon is visible in the bottom left corner of the window.

```
Output  Serial Monitor  X
Message (Enter to send message to 'Arduino Uno WiFi Rev2' on 'COM5')
622.90, r=26.00, Tout=26.00, u=1.286
623.00, r=26.00, Tout=26.00, u=1.286
623.10, r=26.00, Tout=26.00, u=1.286
623.20, r=26.00, Tout=26.00, u=1.286
623.30, r=26.00, Tout=26.00, u=1.286
623.40, r=26.00, Tout=26.00, u=1.286
623.50, r=26.00, Tout=26.00, u=1.286
623.60, r=26.00, Tout=26.00, u=1.286
```

THINGSPEAK

Channel Stats

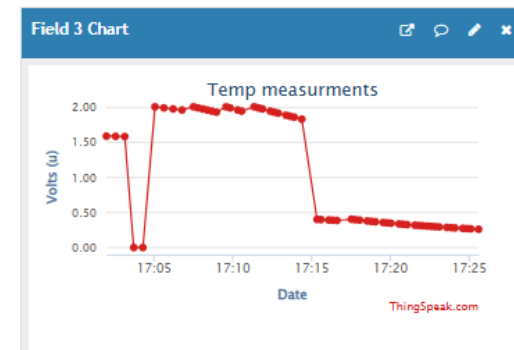
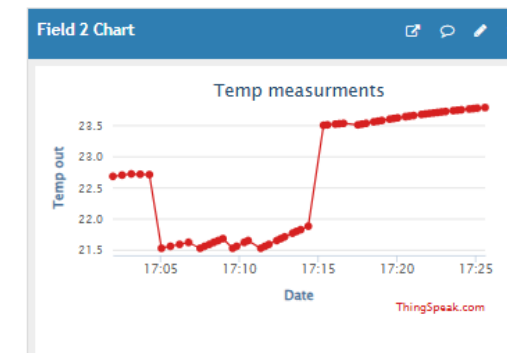
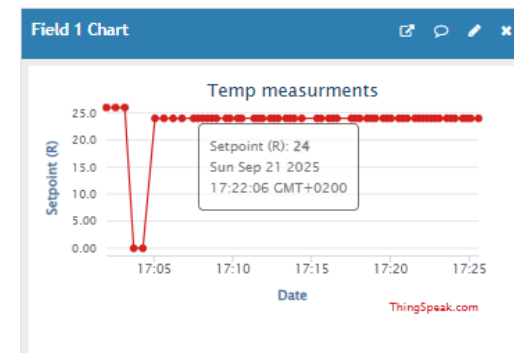
Created: [about 4 hours ago](#)
Last entry: [about 2 hours ago](#)
Entries: 9



Channel for Writing

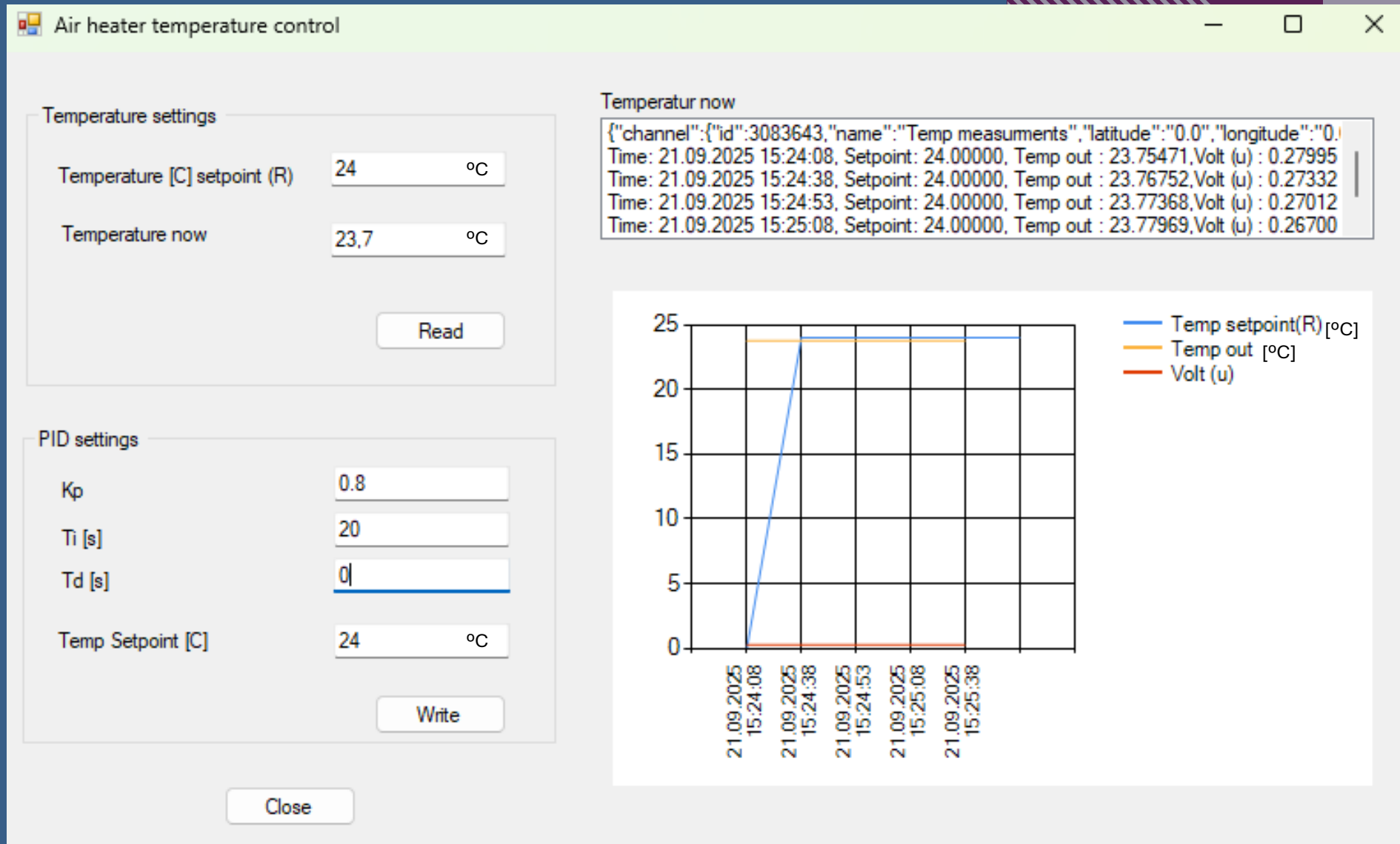
Channel Stats

Created: [a day ago](#)
Last entry: [about 2 hours ago](#)
Entries: 1111



Channel for Reading

GUI- VISUAL STUDIO



An abstract geometric design on the left side of the slide. It features a vertical stack of colored squares: a bright pink square at the top, a light grey square, a dark purple square, and a blue square at the bottom. The pink square contains a series of concentric white semi-circles. The dark purple square contains a series of concentric white circles. The blue square contains a large white semi-circle. To the right of these squares is a large white triangle pointing downwards. A horizontal white line with a small white circle at its end extends from the top of the pink square towards the right. The background of the slide is a solid magenta color.

CONCLUSION