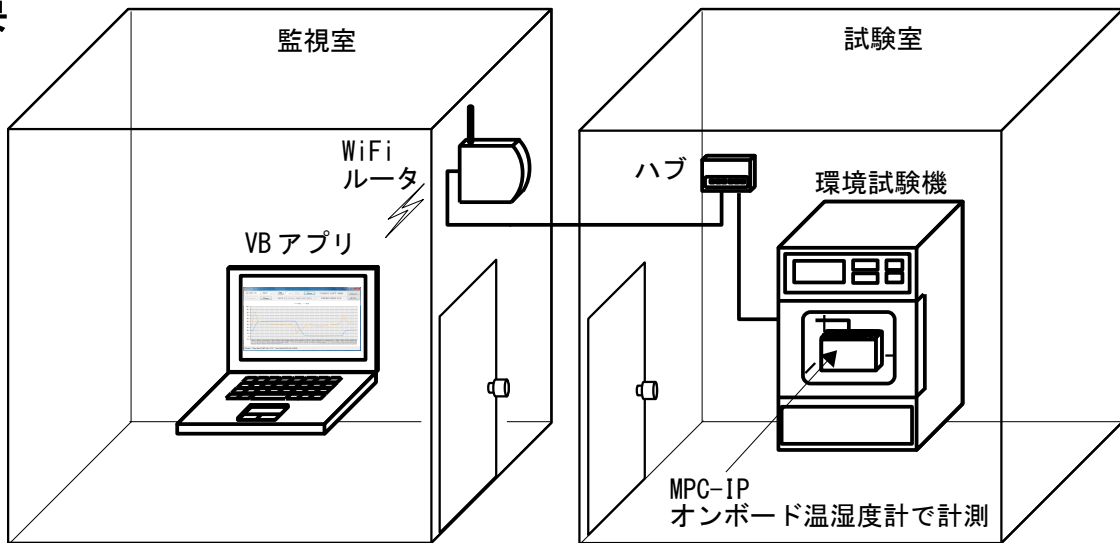


Application Note		Ref No: an2k-042	Last Modify 130123
テーマ	MPC-IP で環境試験機の温湿度をモニタする		
使用機器	MPC-IP、VB2010 Express 他		

概要



- 製品の動作確認などを行う環境試験機の温湿度を別室でモニタします。温湿度の変化で工程の進捗状況を知ることができます。製品 (MPC) の稼動状態も確認しています。
- アプリケーションノート an2k-041.pdf (MPC-2200 を使った温湿度ロガーに TPC アクセスする) は日時と温湿度データを MPC-2200 の点データに蓄積、必要に応じて TCP 接続しますが、本サンプルは常時接続して MPC-IP オンボード温湿度計をリアルタイムに読み込んでいます。

VB アプリケーション

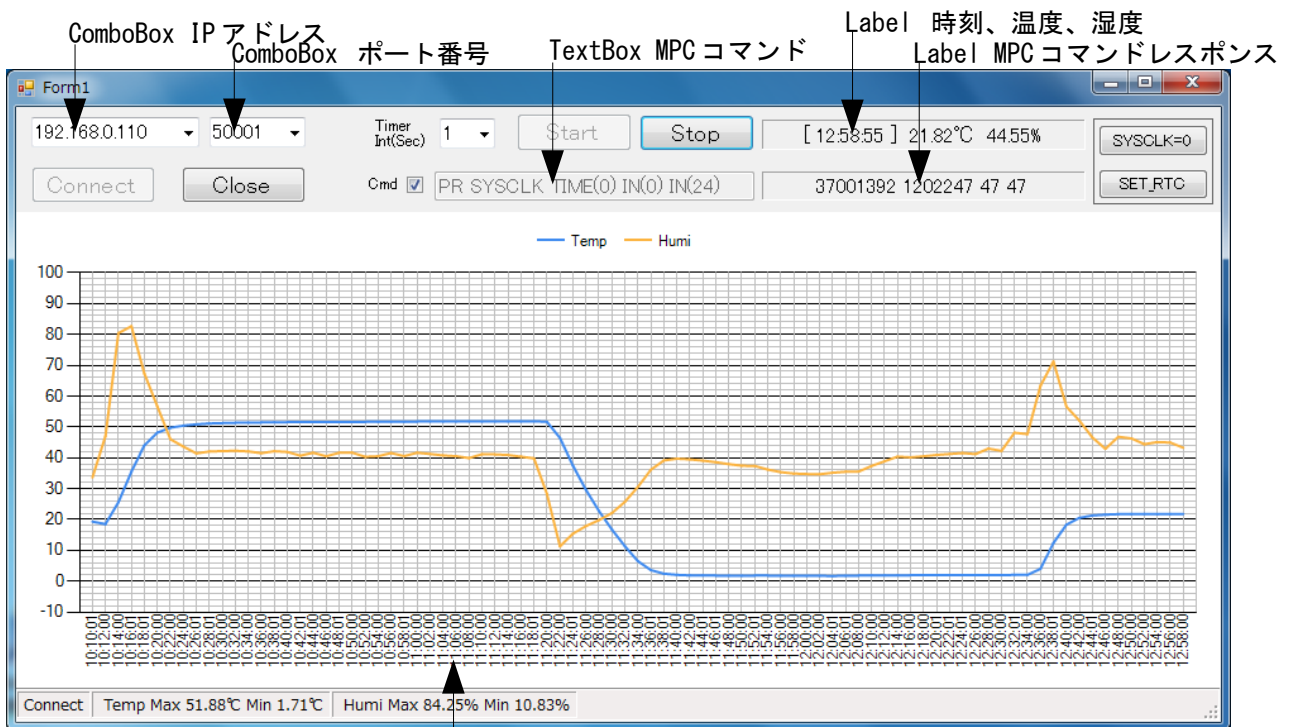


Chart X軸が時刻、Y軸が温度 (青 : °C) と湿度 (橙 : %)。

MPC-2000 と接続して MPC コマンドで変数や I/O などの状態を監視することもできます。

VB プログラム

■ Form1.vb メイン画面

```
Imports System.Windows.Forms.DataVisualization.Charting
Imports System
Imports System.Net
Imports System.Net.Sockets
Imports System.Text
Imports System.Threading.Thread

Public Class Form1
    Dim runnable As Boolean = False
    Dim chart_x_cnt As Integer = 0

    ''' <summary>
    ''' [Connect] TCP接続
    ''' </summary>
    Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click

        Dim ver As String = ""
        Dim res As Integer = 0
        Dim Stream_Name As String
        Dim PortNum As Integer

        Stream_Name = ComboBox1.Text
        PortNum = Val(ComboBox2.Text)

        TcpClientA = New TcpClient()
        Try
            TcpClientA.Connect(Stream_Name, PortNum)
            ToolStripStatusLabel1.Text = "Connect"
            MyStreamA = TcpClientA.GetStream()
            If MPCIP.set_stream_timeout(MyStreamA, 20000, 20000, res) < 1 Then Throw New
Exception("set_stream_timeout")
            If MPCIP.set_stream_ID(MyStreamA, Stream_Name, res) < 1 Then Throw New
Exception("set_stream_ID")
            If MPCIP.set_mewnet_tmout(MyStreamA, 2000, res) < 1 Then Throw New
Exception("set_mewnet_tmout")

            Button1.Enabled = False
            Button3.Enabled = True
            Button3.Focus()
            Panel2.Enabled = True

        Catch ex As Exception
            MsgBox("Error " & vbCrLf & ex.Message & " (" + res.ToString & ")")
        End Try

    End Sub

    Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load
        ComboBox1.Text = "192.168.0.110"
        ComboBox1.Items.Add("192.168.0.110")
        ComboBox1.Items.Add("192.168.0.111")

        ComboBox2.Text = "50001"
        ComboBox2.Items.Add("50001")
        ComboBox2.Items.Add("50002")

        ComboBox3.Text = "1"
        ComboBox3.Items.Add("1")
        ComboBox3.Items.Add("2")
        ComboBox3.Items.Add("5")
        ComboBox3.Items.Add("10")
        ComboBox3.Items.Add("60")

        Label1.Text = ""
        Label2.Text = ""
        ToolStripStatusLabel1.Text = ""
        ToolStripStatusLabel2.Text = ""
        ToolStripStatusLabel3.Text = ""

        'MPCコマンド
        TextBox1.Text = "PR SYSCLK TIME$(0) IN(0) IN(24)"
    End Sub
End Class
```

```

Panel1.Dock = DockStyle.Top
Chart1.Dock = DockStyle.Fill
Panel2.Enabled = False

ChartClear (Chart1)

Button3.Enabled = False
Button4.Enabled = False

End Sub

''' <summary>
''' Timerで定期的に温湿度を計測
''' </summary>
Private Sub Timer1_Tick(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Timer1.Tick
    Dim temp As Double
    Dim humi As Double
    Dim res As Integer
    Dim cmd As String = ""
    Dim ret As String = ""

    Dim date_str As String
    Dim time_str As String

    Dim min_str As String
    Dim sec_str As String

    Static write_flg As Boolean = False
    Static rec_start As Boolean = False

    Static temp_max As Double = -100
    Static temp_min As Double = 100
    Static humi_max As Double = -100
    Static humi_min As Double = 100

    Timer1.Enabled = False
    If runnable = False Then Exit Sub

    ' PCの現在日時取得
    min_str = Now.Minute.ToString("D2")
    sec_str = Now.Second.ToString("D2")
    date_str = String.Format("{0:0000}/{1:00}/{2:00}", Now.Year.ToString("D4"),
Now.Month.ToString("D2"), Now.Day.ToString("D2"))
    time_str = String.Format("{0:00}:{1:00}:{2:00}", Now.Hour.ToString("D2"), min_str, sec_str)

    Try
        ' MPC-IP オンボード温湿度計読込
        If MPCIP.temp_measure(MyStreamA, temp, humi, res) < 1 Then Throw New Exception("temp_measure")

        ' 温湿度の最低最高を記録する
        If temp < temp_min Then
            temp_min = temp
        End If
        If temp > temp_max Then
            temp_max = temp
        End If
        ToolStripStatusLabel2.Text = "Temp Max " & temp_max.ToString("F2") & "°C Min " &
temp_min.ToString("F2") + "°C"
        If humi < humi_min Then
            humi_min = humi
        End If
        If humi > humi_max Then
            humi_max = humi
        End If
        ToolStripStatusLabel3.Text = "Humi Max " & humi_max.ToString("F2") & "% Min " &
humi_min.ToString("F2") + "%"

        Label1.Text = "[ " & time_str & " ] " & temp.ToString("F2") + "°C " + humi.ToString("F2") +
""

        ' 2分間隔(偶数分)でChart1に入れていく
        If ((Val(min_str(1)) Mod 2) = 0) Then
            If (write_flg = False) And (rec_start = True) Then
                Chart1.Series("Temp").Points.AddY(temp)
                Chart1.Series("Humi").Points.AddY(humi)
                Chart1.ChartAreas(0).AxisX.CustomLabels.Add((chart_x_cnt + 1) * 2, 0,
time_str.Substring(0, 8))
            End If
        End If
    Catch ex As Exception
        MessageBox.Show(ex.Message)
    End Try
End Sub

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        chart_x_cnt = chart_x_cnt + 1
        write_flg = True
    End If
Else
    write_flg = False
    rec_start = True
End If

' CheckBox1がチェックならMPCコマンドを実行する
If CheckBox1.Checked = True Then
    cmd = TextBox1.Text
    If MPCIP.mpc_cmd(MyStreamA, cmd, ret, res) < 1 Then Throw New Exception(cmd)
    Label2.Text = ret
End If

Timer1.Interval = CInt(ComboBox3.Text) * 1000
Timer1.Enabled = True

Catch ex As Exception
    MsgBox("Error" & vbCrLf & ex.Message + " (" + res.ToString + ")")
    runnable = False
    Button3.Enabled = True
    Button4.Enabled = False
End Try

End Sub

''' <summary>
''' Chart を初期状態にする
''' </summary>
Private Sub ChartClear (ByVal cht As Chart)

    Dim customLabel1 As New CustomLabel

    With cht
        .Titles.Clear () ' タイトルの初期化
        .BackColor = SystemColors.ButtonFace ' 背景グラデーション
        .BorderSkin.PageColor = SystemColors.ButtonFace

        ' 外形をデフォルトに
        .BorderSkin.SkinStyle = BorderSkinStyle.None
        .Legends.Clear () ' 凡例の初期化
        .Legends.Add ("Legend1")
        .Legends ("Legend1").Alignment = StringAlignment.Center
        .Legends ("Legend1").Docking = Docking.Top

        .Series.Clear () ' 系列(データ関係)の初期化
        .ChartAreas.Clear () ' 軸メモリ・3D表示関係の初期化
        .ChartAreas.Add ("ChartArea1")
        .ChartAreas ("ChartArea1").Position = New ElementPosition (0, 10, 98, 90) ' 後ろのパラメータは %

        .Annotations.Clear () ' グラフの注釈
        .DataSource = Nothing

        .Series.Add ("Temp")
        .Series.Add ("Humi")
        .Series ("Temp").ChartType = SeriesChartType.Line
        .Series ("Humi").ChartType = SeriesChartType.Line
        .Series ("Temp").BorderWidth = 2
        .Series ("Humi").BorderWidth = 2

        .ChartAreas (0).AxisX.CustomLabels.Add (customLabel1)
        .ChartAreas (0).AxisX.LabelAutoFitMaxFontSize = 9
        .ChartAreas (0).AxisX.LabelAutoFitMinFontSize = 9
        .ChartAreas (0).AxisX.MajorGrid.Enabled = True
        .ChartAreas (0).AxisX.MajorGrid.LineColor = Color.Silver
        .ChartAreas (0).AxisX.MajorTickMark.Enabled = False
        .ChartAreas (0).AxisX.Interval = 1

        .ChartAreas (0).AxisY.Maximum = 100
        .ChartAreas (0).AxisY.Minimum = -10
        .ChartAreas (0).AxisY.MajorGrid.Interval = 10
        .ChartAreas (0).AxisY.Interval = 10
        .ChartAreas (0).AxisY.MinorGrid.Enabled = True
        .ChartAreas (0).AxisY.MinorGrid.LineColor = Color.Silver
    End With
End Sub

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        End With

    End Sub

    Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Button2.Click
        Close()
    End Sub

    ''' <summary>
    ''' [Start] 計測開始
    ''' </summary>
    Private Sub Button3_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Button3.Click

        If Chart1.Series("Temp").Points.Count > 0 Then
            If MsgBox("Do you want to clear the Chart?", vbYesNo) = vbYes Then
                ChartClear(Chart1)
                chart_x_cnt = 0
            End If
        End If

        Timer1.Interval = 100
        Timer1.Enabled = True
        runable = True

        TextBox1.Enabled = False

        Button3.Enabled = False
        Button4.Enabled = True
        Button4.Focus()

    End Sub

    ''' <summary>
    ''' [Stop] 計測停止
    ''' </summary>
    Private Sub Button4_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Button4.Click
        runable = False
        Button3.Enabled = True
        Button4.Enabled = False
        TextBox1.Enabled = True

    End Sub

    ''' <summary>
    ''' [SYSCLK=0] MPCのSYSCLKを0にする
    ''' </summary>
    Private Sub Button5_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Button5.Click
        Dim res As Integer
        Dim cmd As String = ""
        Dim ret As String = ""

        Try
            cmd = "SYSCLK=0"
            If MPCIP.mpc_cmd(MyStreamA, cmd, ret, res) < 1 Then Throw New Exception(cmd)
        Catch ex As Exception
            MsgBox("Error" & vbCrLf & ex.Message + " (" + res.ToString + ")")
        End Try

    End Sub

    ''' <summary>
    ''' [SET_RTC] MPCの時計を調整する
    ''' </summary>
    Private Sub Button6_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
Button6.Click
        Dim res As Integer
        Dim ret As String = ""
        Dim date_str As String
        Dim time_str As String
        Try
            date_str = String.Format("&H{0:0000} {1:00} {2:00}", Now.Year.ToString("D4"),
Now.Month.ToString("D2"), Now.Day.ToString("D2"))
            'date_str = "&H20100123" ' debug
            time_str = String.Format("&H{0:0000} {1:00} {2:00}", Now.Hour.ToString("D4"),

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Now.Minute.ToString("D2"), Now.Second.ToString("D2"))
    'time_str = "&H00123456" ' debug

    If MPCIP.mpc_cmd(MyStreamA, "SET_RTC " + date_str, ret, res) < 1 Then Throw New
Exception("SET_RTC date ")
    If MPCIP.mpc_cmd(MyStreamA, "SET_RTC " + time_str, ret, res) < 1 Then Throw New
Exception("SET_RTC time ")

    Dim buf As String
    buf = "年月日 " + date_str + vbCrLf
    buf = buf & "時分秒 " + time_str + vbCrLf + "にセットしました"
    MsgBox(buf)
    Catch ex As Exception
    MsgBox("Error" & vbCrLf & ex.Message + " (" + res.ToString + ")")
    End Try

End Sub

End Class

```

■ Module1.vb

```

Imports System.Net
Imports System.Net.Sockets

Module Module1
    Public MPCIP As New ACClass.MPCIP
    Public TcpClientA As New TcpClient()
    Public MyStreamA As NetworkStream
    Public MyStreamA_Name As String
End Module

```

--- End Of Doc ---