ภาคผนวก ข

โปรแกรมที่ใช้ในงานวิจัย

ในงานวิจัยได้ใช้โปรแกรมที่พัฒนาขึ้นจากโปแกรมภาษา Sbasic และ ภาษา Visual Basic โดยมีรายละเอียดของโปรแกรมดังต่อไปนี้

1. โปรแกรมที่ใช้สำหรับควบคุมการทำงานของบอร์ด CP-JR6811

1.1 โปรแกรมควมคุมสำหรับการทดลองเพนดูลัมอย่างง่าย

```
include "regs11.lib"
declare a
declare b
declare c
declare d
declare e
declare f
declare i
declare j
declare k
declare p
declare t
declare ti
declare t1
declare t2
declare t3
declare t4
declare t5
```

```
declare x
declare y
declare z
main:
pokeb baud,$30
pokeb sccr2,$0c
pokeb TMSK2, %10000011
pokeb TFLG2, %10000000
Do
        Do
                a = inkey()
        Loop Until a <> 0
        a = a and $ff
Loop Until a = 97
printu a
Do
For j = 1 To 120
pokeb TCTL2,%00000100
pokeb TFLG1,%00000010
Do
        x = peekb(TFLG1) AND $02
Loop Until x <> 0
t1 = peek(TIC2)
pokeb TCTL2,%00000010
pokeb TFLG1,%00000001
Do
        x = peekb(TFLG1) AND $01
Loop Until x <> 0
t2 = peek(TIC3)
```

```
pokeb TCTL2,%00000100
pokeb TFLG1,%00000010
Do
        x = peekb(TFLG1) AND $02
Loop Until x <> 0
t3 = peek(TIC2)
pokeb TCTL2,%00000010
pokeb TFLG1,%00000001
Do
        x = peekb(TFLG1) AND $01
Loop Until x <> 0
t4 = peek(TIC3)
p = ((t4 - t2) + (t3 - t1)) / 2
printu p
Do
        Do
                b = inkey()
        Loop Until b <> 0
        b = b and $ff
Loop Until b = 98
ti = ((t4 - t3) + (t2 - t1)) / 2
printu ti
Do
        Do
                c = inkey()
        Loop Until c <> 0
        c = c and $ff
Loop Until c = 99
Next
```

```
Do
        Do
                d = inkey()
        Loop Until d <> 0
        d = d and $ff
Loop Until d = 100
t1 = 0
t2 = 0
t3 = 0
t4 = 0
p = 0
ti = 0
Loop
End
```

1.2 โปรแกรมควบคุมสำหรับการทดลองหาความสัมพันธ์ระหว่างอัตราส่วนของคาบกับมุม

```
include "regs11.lib"
declare a
declare b
declare c
declare d
declare e
declare f
declare i
declare j
declare k
declare p
declare t
```

```
declare  ti
declare  t1
declare  t2
declare  t3
declare  t4
declare  t5
declare  x
declare  y
declare  z

main:
pokeb baud,$30
pokeb sccr2,$0c
pokeb TMSK2, %10000011
pokeb TFLG2, %10000000
Do
        Do
                a = inkey()
        Loop Until a <> 0
        a = a and $ff
Loop Until a = 97
Do
printu a
For j = 1 To 5
pokeb TCTL2,%00000100
pokeb TFLG1,%00000010
Do
        x = peekb(TFLG1) AND $02
Loop Until x <> 0
```

```
t1 = peek(TIC2)
pokeb TCTL2,%00000010
pokeb TFLG1,%00000001
Do
        x = peekb(TFLG1) AND $01
Loop Until x <> 0
t2 = peek(TIC3)
pokeb TCTL2,%00000100
pokeb TFLG1,%00000010
Do
        x = peekb(TFLG1) AND $02
Loop Until x <> 0
t3 = peek(TIC2)
pokeb TCTL2,%00000010
pokeb TFLG1,%00000001
Do
        x = peekb(TFLG1) AND $01
Loop Until x <> 0
t4 = peek(TIC3)
p = ((t4 - t2) + (t3 - t1)) / 2
printu p
Do
        Do
                b = inkey()
        Loop Until b <> 0
        b = b and $ff
Loop Until b = 98
Next
```

```
Do
        Do
                c = inkey()
        Loop Until c <> 0
        c = c and $ff
Loop Until c = 99
t1 = 0
t2 = 0
t3 = 0
t4 = 0
p = 0
Loop
End
```

1.3 โปรแกรมควบคุมสำหรับการทดลองหาจุดศูนย์กลางมวลของวัตถุ

```
include "regs11.lib"
declare a
declare b
declare c
declare d
declare e
declare f
declare i
declare j
declare k
declare p
declare t
declare ti
```

```
declare  t1
declare  t2
declare  t3
declare  t4
declare  t5
declare  x
declare  y
declare  z

main:
pokeb baud,$30
pokeb sccr2,$0c
pokeb TMSK2, %10000011
pokeb TFLG2, %10000000
Do
  Do
    a = inkey()
  Loop Until a <> 0
  a = a and $ff
Loop Until a = 97      'check port open
printu a
Do
For j = 1 To 60
pokeb TCTL2,%00000100                'use IC2 waitrise
pokeb TFLG1,%00000010
  Do                              'to check rise 1st
    x = peekb(TFLG1) AND $02
  Loop Until x <> 0
t1 = peek(TIC2)
```

```
pokeb TCTL2,%00000010              'use IC3 waitfall
pokeb TFLG1,%00000001
 Do
   x = peekb(TFLG1) AND $01
 Loop Until x <> 0
t2 = peek(TIC3)
pokeb TCTL2,%00000100              'use IC2 waitrise
pokeb TFLG1,%00000010
 Do                          'to check rise  2nd
   x = peekb(TFLG1) AND $02
 Loop Until x <> 0
t3 = peek(TIC2)
pokeb TCTL2,%00000010              'use IC3 waitfall
pokeb TFLG1,%00000001
 Do
   x = peekb(TFLG1) AND $01
 Loop Until x <> 0
t4 = peek(TIC3)
p = ((t4 - t2) + (t3 - t1)) / 2
printu p
   Do
      Do
        b = inkey()
      Loop Until b <> 0
      b = b and $ff
   Loop Until b = 98
Next
```

```
    Do
      Do
        c = inkey()
      Loop Until c <> 0
      c = c and $ff
    Loop Until c = 99
  t1 = 0
  t2 = 0
  t3 = 0
  t4 = 0
  p = 0
  Loop

  End
```

2. โปรแกรมสำหรับจัดเก็บข้อมูลการทดลองพัฒนาโดยโปรแกรม Visual Basic 6

2.1 โปรแกรมที่ใช้ทดลองในส่วนของเพนดูลัมอย่างง่าย

```
Option Explicit
Option Base 1
Dim length(1) As Single
Dim angle(1) As Single
Dim wide(1) As Single
Dim instring As String
Dim f(300) As Long
Dim ti(300) As Long
Dim P(300) As Single, result6 As Single
Dim buffer$
Dim g(300) As Single
Dim v(300) As Single, result4 As Single
```

```
Dim gi(300) As Single
Dim sum1 As Single, result3 As Single
Dim sum2 As Single, result11 As Single
Dim vmax As Single, result1 As Single
Dim sqv(300) As Single, result5 As Single
Dim b As Single
Dim a As Single, result2 As Single
Dim Vave As Single, result7 As Single
Dim ve As Single, result8 As Single
Dim Pave As Single, result9 As Single
Dim Pe As Single, result10 As Single
Dim tim As Single, result12 As Single
Dim vDummy As String
Dim nFile As Integer
Dim i As Integer
Dim j As Integer
Dim q As Integer, tmp As String
Dim c As Integer, t As Integer
Dim TempBron As String
Const Pi = (22 / 7)
Const gr = 9.781
```

****

```
Private Sub Exit_Click()

    End

End Sub
```

****

```
Private Sub New_Click()
```

```
Text1.Text = ""
Text2.Text = ""
Text3.Text = ""
Text4.Text = ""
Text5.Text = ""
Text6.Text = ""
Text7.Text = ""
Text8.Text = ""
Text9.Text = ""
Text10.Text = ""
Text11.Text = ""
Text12.Text = ""
Text13.Text = ""
length(1) = InputBox("Input length(cm)")
wide(1) = InputBox("Input wide(cm)")
angle(1) = InputBox("Input angle(degree)")
Text1.Text = length(1)
Text2.Text = angle(1)
Text3.Text = wide(1)
vmax = Sqr(2 * 9.781 * (length(1) / 100) * (1 - Cos(angle(1) * Pi / 180)))
result1 = Round(vmax, 4)
a = Pi*Sqr((length(1)/100)/gr)*(1+((1/4)*(Sin(angle(1)*Pi/360))^2))
result2 = Round(a, 4)
Text4.Text = Text4.Text & result1 & vbTab
Text5.Text = Text5.Text & result2 & vbTab
MSComm1.Output = "d"

End Sub
```

****

```
Private Sub Open_Click()

        Dlg1.Flags = cdlOFNCreatePrompt
        Dlg1.Action = 1
        Screen.MousePointer = vbHourglass
        nFile = FreeFile
        Open Dlg1.FileName For Input As #nFile
        i = 1
        Do While Not EOF(nFile)
        Line Input #nFile, vDummy
        If i = 1 Then
                Text1.Text = vDummy
        End If
        If i = 2 Then
                        Text2.Text = vDummy
        End If
        If i = 3 Then
                        Text3.Text = vDummy
        End If
        If i = 4 Then
                        Text4.Text = vDummy
        End If
        If i = 5 Then
                        Text5.Text = vDummy
        End If
        If i = 6 Then
                        Text6.Text = vDummy
        End If
        If i = 7 Then
```

```
            Text7.Text = vDummy
        End If
        If i = 8 Then
            Text8.Text = vDummy
        End If
        If i = 9 Then
            Text9.Text = vDummy
        End If
        If i = 10 Then
            Text10.Text = vDummy
        End If
        If i = 11 Then
            Text11.Text = vDummy
        End If
        If i = 12 Then
            Text12.Text = vDummy
        End If
        If i = 13 Then
            Text13.Text = vDummy
        End If
        Call SplitStringintoWords(vDummy)
        i = i + 1
        Loop
        Close #nFile
        Screen.MousePointer = vbNormal

    End Sub
```

****

```
Function StripString(source As String) As String
Const letters As String = "abcdefghijklmnopqrstuvwxyz1234567890"
        tmp = source$
        For q% = 1 To Len(source$)
        If InStr(letters, LCase(Mid$(source$, q%, 1))) = 0 Then
                Select Case q%
        Case 1
                tmp = Right$(source$, Len(source$) - q%)
        Case Len(source$)
                tmp = Left$(source$, Len(source) - 1)
        Case Else
                tmp = Left$(source$, q%) & rigth$(source$, Len(source$) - q%)
        End Select
        End If
        Next q%
        StripString = tmp
        End Function
        Sub SplitStringintoWords(bron$)
        Const SearchFor As String = ","
        t = 0
        TempBron = bron
        For c = 1 To Len(bron$)
                q = InStr(TempBron$, SearchFor$)
        If q <> 0 Then
                tmp = Left$(TempBron$, q% - 1)
        If tmp <> "" Then Text1.Text = Text1.Text & StripString(tmp) & vbTab
                TempBron$ = Right$(TempBron, Len(TempBron) - q)
                c = c + q
        End If
```

```
        Next c
        Text1.Visible = True

    End Sub
**********************************************************************************************
    Private Sub Save_Click()

        Dlg1.Flags = cdlOFNPathMustExist & cdlOFNOverwritePrompt
        Dlg1.Action = 2
        Screen.MousePointer = vbHourglass
        nFile% = FreeFile
        Open Dlg1.FileName For Output As #nFile
            Print #nFile, Text1.Text
            Print #nFile, Text2.Text
            Print #nFile, Text3.Text
            Print #nFile, Text4.Text
            Print #nFile, Text5.Text
            Print #nFile, Text6.Text
            Print #nFile, Text7.Text
            Print #nFile, Text8.Text
            Print #nFile, Text9.Text
            Print #nFile, Text10.Text
            Print #nFile, Text11.Text
            Print #nFile, Text12.Text
            Print #nFile, Text13.Text
        Close #nFile
        Screen.MousePointer = vbNormal

    End Sub
```

```
**********************************************************************************************************

Private Sub Start_Click()

        MSComm1.CommPort = 1
        MSComm1.Settings = "9600,n,8,1"
        MSComm1.InputLen = 0
        MSComm1.PortOpen = True
        MSComm1.Output = "a"
        length(1) = InputBox("Input length(cm)")
        wide(1) = InputBox("Input wide(cm)")
        angle(1) = InputBox("Input angle(degree)")
        Text1.Text = length(1)
        Text2.Text = angle(1)
        Text3.Text = wide(1)
        vmax = Sqr(2*9.781*(length(1)/100)*(1-Cos(angle(1)*Pi/180)))
        result1 = Round(vmax, 4)
        a = Pi*Sqr((length(1)/100)/gr)*(1+((1/4)*(Sin(angle(1)*Pi/360))^2))
        result2 = Round(a, 4)
        Text4.Text = Text4.Text & result1 & vbTab
        Text5.Text = Text5.Text & result2 & vbTab
        Do
        Do
                DoEvents
                buffer$ = MSComm1.Input
        Loop Until buffer$ <> ""
        Loop Until buffer$ = 97
        Do
        For i = 1 To 200
```

```
Do
        DoEvents
        buffer$ = MSComm1.Input
Loop Until buffer$ <> ""
f(i) = Val(buffer$)
MSComm1.Output = "b"
Do
        DoEvents
        buffer$ = MSComm1.Input
Loop Until buffer$ <> ""
ti(i) = Val(buffer$)
MSComm1.Output = "c"
P(i) = ((f(i) + 65536) * 8) / 1000000 'change t to period
result6 = Round(P(i), 4)
sum1 = sum1 + P(i)
result3 = Round(sum1, 4)
tim = tim + (2 * P(i))
result12 = Round(tim, 4)
v(i) = (1250 * wide(1)) / (ti(i)) 'calculat velocity  1250 = w*10E-2/t(i)*8E-6
result4 = Round(v(i), 4)
sum2 = sum2 + v(i)
result11 = Round(sum2, 4)
sqv(i) = v(i) ^ 2
result5 = Round(sqv(i), 4)
Text6.Text = Text6.Text & result12 & vbTab
Text7.Text = Text7.Text & result4 & vbTab
Text8.Text = Text8.Text & result5 & vbTab
Text9.Text = Text9.Text & result6 & vbTab
Next i
```

```
Vave = result11 / 200
result7 = Round(Vave, 4)
ve = (Vave - vmax) * 100 / vmax
result8 = Round(ve, 4)
Pave = result3 / 200
result9 = Round(Pave, 4)
Pe = (Pave - a) * 100 / a
result10 = Round(Pe, 4)
Text10.Text = result7
Text11.Text = result8
Text12.Text = result9
Text13.Text = result10
MsgBox "End Experiment"
sum1 = 0
sum2 = 0
tim = 0
Vave = 0
ve = 0
Pave = 0
Pe = 0
Loop

End Sub
```

****

2.2 โปรแกรมทดลองหาความสัมพันธ์ระหว่างอัตราส่วนของคาบกับมุม

```
Option Explicit
Option Base 1
```

```
Dim L As Single
Dim g As Single
Dim angle(150) As Single
Dim instring As String
Dim f(150) As Long
Dim ti(150) As Long
Dim P(100) As Single, result4 As Single
Dim P0 As Single, result1 As Single
Dim P1(150) As Single, result3 As Single
Dim P2(150) As Single, result5 As Single
Dim buffer$
Dim sum1 As Single
Dim a(100) As Single, result2 As Single
Dim vDummy As String
Dim nFile As Integer
Dim i As Integer
Dim j As Integer
Dim q As Integer, tmp As String
Dim c As Integer, t As Integer
Dim TempBron As String
Const Pi = (22 / 7)
Const gr = 9.781
```

****

```
Private Sub Exit_Click()

    End

End Sub
```

****

```
Private Sub New_Click()

        Text1.Text = ""
        Text2.Text = ""
        Text3.Text = ""
        Text4.Text = ""
        Text5.Text = ""
        Text6.Text = ""
        Text7.Text = ""
        sum1 = 0

End Sub
*****************************************************************************************************
Private Sub Open_Click()

        Dlg1.Flags = cdlOFNCreatePrompt
        Dlg1.Action = 1
        Screen.MousePointer = vbHourglass
        nFile = FreeFile
        Open Dlg1.FileName For Input As #nFile
        i = 1
        Do While Not EOF(nFile)
        Line Input #nFile, vDummy
        If i = 1 Then
                Text1.Text = vDummy
        End If
        If i = 2 Then
                Text2.Text = vDummy
        End If
```

```
        If i = 3 Then
                Text3.Text = vDummy
        End If
        If i = 4 Then
                Text4.Text = vDummy
        End If
        If i = 5 Then
                Text5.Text = vDummy
        End If
        If i = 6 Then
                Text6.Text = vDummy
        End If
        If i = 7 Then
                Text7.Text = vDummy
        End If
        Call SplitStringintoWords(vDummy)
        i = i + 1
        Loop
        Close #nFile
        Screen.MousePointer = vbNormal

End Sub
**********************************************************************************************************
Function StripString(source As String) As String

Const letters As String = "abcdefghijklmnopqrstuvwxyz1234567890"
tmp = source$
For q% = 1 To Len(source$)
        If InStr(letters, LCase(Mid$(source$, q%, 1))) = 0 Then
```

```
        Select Case q%
        Case 1
                tmp = Right$(source$, Len(source$) - q%)
        Case Len(source$)
                tmp = Left$(source$, Len(source) - 1)
        Case Else
                tmp = Left$(source$, q%) & rigth$(source$, Len(source$) - q%)
        End Select
        End If
        Next q%
        StripString = tmp
End Function
Sub SplitStringintoWords(bron$)
Const SearchFor As String = ","
t = 0
        TempBron = bron
        For c = 1 To Len(bron$)
        q = InStr(TempBron$, SearchFor$)
        If q <> 0 Then
        tmp = Left$(TempBron$, q% - 1)
        If tmp <> "" Then Text1.Text = Text1.Text & StripString(tmp) & vbTab
        TempBron$ = Right$(TempBron, Len(TempBron) - q)
        c = c + q
        End If
        Next c
        Text1.Visible = True

    End Sub
```

****

```
Private Sub Save_Click()

        Dlg1.Flags = cdlOFNPathMustExist & cdlOFNOverwritePrompt
        Dlg1.Action = 2
        Screen.MousePointer = vbHourglass
        nFile% = FreeFile
        Open Dlg1.FileName For Output As #nFile
        Print #nFile, Text1.Text
        Print #nFile, Text2.Text
        Print #nFile, Text3.Text
        Print #nFile, Text4.Text
        Print #nFile, Text5.Text
        Print #nFile, Text6.Text
        Print #nFile, Text7.Text
        Close #nFile
        Screen.MousePointer = vbNormal

    End Sub
**********************************************************************************************************
    Private Sub Start_Click()

        MSComm1.CommPort = 1
        MSComm1.Settings = "9600,n,8,1"
        MSComm1.InputLen = 0
        MSComm1.PortOpen = True
        MSComm1.Output = "a"
        L = InputBox("Input L(cm)")
        g = InputBox("Input g(m/s2)")
        Text1.Text = L
```

```
Text2.Text = g
P0 = 2 * Pi * Sqr((L * 0.01) / g)
result1 = Round(P0, 3)
Text4.Text = Text4.Text & result1 & vbTab   'print rad
For j = 1 To 18
MSComm1.Output = "a"
angle(j) = InputBox("Input angle(degree)")
Text3.Text = angle(j)
a(j) = angle(j) * Pi / 180
result2 = Round(a(j), 3)
Text5.Text = Text5.Text & result2 & vbTab   'print rad
Do
Do
        DoEvents
        buffer$ = MSComm1.Input
        Loop Until buffer$ <> ""
Loop Until buffer$ = 97
For i = 1 To 5
Do
        DoEvents
        buffer$ = MSComm1.Input
Loop Until buffer$ <> ""
f(i) = Val(buffer$)
MSComm1.Output = "b"
P1(i) = (2 * (f(i) + 65536) * 8) / 1000000 'change t to period
result3 = Round(P1(i), 3)
sum1 = sum1 + P1(i)
Next i
P(j) = sum1 / 5
```

```
result4 = Round(P(j), 3)
Text6.Text = Text6.Text & result4 & vbTab   'print T
P2(j) = P(j) / P0
result5 = Round(P2(j), 3)
Text7.Text = Text7.Text & result5 & vbTab
MsgBox "Start Experiment new angle"
sum1 = 0
MSComm1.Output = "c"
Next j
MsgBox "End Experiment"

End Sub
```

****

2.3 โปรแกรมที่ใช้ทดลองหาจุดศูนย์กลางมวลของวัตถุ

```
Option Explicit
Option Base 1
Dim L As Single
Dim g As Single
Dim angle(150) As Single
Dim instring As String
Dim f(150) As Long
Dim ti(150) As Long
Dim P(100) As Single, result4 As Single
Dim P0 As Single, result1 As Single
Dim P1(150) As Single, result3 As Single
Dim P2(150) As Single, result5 As Single
Dim buffer$
```

```
Dim sum1 As Single
Dim a(100) As Single, result2 As Single
Dim vDummy As String
Dim nFile As Integer
Dim i As Integer
Dim j As Integer
Dim q As Integer, tmp As String
Dim c As Integer, t As Integer
Dim TempBron As String
Const Pi = (22 / 7)
Const gr = 9.781
*****************************************************************************************************
Private Sub Exit_Click()

        End

End Sub
*****************************************************************************************************
Private Sub New_Click()

        Text1.Text = ""
        Text2.Text = ""
        Text3.Text = ""
        Text4.Text = ""
        Text5.Text = ""
        Text6.Text = ""
        Text7.Text = ""
        sum1 = 0
        'MSComm1.Output = "c"
```

```
End Sub
**********************************************************************************************************
Private Sub Open_Click()

    Dlg1.Flags = cdlOFNCreatePrompt
    Dlg1.Action = 1
    Screen.MousePointer = vbHourglass
    nFile = FreeFile
    Open Dlg1.FileName For Input As #nFile
    i = 1
    Do While Not EOF(nFile)
        Line Input #nFile, vDummy
    If i = 1 Then
        Text1.Text = vDummy
    End If
    If i = 2 Then
        Text2.Text = vDummy
    End If
    If i = 3 Then
        Text3.Text = vDummy
    End If
    If i = 4 Then
        Text4.Text = vDummy
    End If
    If i = 5 Then
        Text5.Text = vDummy
    End If
    If i = 6 Then
        Text6.Text = vDummy
```

```
        End If
        If i = 7 Then
                Text7.Text = vDummy
        End If
        Call SplitStringintoWords(vDummy)
        i = i + 1
        Loop
        Close #nFile
        Screen.MousePointer = vbNormal

End Sub
**********************************************************************************************************
Function StripString(source As String) As String
Const letters As String = "abcdefghijklmnopqrstuvwxyz1234567890"
tmp = source$
        For q% = 1 To Len(source$)
        If InStr(letters, LCase(Mid$(source$, q%, 1))) = 0 Then
        Select Case q%
        Case 1
                tmp = Right$(source$, Len(source$) - q%)
        Case Len(source$)
                tmp = Left$(source$, Len(source) - 1)
        Case Else
                tmp = Left$(source$, q%) & rigth$(source$, Len(source$) - q%)
        End Select
        End If
        Next q%
        StripString = tmp
```

```
End Function
*****************************************************************************************************
Sub SplitStringintoWords(bron$)

    Const SearchFor As String = ","
    t = 0
    TempBron = bron
    For c = 1 To Len(bron$)
    q = InStr(TempBron$, SearchFor$)
    If q <> 0 Then
    tmp = Left$(TempBron$, q% - 1)
    If tmp <> "" Then Text1.Text = Text1.Text & StripString(tmp) & vbTab
    TempBron$ = Right$(TempBron, Len(TempBron) - q)
    c = c + q
    End If
    Next c
    Text1.Visible = True

End Sub
*****************************************************************************************************
Private Sub Save_Click()

    Dlg1.Flags = cdlOFNPathMustExist & cdlOFNOverwritePrompt
    Dlg1.Action = 2
    Screen.MousePointer = vbHourglass
    nFile% = FreeFile
    Open Dlg1.FileName For Output As #nFile
        Print #nFile, Text1.Text
        Print #nFile, Text2.Text
```

```
            Print #nFile, Text3.Text
            Print #nFile, Text4.Text
            Print #nFile, Text5.Text
            Print #nFile, Text6.Text
            Print #nFile, Text7.Text
        Close #nFile
        Screen.MousePointer = vbNormal

    End Sub
**********************************************************************************************
    Private Sub Start_Click()

        MSComm1.CommPort = 1
        MSComm1.Settings = "9600,n,8,1"
        MSComm1.InputLen = 0
        MSComm1.PortOpen = True
        MSComm1.Output = "a"

        L = InputBox("Input L(cm)")
        g = InputBox("Input g(m/s2)")
        Text1.Text = L
        Text2.Text = g
        P0 = 2 * Pi * Sqr((L * 0.01) / g)
        result1 = Round(P0, 3)
        Text4.Text = Text4.Text & result1 & vbTab
        For j = 1 To 18
        MSComm1.Output = "a"
        angle(j) = InputBox("Input angle(degree)")
        Text3.Text = angle(j)
```

```
a(j) = angle(j) * Pi / 180
result2 = Round(a(j), 3)
Text5.Text = Text5.Text & result2 & vbTab   'print rad
Do
Do
        DoEvents
        buffer$ = MSComm1.Input
        Loop Until buffer$ <> ""
Loop Until buffer$ = 97
For i = 1 To 5
Do
        DoEvents
        buffer$ = MSComm1.Input
Loop Until buffer$ <> ""
f(i) = Val(buffer$)
MSComm1.Output = "b"
P1(i) = (2 * (f(i) + 65536) * 8) / 1000000 'change t to period
result3 = Round(P1(i), 3)
sum1 = sum1 + P1(i)
Next i
P(j) = sum1 / 5
result4 = Round(P(j), 3)
Text6.Text = Text6.Text & result4 & vbTab
P2(j) = P(j) / P0
result5 = Round(P2(j), 3)
Text7.Text = Text7.Text & result5 & vbTab
MsgBox "Start Experiment new angle"
sum1 = 0
MSComm1.Output = "c"
```

```
        Next j
        MsgBox "End Experiment"

    End Sub
**********************************************************************************************************
```