

Supplementary Information

Application of an Online-Biomass Sensor in an Optical Multisensory Platform Prototype for Growth Monitoring of Biotechnical Relevant Microorganism and Cell Lines in Single-Use Shake Flasks. *Sensors* 2014, 14, 17390-17405

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1. Cell Size Determination

```
// P. pastoris
run("Convolve...", "text1=[1 1 1\n1 -8 1\n1 1 1\n]");
run("8-bit");
setThreshold(50, 255);
run("Convert to Mask");
run("Fill Holes");
run("Watershed");
run("Open");
run("Analyze Particles...", "size=20-300 circularity=0.50-1.00 show=[Count
Masks] include summarize");
run("Invert");
close();close();

// L. zeae
run("Convolve...", "text1=[1 1 1\n1 -8 1\n1 1 1\n]");
run("8-bit");
setThreshold(50, 255);
```

```

run("Convert to Mask");
run("Watershed");
run("Analyze Particles...", "size=5-100 circularity=0.0-1.00 show=[Count Masks] include summarize");
run("Invert");
close();close();

```

2. VBA

Option Explicit

```
Public Sub AutoKorrelation()
```

```
Call Clear
```

```

Dim nosampl As Boolean
nosampl = Menu.MultiPage1.Page1.CheckBox6.Value
If nosampl = True Then Call AutoKorrelation2

```

```

Dim k, i, n, m, l, s, t, u As Integer
Dim threshold1 As Double
Dim threshold2 As Double

```

```

Dim A As New Collection
Dim A2 As New Collection
Dim B As New Collection
Dim B2 As New Collection
Dim C As New Collection
Dim C2 As New Collection

```

```

Dim Range1 As Long
Dim Range2 As String
Dim Range2a As String
Dim Range2b As String

```

```

Range1 = CLng(Menu.MultiPage1.Page1.TextBox3.Value)
Range2a = Menu.MultiPage1.Page1.TextBox4.Value
Range2b = Menu.MultiPage1.Page1.TextBox5.Value

```

```

threshold1 = CDb1(Menu.MultiPage1.Page1.TextBox1.Value)
threshold2 = CDb1(Menu.MultiPage1.Page1.TextBox2.Value) / 60

```

```

Select Case Menu.MultiPage1.Page1.CheckBox4.Value
Case Is = True: u = 0

```

Case Is = False: u = 1

End Select

k = 2

l = 1

A.Add (0)

B.Add (Tabelle1.Cells(46, k + 2)) 'Amp bei t0

If Tabelle1.Cells(2, k) = 0 And Tabelle2.Cells(RCC1(Range2a), RCC2(Range2a)) = 0 Then C.Add
Tabelle2.Cells(RCC1(Range2b), RCC2(Range2b))

For n = 2 To Range1

If (Tabelle1.Cells(n + 1, k) - Tabelle1.Cells(n, k)) > threshold2 Then

For s = RCC1(Range2a) To RCC3(Range2a)

If (Tabelle1.Cells(n, k) - Tabelle2.Cells(s, RCC2(Range2a))) ^ 2 < threshold1 Then

A.Add Tabelle1.Cells(n + u, k)

B.Add Tabelle1.Cells(n + u, k + 2)

C.Add Tabelle2.Cells(s, RCC2(Range2b))

l = l + 1

End If

Next s

End If

Next n

m = 0

i = 1

For i = 1 To 1

If i = 1 Then

A2.Add (A(i))

B2.Add (B(i))

C2.Add (C(i))

GoTo Ende1

End If

If A(i) <> A(i + 1) Then

A2.Add (A(i))

```
B2.Add (B(i))
```

```
C2.Add (C(i))
```

```
m = m + 1
```

```
End If
```

```
Next i
```

```
Ende1:
```

```
t = 8
```

```
i = 1
```

```
For n = 2 To m + 2
```

```
    Tabelle1.Cells(n, t) = A2(i)
```

```
    Tabelle1.Cells(n, t + 1) = B2(i)
```

```
    Tabelle1.Cells(n, t + 2) = C2(i)
```

```
    i = i + 1
```

```
Next n
```

```
End Sub
```

```
Public Sub Clear()
```

```
    Tabelle1.Range("H2:J400000") = ""
```

```
    If Menu.TextBox2.Value < 0.3 Then
```

```
        Menu.TextBox2.Value = 0.3
```

```
        MsgBox "minimum value = 0.3", vbExclamation, "Threshold Error"
```

```
    End If
```

```
End Sub
```

Option Explicit

```
Public Sub MedianKorrektur()
```

```
Application.ScreenUpdating = False
```

```
Call Clear2
```

```
Dim k, i, n, m, l, s As Integer
```

```
Dim Range1 As Long
```

```
Dim fenster As Integer
```

```
Dim threshold2 As Double
```

```
Dim dAMP As Double
```

```
Dim discdata As Boolean
```

```
Dim fwdmed As Boolean
```

```
Dim speedmodeon As Boolean
```

```
Range1 = CLng(Menu.MultiPage1.Page2.TextBox17.Value)
```

```
fenster = CInt(Menu.MultiPage1.Page2.TextBox6.Value)
```

```
threshold2 = CDbl(Menu.MultiPage1.Page1.TextBox2.Value) / 60
```

```
discdata = Menu.MultiPage1.Page2.CheckBox1.Value
```

```
fwdmed = Menu.MultiPage1.Page2.CheckBox2.Value
```

```
speedmodeon = Menu.MultiPage1.Page2.CheckBox3.Value
```

```
k = 3
```

```
l = 2
```

```
For n = fenster + 1 To Range1
```

```
    If Tabelle1.Cells(n - (fenster - 1), k - 2) <> "" Then
```

```
        Tabelle1.Cells(n - (fenster - 1), k - 1) = (Tabelle1.Cells(n - (fenster - 1), k - 2) - Tabelle1.Cells(2, k - 2)) / (3600000)
```

```
        Else: GoTo Endel
```

```
    End If
```

```
Next n
```

```
Endel:
```

```
For n = fenster + 1 To Range1
```

```
    If Tabelle1.Cells(n, k) = "" Then GoTo Ende2
```

```
        If (Tabelle1.Cells(n, l) - Tabelle1.Cells(n - 1, l)) > threshold2 Then
```

If discdata = False And fwdmed = False Then GoTo marke1:

 If discdata = True Then

 n = n + fenster

 GoTo marke1

 End If

 dAMP = Application.Median(Tabelle1.Range(Cells(n + 2 * (fenster - 1), k), Cells(n + (fenster - 1), k))) -

 Application.Median(Tabelle1.Range(Cells(n + fenster, k), Cells(n + 1, k))))

 s = 0

 Do

 Tabelle1.Cells(n, k + 1) = Application.Median(Tabelle1.Range(Cells(n + (fenster - 1), k), Cells(n, k))) - dAMP

 s = s + 1

 n = n + 1

 Loop While s < fenster

 n = n - 1

 End If

marke1:

 Tabelle1.Cells(n, k + 1) = Application.Median(Tabelle1.Range(Cells(n - (fenster - 1), k), Cells(n, k)))

Next n

Ende2:

If speedmodeon = True Then

 Call SpeedMode

Else: Call noSpeedModeAmp

End If

Application.ScreenUpdating = True

End Sub

Public Sub Clear2()

```
Dim discdata As Boolean
```

```
Dim fwdmed As Boolean
```

```
discdata = Menu.MultiPage1.Page2.CheckBox1.Value
```

```
fwdmed = Menu.MultiPage1.Page2.CheckBox2.Value
```

```
Tabelle1.Range("B2:B400000") = ""
```

```
Tabelle1.Range("D2:D400000") = ""
```

```
If discdata = True And fwdmed = True Then
```

```
discdata = False
```

```
fwdmed = False
```

```
MsgBox "Wählen Sie eine der beiden Methoden oder keine", vbExclamation, "method incompatibility"
```

```
End If
```

```
End Sub
```

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