

In[5]:=

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Manipulate[Dynamic[If[start,
    Column[{Framed[processM2[CurrentImage[], n, m, d, sd]], ""},
    Row[{"", Dynamic[{h, imin, imax, imean}],
    If[jishu,
        Dynamic@Style[processJishu2[u, sd, d, h, imin, imax, imean], {Blue, 15}]]
    , ""], Spacer[20]]]],
Column[{
Framed@Row[{Framed@Show[Image[Table[1, {240}, {320}]], ImageSize -> 380],
    Show[Image[Table[0, {240}, {320}]], ImageSize -> 400]], Spacer[20]], "",
Row[{"", Dynamic[{h, imin, imax, imean}], Spacer[20]]]]],
Item[Row[{"", Style["薄膜厚度与平整度自动化测量系统", {Blue, 25, Bold}], ""],
    Spacer[220]], ControlPlacement -> Top],
Delimiter,
Item[Row[{"", Button["参数设置", CreateDialog[
Column[{Control[{h, 5}], Control[{imin, 0.2}], Control[{imax, 0.8}],
    Control[{imean, 0.05}]]], Right], Modal -> True]
, ImageSize -> {100, 30}],
    Button["检查CCD", CreateDialog[CurrentImage[], Modal -> True],
    Method -> "Queued", ImageSize -> {100, 30}], Button["调整仪器",
CreateDialog[Dynamic[CurrentImage[]], Modal -> True], Method -> "Queued"
, ImageSize -> {100, 30}], "", Dynamic@If[! start, Button["开始拍摄", start = True,
    ImageSize -> {100, 30}], Button["停止拍摄", If[! jishu, start = False]
, ImageSize -> {100, 30}]], Dynamic@If[start,
If[! jishu, Button["开始计数", jishu = True, ImageSize -> {100, 30}],
Button["暂停计数", jishu = False, ImageSize -> {100, 30}]],
Button["未能计数", ImageSize -> {100, 30}]], Button["清除数据",
If[! jishu, flag = True; {lr, num, dataget, datas} = {0, 0, {}, {}}]
, ImageSize -> {100, 30}]], Spacer[25]], ControlPlacement -> Top],
Item[Row[{"",
Grid[{
{Control[{n, 160, "水平调节"}, 1, 320, 1, Appearance -> "Labeled"]},
    Control[{sd, 20, "扫描宽度"}, 10, 119, 1, Appearance -> "Labeled"]}},
{Control[{m, 120, "竖直调节"}, sd + 1, 240 - sd - 1, 1, Appearance -> "Labeled"]},
    Control[{d, 0, "样本宽度"}, 0, sd, 1, Appearance -> "Labeled"]}}],
    Spacings -> {{4, 8, 4},
    Automatic}]], Spacer[70]], ControlPlacement -> Bottom],
Delimiter,
Item[Row[{"", Button[Style["薄膜厚度计算", {Red, 20}],
CreateDialog[
    Style[StringForm["所测薄膜厚度为: `1` 微米", NumberForm[num / 2  $\lambda$ , {6, 3}]],
    {Red, 30}]], ImageSize -> {240, 40}], "",
    Row[{Dynamic@Button[Style[StringForm["记录: `1`", s], {Red, 15}],
If[flag && Length[dataget] >= 4, datas = Append[datas, dataget]; s++; flag = False]
, ImageSize -> {80, 40}], Button[Style["平整度计算", {Red, 20}],
Module[{data = {}, len, lmax = 0, 1}, len = Length[datas];
If[len > 0, If[len == 1, data = datas[[1]] / 2  $\lambda$ ;
CreateDialog[Column[{
Style[StringForm["所测平面的平整度为: `1` 微米",
    NumberForm[Max[data] - Min[data], {6, 3}]],
{Red, 20}], "", ListLinePlot[data, PlotLabel -> "平整度折线",
PlotRange -> {0, 5}, AspectRatio -> 0.4, PlotStyle -> Red, Frame -> True,

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        ImageSize -> 500]]], WindowTitle -> "测量结果"],
    Do[l = Length[datas[[i]]];
        If[l > lmax, lmax = l], {i, 1, len}]; data = datas / 2 λ;
    Do[l = Length[data[[i]]]; If[l < lmax, Do[data[[i]] = Append[data[[i]], 0], {lmax - 1}]],
        {i, 1, len}];
        CreateDialog[Column[{
    Style[StringForm[
        "所测平面的平整度为：`1`微米", NumberForm[Max[data] - Min[data],
            {6, 3}]], {Red, 20}], ""],
    ListPlot3D[data, Mesh -> All,
        PlotRange -> {-5, 5}, ImageSize -> 500, PlotLabel -> "平整度曲面"]
    ]], WindowTitle -> "测量结果"]]]], ImageSize -> {180, 40}]], Spacer[20]], "",
        Spacer[75]],
    ControlPlacement -> Bottom],
    Initialization :> (start = False; jishu = False; {lr, num, dataget} = {0, 0, {}};
    λ = 0.633; s = 0; datas = {}; flag = True;
    processM2[img_, n_, m_, d_, sd_, L_: 240, l_: 320, size_: 400] :=
    Module[{data}, u = {}; data = ImageData[ColorConvert[img, "Grayscale"]];
    If[Length[data[[1, 1]]] == 0,
    Do[u = Prepend[u, data[[i, n]]], {i, L - m + 1 - sd, L - m + 1 + sd}],
    Do[u = Prepend[u, data[[i, n, 1]]], {i, L - m + 1 - sd, L - m + 1 + sd}]];
    Row[{Show[
    ListLinePlot[u, Frame -> True,
        PlotStyle -> RGBColor[0, 0.5, 0], PlotRange -> {-0.1, 1.1},
        AspectRatio -> (3 / 4), ImageSize -> size],
    Graphics[
        {{Blue, Dashed, Line[{{1, 0}, {1, 1}}], Line[{{2 sd + 1, 0}, {2 sd + 1, 1}}]},
        {Red, Line[{{sd + 1, 0}, {sd + 1, 1}}], Line[{{sd + 1 - d, 0}, {sd + 1 - d, 1}}],
            Line[{{sd + 1 + d, 0}, {sd + 1 + d, 1}}]}]],
    Show[img,
        Graphics[{{Green, Line[{{n, m - sd}, {n, m + sd}}]}, {Red, Line[{{n - 50, m},
            {n + 50, m}}], Line[{{n - 50, m - d}, {n + 50, m - d}}],
            Line[{{n - 50, m + d}, {n + 50, m + d}}]},
            {Dashed, Blue, Line[{{n - 50, m - sd},
            {n + 50, m - sd}}], Line[{{n - 50, m + sd}, {n + 50, m + sd}}]}]],
        ImageSize -> size]
    ], Spacer[20]]] /; sd < m < L - sd;
    jishuflag = True; num = 0; lr = 0; dataget = {}; saveflag = False;
    processJishu2[u_, sd_, d_, h_: 5, imin_: 0.2, imax_: 0.8, imean_: 0.05] :=
    Module[{yangben = {}, boolfirst = {}, boolend = {}, tot1, tot2, first, end, len, mean},
    Do[yangben = Append[yangben, Part[u, i]], {i, sd + 1 - d, sd + 1 + d}];
    first = yangben[[1]];
        end = yangben[[-1]]; mean = Mean[yangben]; len = Length[yangben];
    Do[boolfirst = Append[boolfirst, Boole[yangben[[i]] > first]], {i, 2, len - 1}];
    Do[boolend = Append[boolend, Boole[yangben[[i]] > end]], {i, 2, len - 1}];
    tot1 = Total[boolfirst] / (len - 2); tot2 = Total[boolend] / (len - 2); If[jishuflag,
    Which[tot1 <= imin && tot2 >= imax && first - mean >= imean && mean - end >= imean,
    lr++; num++; jishuflag = False; saveflag = True,
    tot1 >= imax && tot2 <= imin && mean - first >= imean && end - mean >= imean,
    lr--; num++; jishuflag = False; saveflag = True]];
    If[(! jishuflag) && tot1 <= imin &&
        tot2 <= imin && first - mean >= imean && end - mean >= imean,
    jishuflag = True];
    If[saveflag && Mod[num, h] == 0 && num ≠ 0,
    dataget = Append[dataget, lr]; lr = 0; saveflag = False]; {lr, num, dataget}]]]

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# 薄膜厚度与平整度自动化测量系统

参数设置

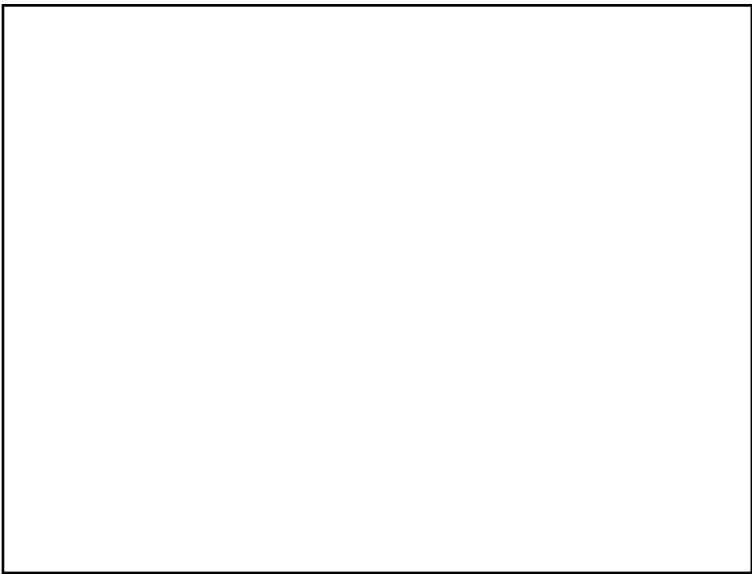
检查 C C D

调整仪器

开始拍摄

未能计数

清除数据



Out[5]=

{5, 0.2, 0.8, 0.05}

水平调节



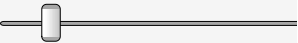
1 6 0

竖直调节



1 2 0

扫描宽度



样本宽度

