Ohm

0.1

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Chapter 1

Module Index

1.1 Modules

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Module used to analyze the line of pixels selected by the user through the UI. It uses high values of the differential of the RGB colours to detect edges of bands. 12
CameraInput 13
ImageInput 14

Chapter 2

Namespace Index

2.1 Packages

Here are the packages with brief descriptions (if available):

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Input 15
UserInterface 15
ValueIdentification 15

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

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Class Index

4.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

ohm.ImageProcessing.BandReader
: Module used to analyze the line of pixels selected by the user through the UI. It uses high values of the differential of the RGB colours to detect edges of bands . . . 17

ohm.Input.CameraInput
: Instances of this class are to be used to receive input from device camera. Currently unimplemented . . . 22

ohm.Helpers . . . 23

ohm.Input.ImageInput
: A source of input data, uses static images . . . 24

ohm.Input.Input . . . 25

ohm.userinterface.LiveImageView
: The LiveImageView is an ImageView that periodically calls a Renderer to produce a new image that the ImageView then displays. This is useful to create images from real time updating images/data . . . 26

ohm.Ohm . . . 27

ohm.ImageProcessing.OhmImageProcessor
: Module that will be used as a means of combining the algorithms outlined in BandReader and ResistorBodyID. Not yet implemented . . . 27

ohm.userinterface.OhmViewController
: Coordinates the algorithms present in the model with user input through the view . . . 28

ohm.userinterface.ResistorAxisPickerView
: This class displays an opencv Mat as an image and allows the user to pick two endpoints of a line. Once two valid points, a listener is called . . . 29

ohm.ImageProcessing.ResistorBodyID . . . 30

ohm.ValueIdentification.ResistorColour
: Enum containing all of the possible colours that a resistor can take on. Also features member functions used to map the colours of bands to values used in the calculation process . . . 30

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Module Documentation

5.1 Input

Classes

- interface ohm.Input.Input

5.1.1 Detailed Description

5.2 UserInterface

Classes

- class ohm.userinterface.LiveImageView

  The LiveImageView is an ImageView that periodically calls a Renderer to produce a new image that the ImageView then displays. This is useful to create images from real time updating images/data.
- class ohm.userinterface.OhmViewController

  Coordinates the algorithms present in the model with user input through the view.
- class ohm.userinterface.ResistorAxisPickerView

  This class displays an opencv Mat as an image and allows the user to pick two endpoints of a line. Once two valid points, a listener is called.

5.2.1 Detailed Description

5.3 ColourMapping

Classes

- enum ohm.ValueIdentification.ResistorColour

  Enum containing all of the possible colours that a resistor can take on. Also features member functions used to map the colours of bands to values used in the calculation process.

5.3.1 Detailed Description

Author

Jonathan Brown

5.4 Module used to analyze the line of pixels selected by the user through the UI. It uses high values of the differential of the RGB colours to detect edges of bands.

Classes

- class ohm.ImageProcessing.BandReader

  Module used to analyze the line of pixels selected by the user through the UI. It uses high values of the differential of the RGB colours to detect edges of bands.
- class ohm.ImageProcessing.OhmImageProcessor

  Module that will be used as a means of combining the algorithms outlined in BandReader and ResistorBodyID. Not yet implemented.
- class ohm.ImageProcessing.ResistorBodyID

5.4.1 Detailed Description

5.5 CameraInput

Classes

- class ohm.Input.CameraInput

  Instances of this class are to be used to receive input from device camera. Currently unimplemented.

5.5.1 Detailed Description

5.6 ImageInput

Classes

- class ohm.Input.ImageInput

  A source of input data, uses static images.

5.6.1 Detailed Description

Chapter 6

Namespace Documentation

6.1 Package ImageProcessing

6.1.1 Detailed Description

Contains the Band Location and Resistor Body Identification modules.

6.2 Package Input

6.2.1 Detailed Description

This package contains the components of the Camera and ImageFile modules. They hide the applications access to the hardware (camera or file system).

6.3 Package UserInterface

6.3.1 Detailed Description

Contains the views and the controller of the application. This is a Behavioural Module who's secret is the UI components of the application.

6.4 Package ValueIdentification

6.4.1 Detailed Description

Contains the Colour Mapping and Value Identification Modules

Chapter 7

Class Documentation

7.1 ohm.ImageProcessing.BandReader Class Reference

Module used to analyze the line of pixels selected by the user through the UI. It uses high values of the differential of the RGB colours to detect edges of bands.

Static Public Member Functions

- static List< Point > read (Mat frame, Point p1, Point p2)
- static double [ ][ ] boxSample (Mat mat, Point start, Point end, int nSamples, double boxWidth)
- static double [ ][ ] rollingAverageFilter (double[ ][ ] sample, int windowRadius)
- static double [ ] componentwiseMean (double[ ][ ] samples)
- static double [ ][ ] sample (Mat mat, Point start, Point end, int nSamples)
- static double [ ][ ] diff (double[ ][ ] y)
- static double mag (double[ ] vect)
- static double dist (Point p1, Point p2)
- static double [ ] **groupTerms** (double[ ] terms, int binSize)
- static List< Pair< Integer, Double > > **findLocalMaxima** (double[ ] values)
- static List< Pair< Integer, Double > > **findGlobalMaxima** (double[ ] values, int nMaxima)
- static Point **onLine** (Point start, Point end, double fraction)

7.1.1 Detailed Description

Module used to analyze the line of pixels selected by the user through the UI. It uses high values of the differential of the RGB colours to detect edges of bands.

Author

Ryan Marks & Jonathan Brown

7.1.2 Member Function Documentation

7.1.2.1 boxSample()

```
static double [][] ohm.ImageProcessing.BandReader.boxSample (
            Mat mat,
            Point start,
            Point end,
            int nSamples,
            double boxWidth )  [static]
```

This method takes something Ryan made up called a box sample. At nSamples points along the line from start to end, a line of samples are take along a line of length boxWidth, normal to and centred on the sampling line

Parameters

mat	The matrix being sampled
start	The start of the sampling line
end	The end of the sampling line
nSamples	The number or linear samples to take along the sampling line
boxWidth	the length of the normal sampling line.

Returns

An array containing the average rgb values (represented as double[]) in the sampling window.

7.1.2.2 componentwiseMean()

```
static double [] ohm.ImageProcessing.BandReader.componentwiseMean (
            double samples[][] )  [static]
```

Calculate the mean of an array of vectors.

Parameters

samples	Array of RGB vectors represented as double[]

Returns

The average of all vectors within the input array (represented as a double[])

7.1.2.3 diff()

```
static double [][] ohm.ImageProcessing.BandReader.diff (
            double y[][] )  [static]
```

Take the discrete derivative of a series of vectors.

Parameters

y	A series of vectors

Returns

y', the derivative of the input represented as a array of vectors (double[]).

7.1.2.4 dist()

```
static double ohm.ImageProcessing.BandReader.dist (
            Point p1,
            Point p2 )  [static]
```

Calcualte the distance between two points.

Parameters

p1	Point 1.
p2	Point 2.

Returns

Distance between p1 and p2.

7.1.2.5 mag()

```
static double ohm.ImageProcessing.BandReader.mag (
            double [] vect )  [static]
```

Calculate the magnitude of a given vector

Parameters

vect	Input vector

Returns

The magnitude of the input vector

7.1.2.6 read()

```
static List<Point> ohm.ImageProcessing.BandReader.read (
            Mat frame,
            Point p1,
            Point p2 )  [static]
```

Parameters

frame	Image to Sample.
p1	Starting point of the sampling line.
p2	Ending point of the sampling line.

Returns

List of points along the line that are likely band edges.

7.1.2.7 rollingAverageFilter()

```
static double [][] ohm.ImageProcessing.BandReader.rollingAverageFilter (
            double sample[][],
            int windowRadius )  [static]
```

This method is used to apply a rolling average filter to vector data.

Parameters

sample	An array of (arrays of doubles representing an individual vector sample)
windowRadius	The number of samples on either side of a given sample to incorporate into the average

Returns

An array containing the average RGB value sampled along the line.

7.1.2.8 sample()

```
static double [][] ohm.ImageProcessing.BandReader.sample (
            Mat mat,
            Point start,
            Point end,
            int nSamples )  [static]
```

Take a linear sampling from a matrix at a given number of points along a line

Parameters

mat	The matrix to be sampled
start	The start of the sampling line
end	The end of the sampling line
nSamples	The number of samples to take along the line.

Returns

The samples taken

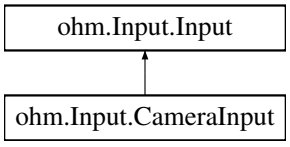
The documentation for this class was generated from the following file:

- java/ohm/ImageProcessing/BandReader.java

7.2 ohm.Input.CameraInput Class Reference

Instances of this class are to be used to receive input from device camera. Currently unimplemented.

Inheritance diagram for ohm.Input.CameraInput:



Public Member Functions

- Mat getMat ()
- Image getImage ()

7.2.1 Detailed Description

Instances of this class are to be used to receive input from device camera. Currently unimplemented.

7.2.2 Member Function Documentation

7.2.2.1 getImage()

```
Image ohm.Input.CameraInput.getImage ( )
```

Used to retrieve a image representation of the input (used by JavaFX).

Returns

Image representation of input.

Implements ohm.Input.Input.

7.2.2.2 getMat()

```
Mat ohm.Input.CameraInput.getMat ( )
```

Used to retrieve a matrix representation of the input (used by Opencv libraries).

Returns

Matrix representation of input.

Implements ohm.Input.Input.

The documentation for this class was generated from the following file:

- java/ohm/Input/CameraInput.java

7.3 ohm.Helpers Class Reference

Static Public Member Functions

- static Image **matToImage** (Mat mat)

7.3.1 Detailed Description

Module featuring static methods used by multiple other modules in order to perform common computations. Will be eliminated in final release.

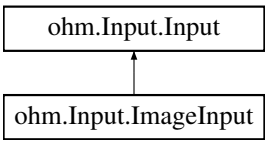
The documentation for this class was generated from the following file:

- java/ohm/Helpers.java

7.4 ohm.Input.ImageInput Class Reference

A source of input data, uses static images.

Inheritance diagram for ohm.Input.ImageInput:



Public Member Functions

- ImageInput ()
- Mat getMat ()
- Image getImage ()

7.4.1 Detailed Description

A source of input data, uses static images.

Author

Jonathan Brown

7.4.2 Constructor & Destructor Documentation

7.4.2.1 ImageInput()

```
ohm.Input.ImageInput.ImageInput ( )
```

Default constructor creates an instance using a default image.

7.4.3 Member Function Documentation

7.4.3.1 getImage()

```
Image ohm.Input.ImageInput.getImage ( )
```

Used to retrieve a image representation of the input (used by JavaFX).

Returns

Image representation of input.

Implements ohm.Input.Input.

7.4.3.2 getMat()

```
Mat ohm.Input.ImageInput.getMat ( )
```

Method returns a OpenCV Matrix of the loaded image.

Returns

OpenCV Matrix representation of the image.

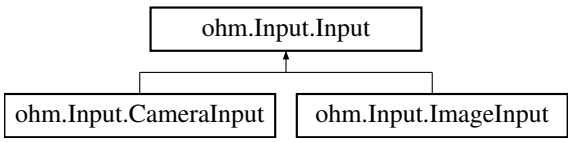
Implements ohm.Input.Input.

The documentation for this class was generated from the following file:

- java/ohm/Input/ImageInput.java

7.5 ohm.Input.Input Interface Reference

Inheritance diagram for ohm.Input.Input:



Public Member Functions

- Mat getMat ()
- Image getImage ()

7.5.1 Detailed Description

Author

Jonathan Brown

7.5.2 Member Function Documentation

7.5.2.1 getImage()

```
Image ohm.Input.Input.getImage ( )
```

Used to retrieve a image representation of the input (used by JavaFX).

Returns

Image representation of input.

Implemented in ohm.Input.ImageInput, and ohm.Input.CameraInput.

7.5.2.2 getMat()

```
Mat ohm.Input.Input.getMat ( )
```

Used to retrieve a matrix representation of the input (used by Opencv libraries).

Returns

Matrix representation of input.

Implemented in ohm.Input.ImageInput, and ohm.Input.CameraInput.

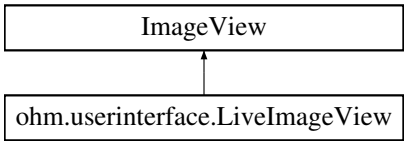
The documentation for this interface was generated from the following file:

- java/ohm/Input/Input.java

7.6 ohm.userinterface.LiveImageView Class Reference

The LiveImageView is an ImageView that periodically calls a Renderer to produce a new image that the ImageView then displays. This is useful to create images from real time updating images/data.

Inheritance diagram for ohm.userinterface.LiveImageView:



Classes

- interface **Renderer**

Public Member Functions

- void **setFrameRate** (int frameRate)
- void **setRenderer** (Renderer newRenderer)

7.6.1 Detailed Description

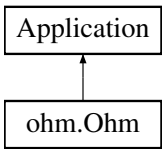
The LiveImageView is an ImageView that periodically calls a Renderer to produce a new image that the ImageView then displays. This is useful to create images from real time updating images/data.

The documentation for this class was generated from the following file:

- java/ohm/userinterface/LiveImageView.java

7.7 ohm.Ohm Class Reference

Inheritance diagram for ohm.Ohm:



Public Member Functions

- void **start** (Stage primaryStage) throws Exception

Static Public Member Functions

- static void **main** (String[ ] args) throws Exception

The documentation for this class was generated from the following file:

- java/ohm/Ohm.java

7.8 ohm.ImageProcessing.OhmImageProcessor Class Reference

Module that will be used as a means of combining the algorithms outlined in BandReader and ResistorBodyID. Not yet implemented.

7.8.1 Detailed Description

Module that will be used as a means of combining the algorithms outlined in BandReader and ResistorBodyID. Not yet implemented.

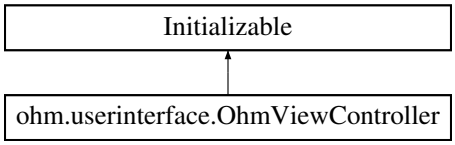
The documentation for this class was generated from the following file:

- java/ohm/ImageProcessing/OhmImageProcessor.java

7.9 ohm.userinterface.OhmViewController Class Reference

Coordinates the algorithms present in the model with user input through the view.

Inheritance diagram for ohm.userinterface.OhmViewController:



Public Member Functions

- void initialize (URL url, ResourceBundle rb)
- void **buttonClicked** (ActionEvent actionEvent)

Public Attributes

- Button **startCameraButton**

7.9.1 Detailed Description

Coordinates the algorithms present in the model with user input through the view.

7.9.2 Member Function Documentation

7.9.2.1 initialize()

```
void ohm.userinterface.OhmViewController.initialize (
            URL url,
            ResourceBundle rb )
```

Method used to "glue" together the front and back end of the application.

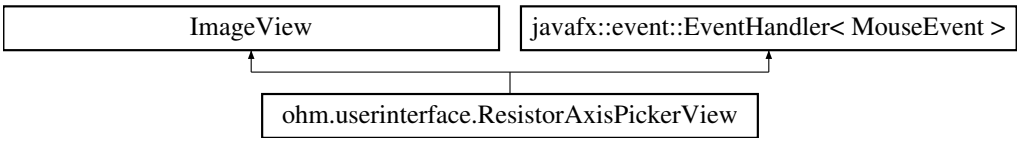
The documentation for this class was generated from the following file:

- java/ohm/userinterface/OhmViewController.java

7.10 ohm.userinterface.ResistorAxisPickerView Class Reference

This class displays an opencv Mat as an image and allows the user to pick two endpoints of a line. Once two valid points, a listener is called.

Inheritance diagram for ohm.userinterface.ResistorAxisPickerView:



Classes

- interface **Listener**

Public Member Functions

- void **handle** (MouseEvent event)
- void setImage (Mat newImage)
- void setListener (Listener listener)

Static Public Member Functions

- static double **dist** (Point p1, Point p2)

7.10.1 Detailed Description

This class displays an opencv Mat as an image and allows the user to pick two endpoints of a line. Once two valid points, a listener is called.

7.10.2 Member Function Documentation

7.10.2.1 setImage()

```
void ohm.userinterface.ResistorAxisPickerView.setImage (
            Mat newImage )
```

Set the matrix to display

Parameters

newImage	Image to be set as the image to be displayed in the UI

7.10.2.2 setListener()

```
void ohm.userinterface.ResistorAxisPickerView.setListener (
            Listener listener )
```

Assign a line listener to be updated when new points are selected

Parameters

listener	Object that triggers responds to a mouse click inside the view.

The documentation for this class was generated from the following file:

- java/ohm/userinterface/ResistorAxisPickerView.java

7.11 ohm.ImageProcessing.ResistorBodyID Class Reference

7.11.1 Detailed Description

Module to be used for identifying arbitrarily placed resistors in an image. Not yet implemented. Expected time is by Rev-1 Demo.

The documentation for this class was generated from the following file:

- java/ohm/ImageProcessing/ResistorBodyID.java

7.12 ohm.ValueIdentification.ResistorColour Enum Reference

Enum containing all of the possible colours that a resistor can take on. Also features member functions used to map the colours of bands to values used in the calculation process.

Public Member Functions

- ResistorColour (int v, double r, double g, double b)

Static Public Member Functions

- static ResistorColour fit (int r, int g, int b)
- static ResistorColour fit (double r, double g, double b)

Public Attributes

- **BLACK** =(0,0,0,0)
- **BROWN** =(1,70,45,35)
- **RED** =(2,155,0,35)
- **ORANGE** =(3,245,105,30)
- **YELLOW** =(4,200,200,55)
- **GREEN** =(5,20,75,40)
- **BLUE** =(6,45,45,140)
- **VIOLET** =(7,50,33,80)
- **GREY** =(8,125,125,125)
- **WHITE** =(9,200,200,200)
- **BASE** =(-1,200,170,145)
- int **value**
- double **red**
- double **green**
- double **blue**

7.12.1 Detailed Description

Enum containing all of the possible colours that a resistor can take on. Also features member functions used to map the colours of bands to values used in the calculation process.

7.12.2 Constructor & Destructor Documentation

7.12.2.1 ResistorColour()

```
ohm.ValueIdentification.ResistorColour.ResistorColour (
            int v,
            double r,
            double g,
            double b )
```

Parameters

v	The number represented by the colour in the calculation of the resistor's ohmage.
r	The red value of the colour in RGB space. Ranges between 0 and 255.
g	The green value of the colour in RGB space. Ranges between 0 and 255.
b	The blue value of the colour in RGB space. Ranges between 0 and 255.

7.12.3 Member Function Documentation

7.12.3.1 fit() [1/2]

```
static ResistorColour ohm.ValueIdentification.ResistorColour.fit (
            int r,
            int g,
            int b )  [static]
```

Function takes in a sampled colour from the images and attempts to fit it to the closest known colour a resistor can possess.

Parameters

r	The red colour value of the colour to be fit.
g	The green colour value of the colour to be fit.
b	The blue colour value of the colour to be fit.

Returns

The known colour that best represents the sampled colour.

7.12.3.2 fit() [2/2]

```
static ResistorColour ohm.ValueIdentification.ResistorColour.fit (
            double r,
            double g,
            double b )  [static]
```

Function takes in a sampled colour from the images and attempts to fit it to the closest known colour a resistor can possess.

Parameters

r	The red colour value of the colour to be fit.
g	The green colour value of the colour to be fit.
b	The blue colour value of the colour to be fit.

Returns

The known colour that best represents the sampled colour.

The documentation for this enum was generated from the following file:

- java/ohm/ValueIdentification/ResistorColour.java

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