

# CardioMRI v2.0



## User Manual

Fall 2015 Sr Design Group

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# 1. Preface

This software allows a cardiologist to annotate sequences of images of a heart for various purposes. The heart images are created by MRI scans, and produce slices for multiple axis. The cardiologist will be able to mark a section of a heart with a curve on two slices, and these curves can be exported to an external program that will calculate the intermediate curves and then calculate the volume of the heart from the curves. The cardiologist will also be able to mark certain “landmark” points in the images, which will allow tracking of important heart landmarks. These annotations will ultimately help researchers better analyze MRI scans of hearts, and reduce some of their workload by compiling several useful functions into a single piece of software. This Software is provided in the hopes it will be useful.

## **Thanks to**

Dr. Thomas Denney

Dr. Richard Chapman

Austin Hancock

All The Senior Design Groups who came before us on this project

Auburn University

## 2. Installation

### Windows 7/8/10

Requirements: Java Runtime Environment

Download the JAR file and place it in the directory of your choosing

To run the program, double click on the JAR

### Mac OS X

Requirements: Java Runtime Environment

Download the JAR file and place it in the directory of your choosing

To run the program, double click on the JAR

### Linux

Requirements: Java Runtime Environment

Download the JAR file and place it in the directory of your choosing

To run the program, double click on the JAR

### Developer Installation

Requirements:

Eclipse Integrated Development Environment

JDK 1.8

Git

Import Source:

Open Eclipse then **File** → **Import**.

Open the Git folder and select **Projects from Git** and click next.

On the next screen select **Clone URI** and click next.

Input `https://github.com/kullen/MRI.git` into the URI field and click next

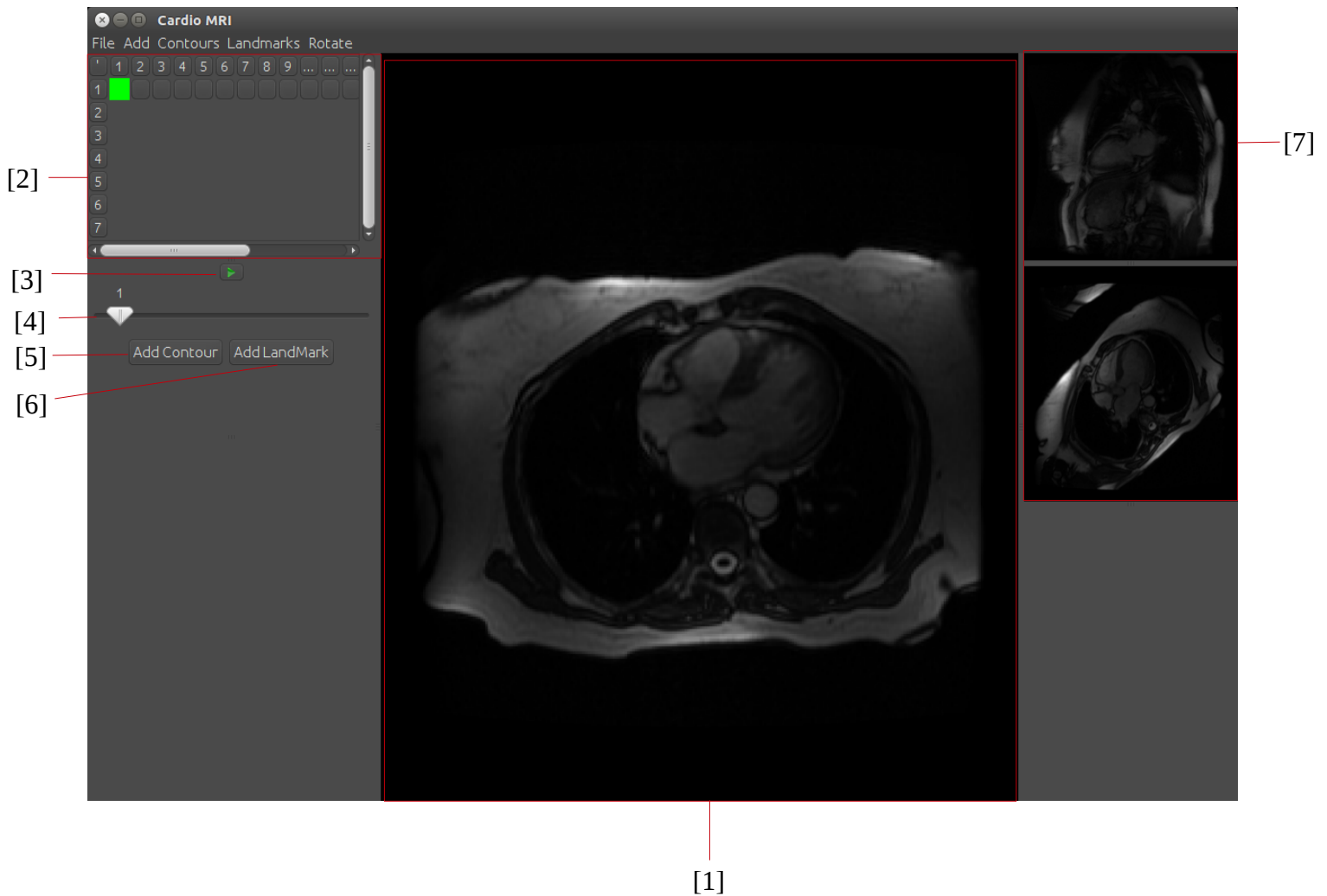
Select the branches you would like to clone and click **Next**. This step is optional as they are all selected by default, just click **Next**.

Provide the directory you would like the project to be located in and click **Next**.

Import the CardioMRI project into Eclipse. After this is complete you will be able to modify the project. Thanks for contributing!

### 3. Operation

#### Main Interface



#### [1] Main Image Area

Area where active editing of the image takes place.

#### [2] Image Grid Control Area

Shows which image you are currently editing. Rows are time in the series; Columns are slices.

#### [3] Play/Stop Button

Controls the animation of the series.

#### [4] Speed Control

This slider controls how fast the animation plays

#### [5] Add Contour

Select this to add a new contour.

#### [6] Add Landmark

Select this to add a new Landmark.

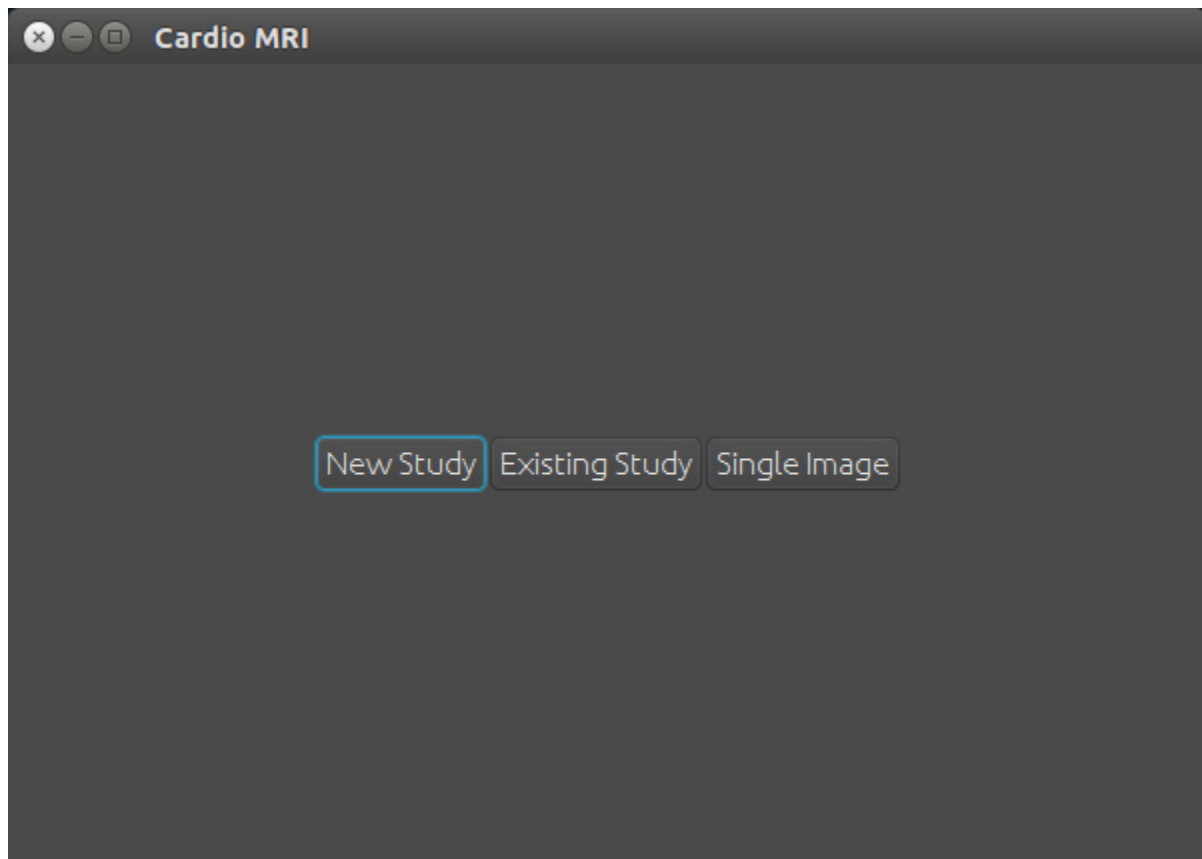
#### [7] Other Views

This shows the other views you selected while setting up the study. **Rotate** on the menu will move the next image into the Main Image Area

## Start Up

### New Study

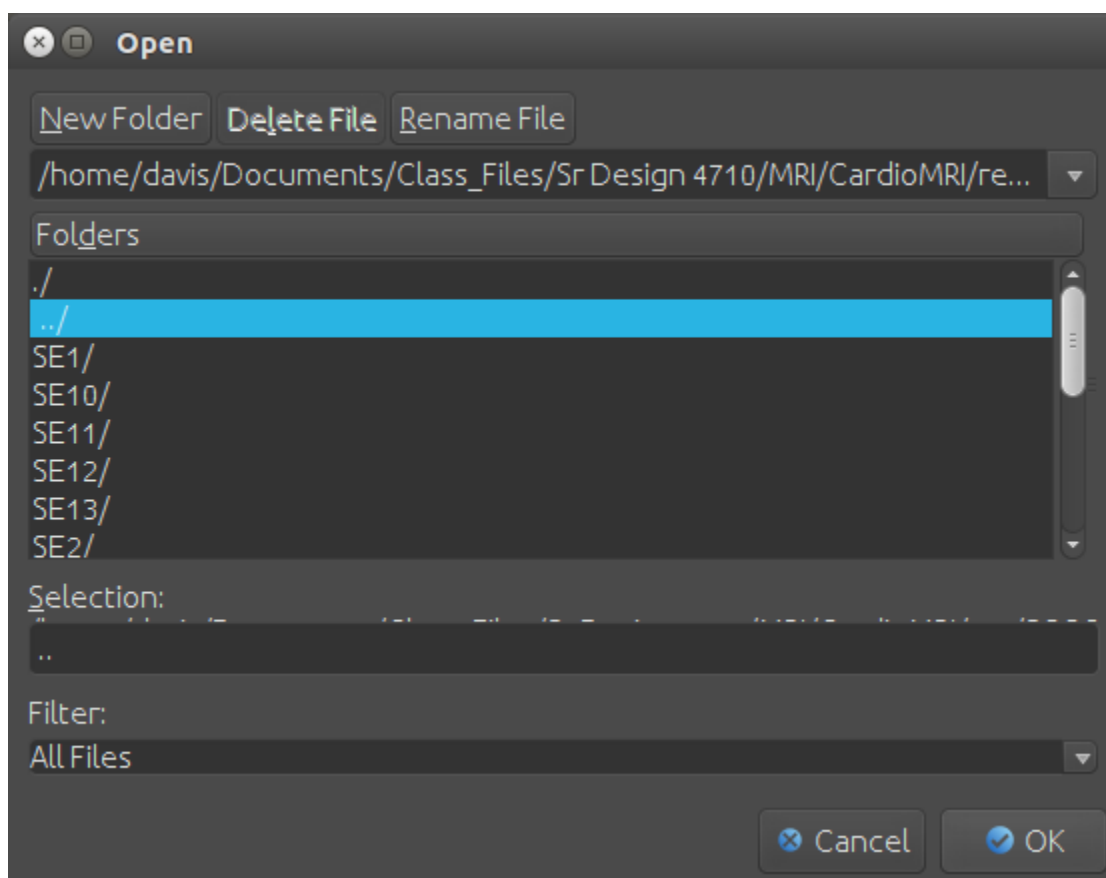
Select **New Study** on the presented menu.



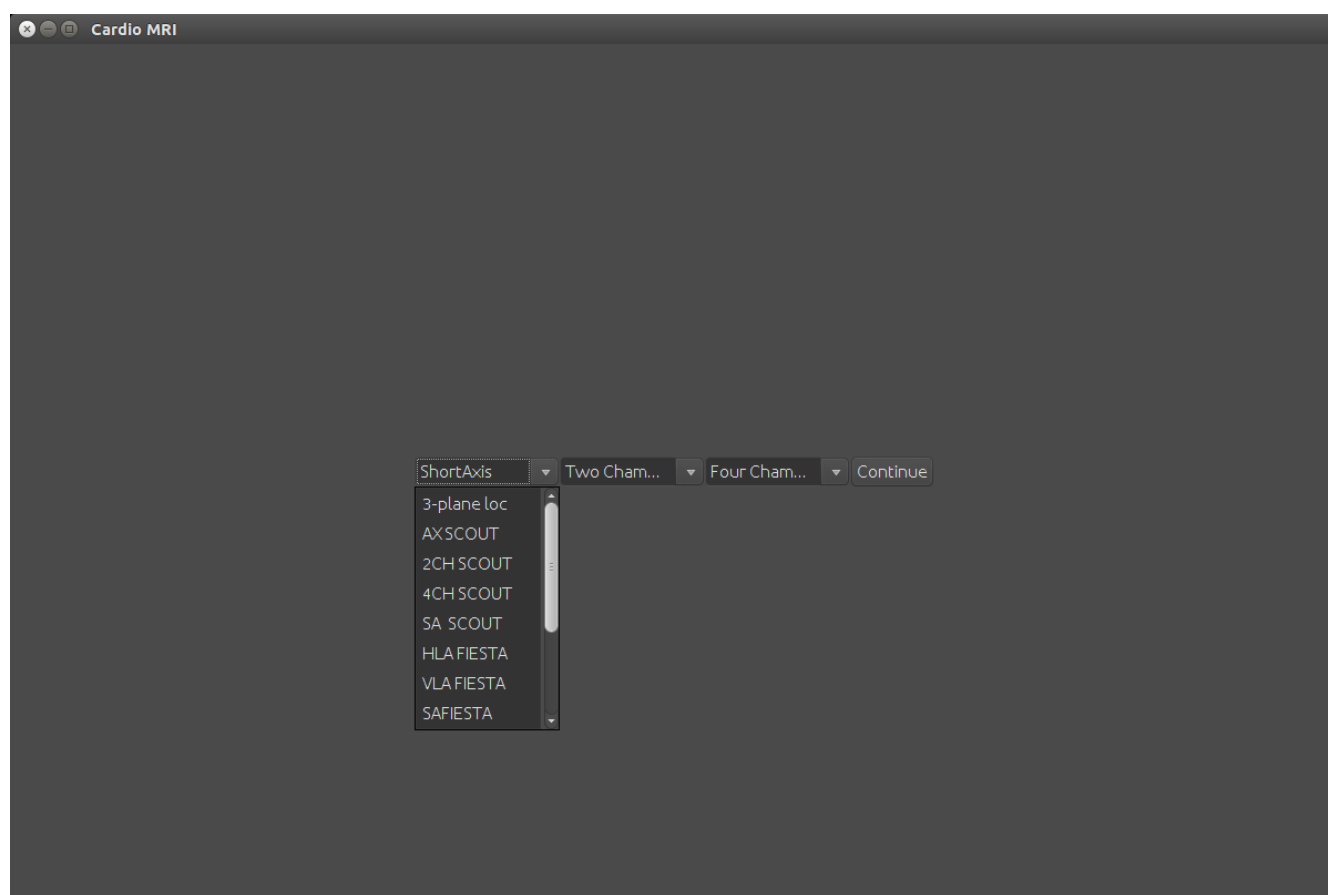


Select a folder containing a MRI study and click **Ok**.

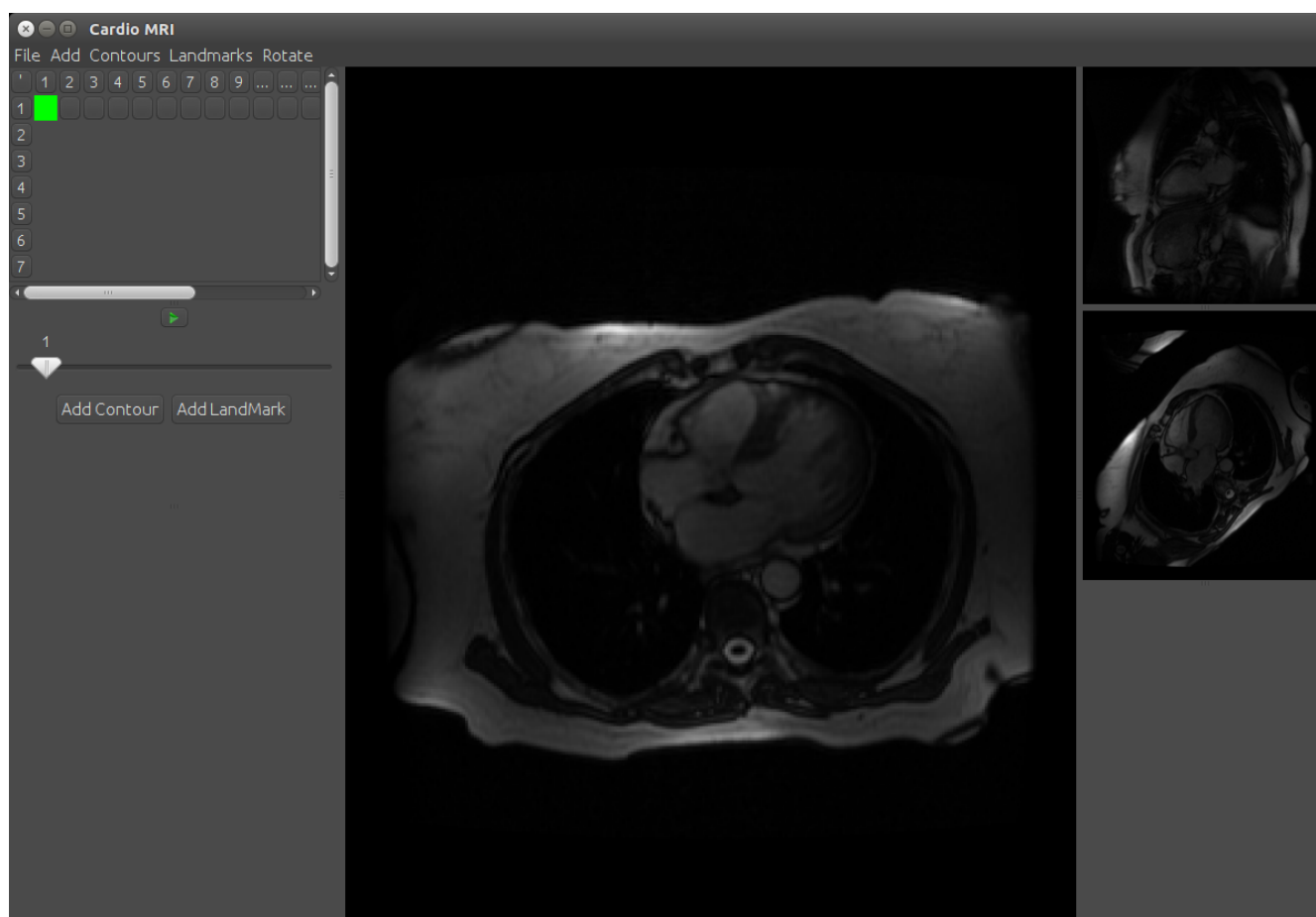
NOTE: On less powerful machines this step may take some time, please be patient.



Select the appropriate options for the selected study. Then click **Continue**.



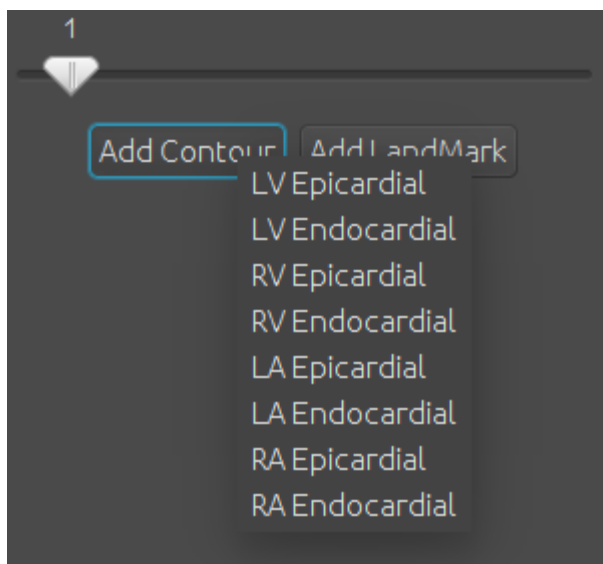
You will now be at the main interface for the program.



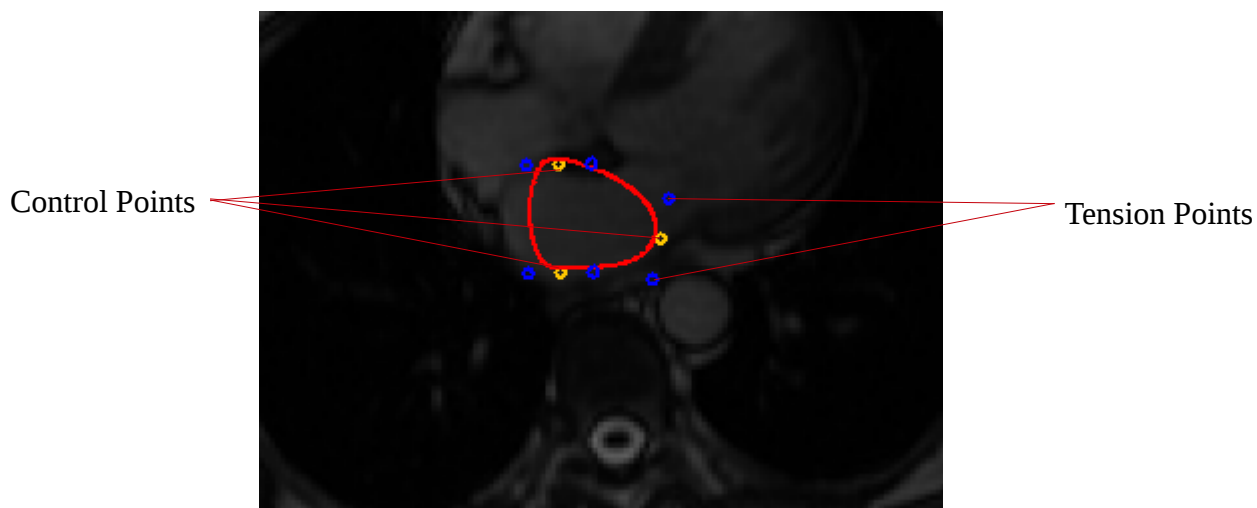
## Annotation

### Contours

Select **Add Contour** button, and Select the appropriate contour.

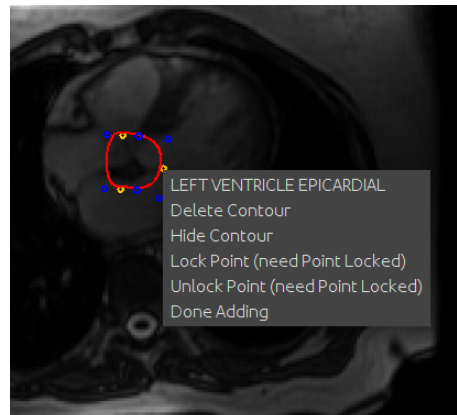


Once you have selected the appropriate contour, begin adding points in the main image area, by clicking where you want a control point to be added.



The Control Points set the primary features of the contour. The Tension points edit the shape of the adjacent sections of the contour.

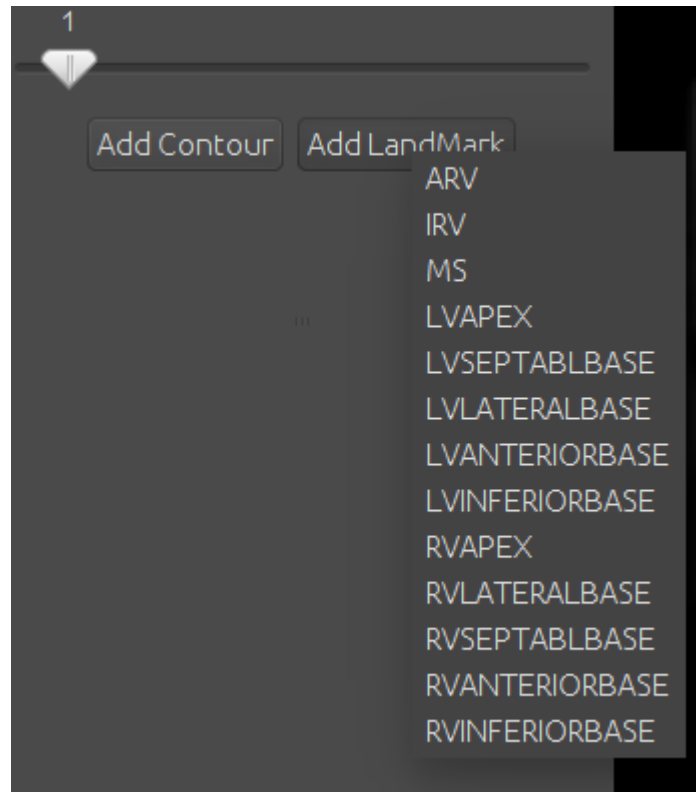
NOTE: By default the tension points are set to Locked, meaning the curve remains smooth through the control point. This can be changed by right clicking on the Control Point and changing its Locked status.



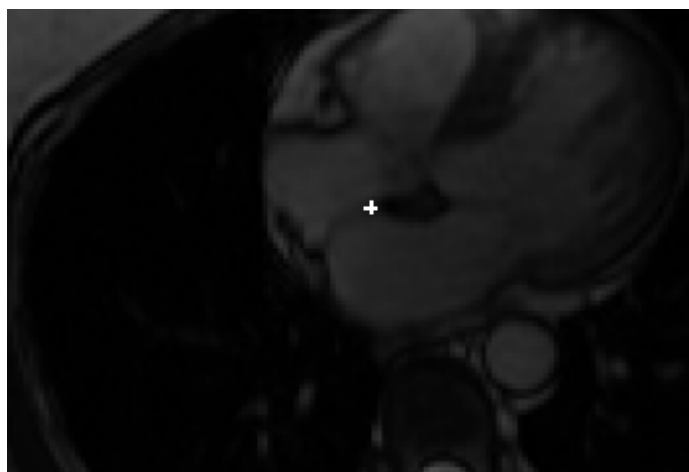
This menu also contains information about the selected Contour, as well as the option to **Delete Contour/Hide Contour** the contour, and to finish adding control points by selecting **Done Adding**

## Landmarks

Select the **Add Landmark** button, and select the appropriate landmark type.

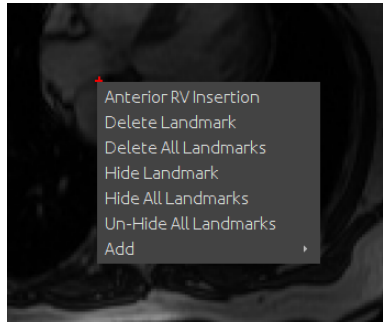


Then click where you would like the Landmark to be added in the Main Image area. Landmarks are shown as crosses.



Repeat this process until all landmarks have been added.

Right Click on a landmark to see more information about it, or to hide or delete it.

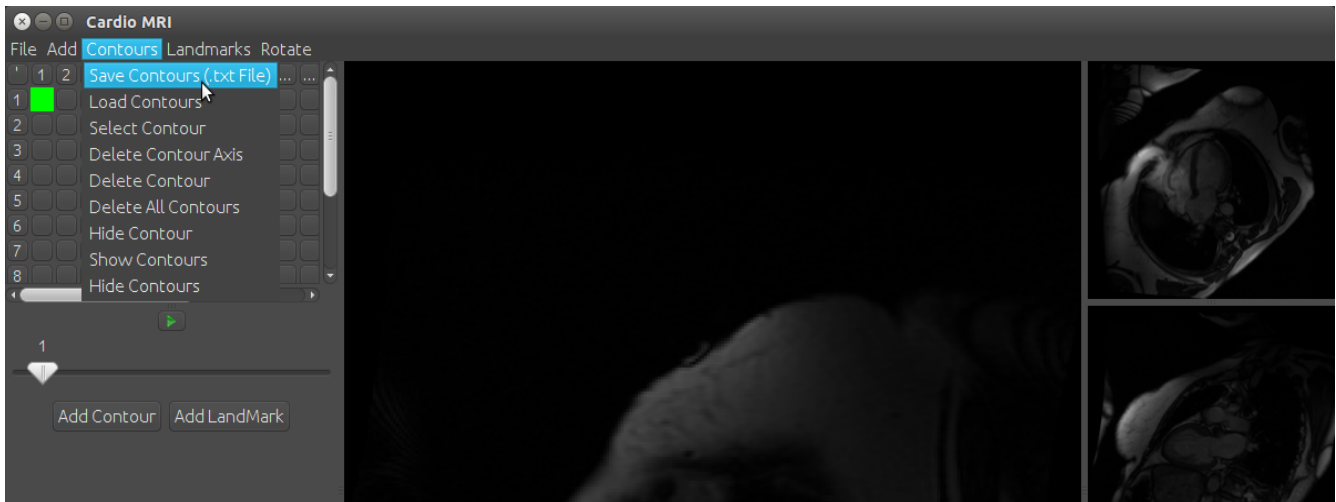


NOTE: Hidden Contours and Images can be un-hidden in the menu bar under the appropriate **Contours** or **Landmarks** Menu

## Saving/Loading Contours and Landmarks

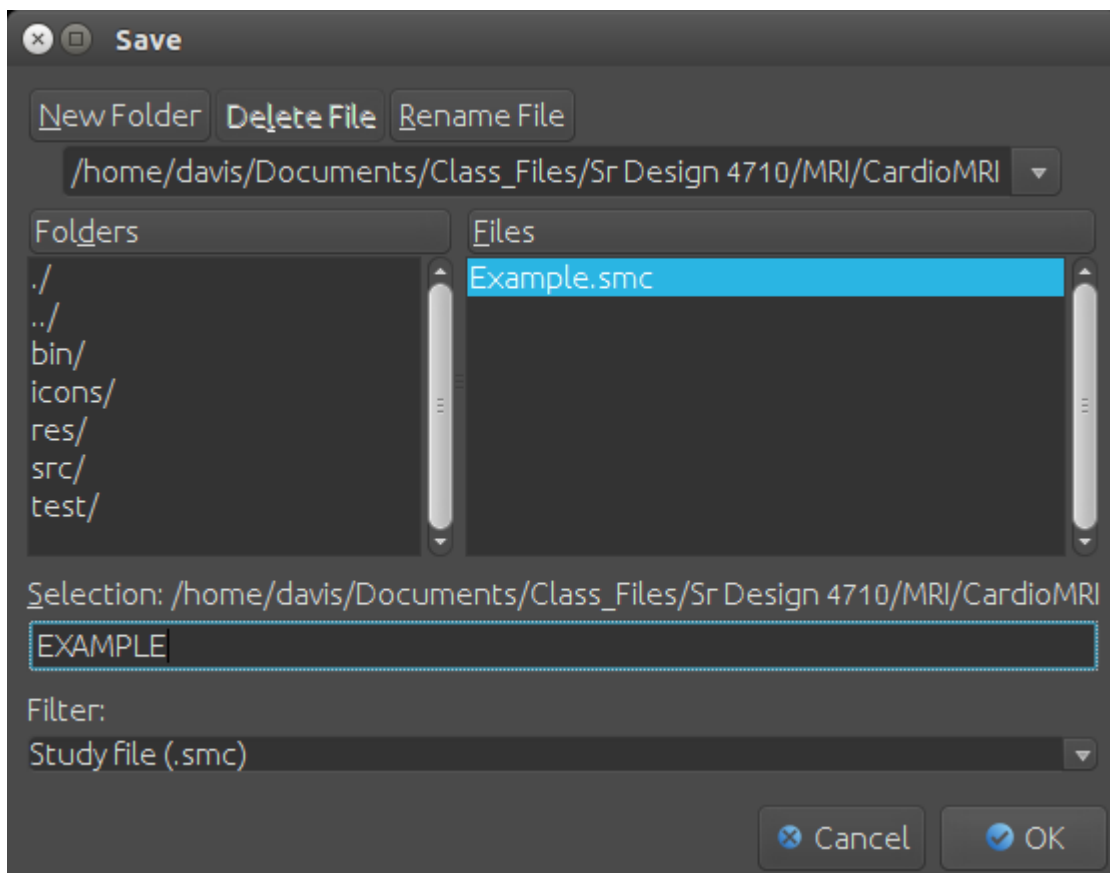
### Saving

To save a study click **Contours** in the menu bar. Then select **Save Contours**.



NOTE: **Save** and **Save As** currently do not save the study.

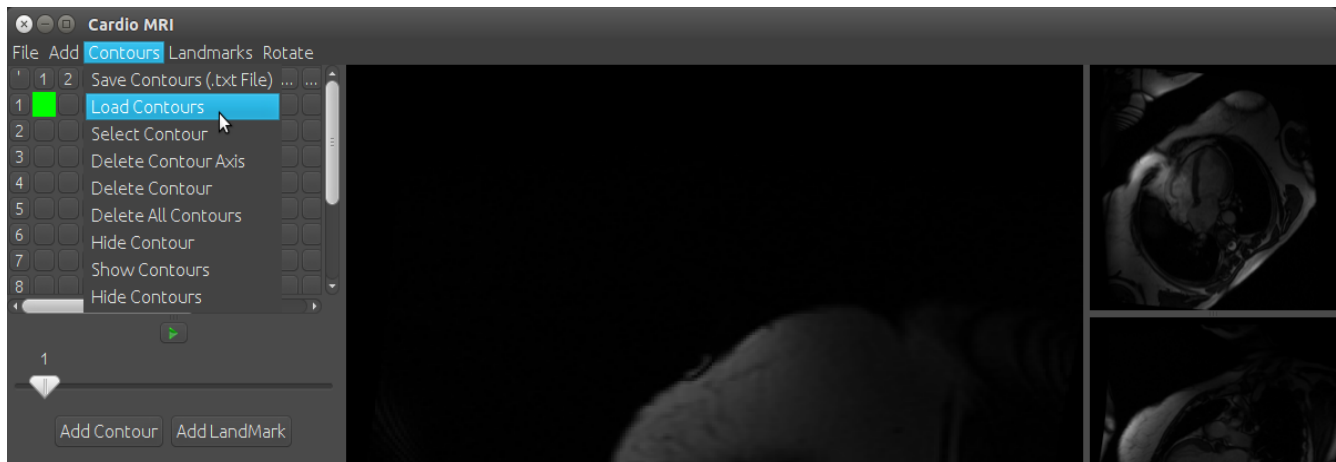
In the next window give the file a name (EXAMPLE in the image below). Then click **Ok**.



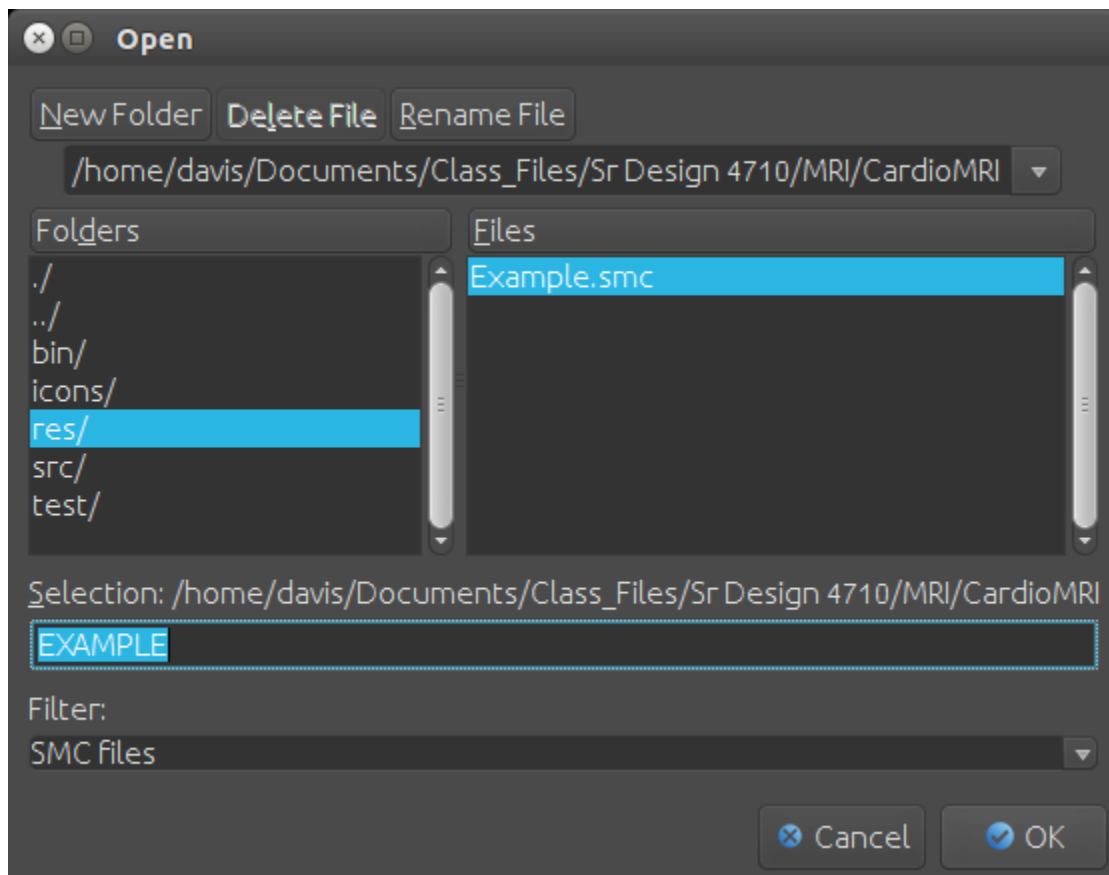


## Loading

To load an existing study, click **Contours** in the menu bar, then click **Load Contours**.



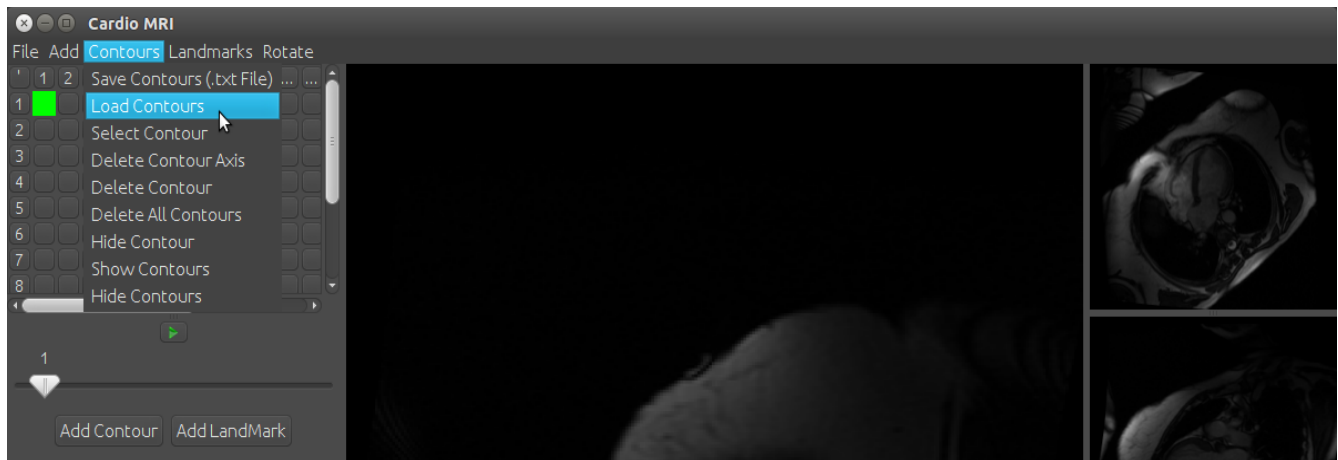
You will then be presented with a window to select the appropriate file. Select the appropriate file, then click **Ok**.



## Exporting

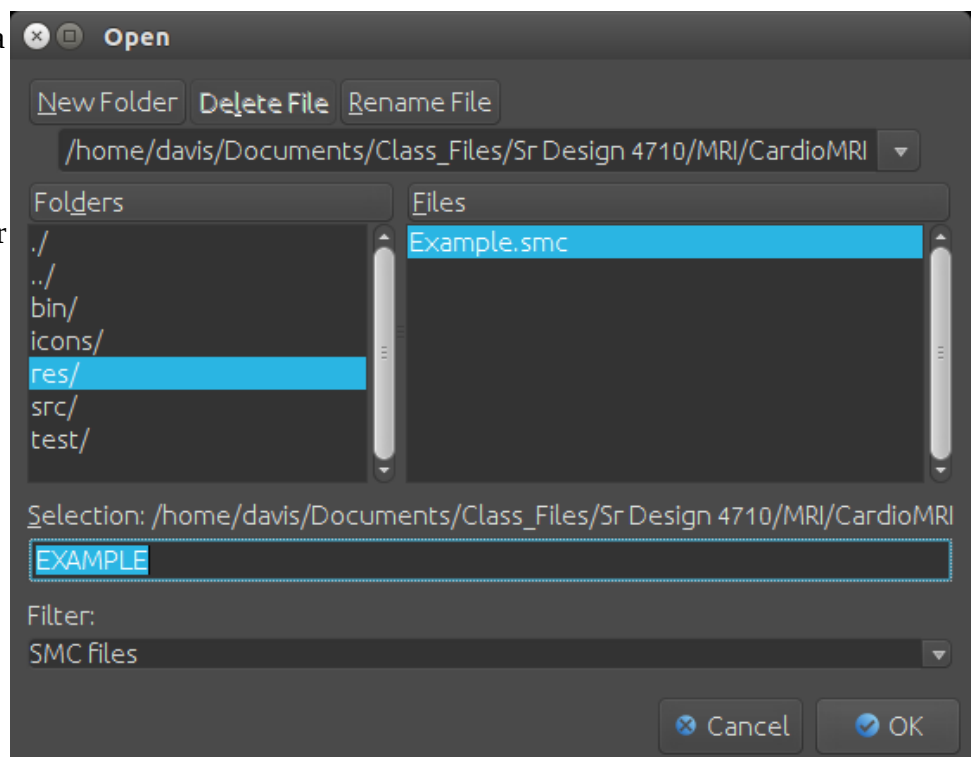
In previous versions the saving of the study and exporting of contours for analysis in other programs. In this version the same file made by saving contours, saves the study as well as having the information for analysis.

To export click **Contours** then **Save Contours**



You will then be presented with a window to select the appropriate file. Select the appropriate file, then click **Ok**.

This file can then be imported for analysis.



## 5. Frequently Asked Questions

*Q. How do I export the annotations for analysis?*

**A.** Go to the Contours menu and select save contours. Then save the file. This file can be imported for analysis.

*Q. How can I tell which contour or landmark is which?*

**A.** Right click on the object of interest. The first line in the context menu is the Type for each.

*Q. What is the answer to life the universe and everything?*

**A.** Forty-Two.

*Q. When I move one tension point another one moves?*

**A.** This is intentional behavior. This ensures the contour is smooth through the control point. If you need to draw a sharp corner, right click the control point and click **unlock smooth**.

*Q. How can I Delete a control point or landmark?*

**A.** Right click on the point and click Delete.

*Q. I have too many objects and it is difficult to see my work?*

**A.** You can hide individual contours and landmarks, or hide all the objects for an easier editing experience.

## 6. Developer Contact Information

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Source Code can be found at <https://github.com/kullen/MRI>

Project Documentation can be found at <https://tree.taiga.io/project/squarles2007-mri/>