



Introduction:

Welcome to Guru's Range of Right Motion Capture system. The Range of Right System has been designed from the ground up to be an easy to use motion capture system that will allow you to fit clients with greater precision and greater confidence. Guru's Range of Right system is a 2D Motion capture system that uses 8 retro reflective markers placed on the rider's body to measure the most important bike fitting metrics. This manual is intended to get you started with the Range of Right system. To best learn how to use Range of Right properly, we suggest that you attend one of our Guru Academy Courses which have all been revamped recently to incorporate the Range of Right system.

Registration for these courses is located here: <http://www.gurucycling.com/schedule/>

What's Required:

The Range of Right software requires a few pieces of hardware to operate. These items can be purchased individually and we have links to amazon.com posted on our website to make ordering simple for you which can be found here: <http://www.gurucycling.com/range-of-right/>

- Microsoft Kinect 2.0/XBOX One Camera
 - Microsoft Kinect X-Box Adapter Cable
 - A Tripod or Sturdy Shelf
 - A Computer with Windows 10 at least one USB 3.0 port for the Kinect, two USB 2.0 ports (keyboard and mouse), Intel Core I5 (or better), 4GB Ram minimum
- *We do not recommend using the same computer that drives a Guru Dynamic Fit Unit*
- Retroreflective Stickers (for body markers, except the shoulder)
 - Reflective Balls (for shoulder markers)

The Range of Right System can work with a rider on a Guru DFU, any other fit bike or with a rider on a stationary bike trainer.

Hardware Setup:

Setting up the Kinect Camera could not be easier, simply follow the directions provided with the Camera.



Fit Area Set up:

Setting up your fit area to carefully accommodate the Kinect and Range of Right will make your workflow a lot easier. The Kinect Camera needs to be located about 7 feet from the center of the bike and it should be set as close to perpendicular to the direction of the bike as possible. Use a carpenter's level, placed on top of the Kinect Camera, to ensure that it is set level. Set the height of your Kinect so that the camera is at about the same height as your average rider's hip.

A few things to consider:

- The Kinect works by locating reflective markers on the rider. If the background of your fit area has reflective objects in it, they will interfere with the Kinect. The background should be clear of all reflective items and clear of strong sunlight.
- Many bikes, wheels, tires and cycling clothes have reflective items on them. We recommend keeping some painters tape and duct tape around to cover these reflective items. If you plan to use the Range of Right system with a rider on a stationary trainer, it is also a good idea to keep a spare wheelset or two around without reflective logos. If you are using a DFU with a reflective rear tire, that tire should be swapped with one that does not have the reflective graphics or you can take the tire off and spray paint it.
- The Kinect needs to see all 8 reflective markers to work correctly, even if you are only interested in measuring the knee angles, all 8 reflective markers must be detectable by the Kinect in order for Data to collect. Keep the area in between your Kinect and your rider clear of all items and people.

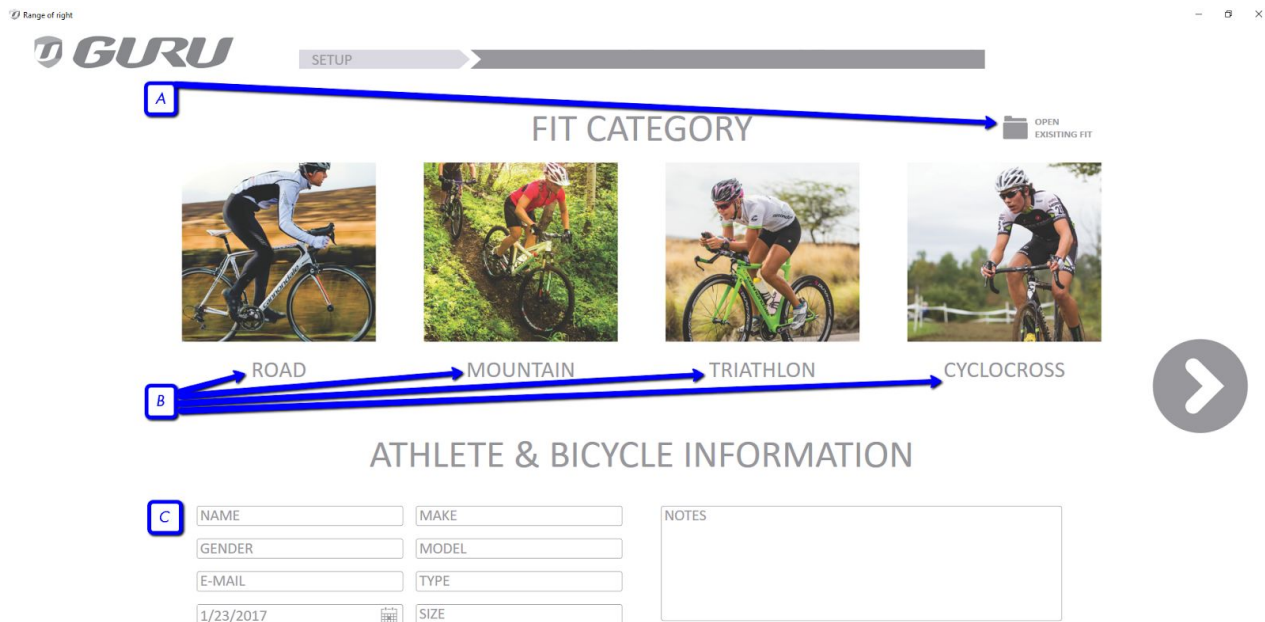
Software Installation:

To install the software required to run Range of Right, follow the link provided from the GURU team and click on download. When your web browser completes the download click on the file to start the installation process. Note that it is possible that Windows will bring up a message saying that the file is not from a trusted source. If this happens click on the "More Information" button below the prompt which will enable a "Run Anyway" button allowing you to begin the installation. On the installation prompt select "Download and install Kinect Drivers", then click continue. From here navigate through any installation prompts that appear. Once the installation is complete you will be able to run the software. The first time you run the software you will be required to enter a license key received from GURU Support to register the software. *Important note each license key can only be used to activate ONE computer and once activated cannot be transferred to a second system. Please make sure to register the software to the computer you plan on using.

Using The Software:

Set Up Screen:

When you open the Range of Right software you will be brought directly to the rider set up screen. In this screen you will be able to enter information about your rider and their bicycle. The Fit category determines the suggested angle ranges that will appear in the record and analyze screen and the type of report that is generated but does not change anything else about the way the software functions. You also have the ability to open a prior fit for additional review if necessary.




Range of right - □ ×

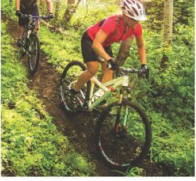
GURU SETUP

A OPEN EXISTING FIT


FIT CATEGORY




ROAD



MOUNTAIN



TRIATHLON



CYCLOCROSS

B ➤

ATHLETE & BICYCLE INFORMATION

C

NAME	MAKE	NOTES
GENDER	MODEL	
E-MAIL	TYPE	
1/23/2017	SIZE	

- A. Clicking the folder icon allows you to open previously saved fits.
- B. Selecting the fit category will populate the angles ranges suggested for that riding type
- C. Athlete information can be entered here. Along with Pre-Fit notes. You will have the ability to add or change this information later in the “Create Report” screen.

Record Screen:

In this screen you will be able to perform the majority of your rider assessment and video capture. Range of Right provides the ability to capture video and biomechanical data from 4 separate fit positions. Each field has a customizable title which are set to default as 'Initial', 'Pos1', 'Pos2', and 'Final'. The record button on the top of each column allow you to record a 10 second video capture of the rider in motion.

If you would like to discard a particular capture after recording there is a small (x) icon in the thumbnail photo that appears in the top row. Range of Right displays a rolling average of each measurement.

Annotations:

- I:** Each field is customizable
- G:** Length of video timer (Max 10 Second)
- H:** Capture will freeze these figures, and stop collection of rolling average

	LIVE	capt1	capt2	Pos2	Final
Rolling Average Value	02.866				
Knee Extension 35-40	41	36	36		
Knee Flexion Less than 115	103	103	100		
Ankle Angle Max 90-105	102	102	103		
Knee to Foot +/- 10mm	22	27	25		
Back 40-50	48	48	48		
Hip Angle Closed	89	92	92		
Shoulder to Wrist 80-90	83	82	82		
Shoulder to Elbow	68	71	71		
Elbow 150-160	148	155	155		

- D. To toggle the direction of the rider, select this icon. If the rider is faced the opposite direction, Range of Right will not operate correctly
- E. Zoom in and out on the rider
- F. Reset zoom to default
- G. These are the live rider measurement values
- H. To record a 10 second video, select this icon
- I. By selecting the (+) icon, the ranges will appear in this window. The ranges are determined by "Fit Category" that was selected.

Analyze Screen:

The analyze screen has been designed to allow the fitter to examine the video capture frame by frame. As you move the video forward or backward the values presented on the screen will show the angle at that exact moment and not a rolling average like the record screen. This screen will also allow you to select the captures that you would like to be compiled into the final fit report.

Range of right

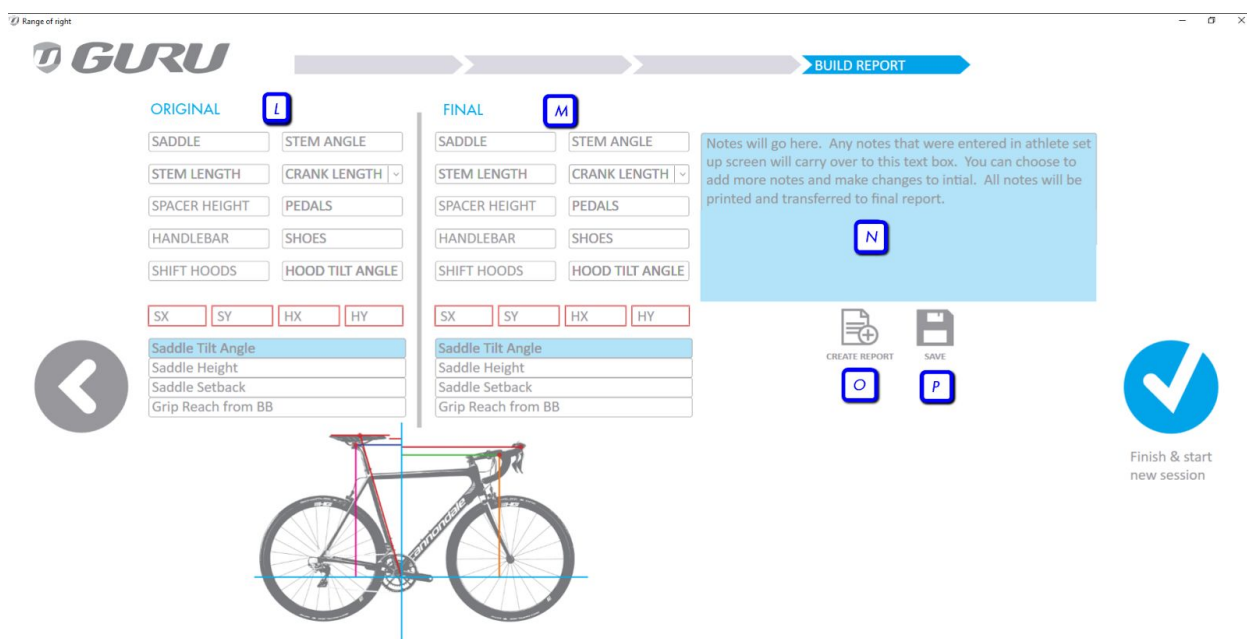
GURU ANALYZE

	Initial	Pos1	Pos2	Final
Rolling Average Value				
Knee Angle Extension 35-40				
Knee Angle Flexion Less than 115				
Ankle Angle Max 90-105				
Knee to Foot +/- 10mm				
Back Angle 40-50				
Hip Angle Closed				
Shoulder to Wrist Angle 80-90				
Shoulder to Elbow Angle				
Include in report				

- J. Use these arrows to advance the selected video frame by frame.
- K. To select a capture to be compiled in the final report select this box
- L. To save the fit for later click the disk icon

Creating Reports:

The final screen is used to record the bike measurements before and after changes have been made. You can also add notes, a fit summary, suggestions or recommendations or anything else you may want to in the notes section. This information will populate in the final report for both the fitter and the athlete to have a record of what changes or suggestions were made during the fit.



GURU BUILD REPORT

ORIGINAL **L** **FINAL** **M**

SADDLE STEM ANGLE SADDLE STEM ANGLE

STEM LENGTH CRANK LENGTH STEM LENGTH CRANK LENGTH

SPACER HEIGHT PEDALS SPACER HEIGHT PEDALS

HANDLEBAR SHOES HANDLEBAR SHOES

SHIFT HOODS HOOD TILT ANGLE SHIFT HOODS HOOD TILT ANGLE

SX SY HX HY SX SY HX HY

Saddle Tilt Angle Saddle Tilt Angle

Saddle Height Saddle Height

Saddle Setback Saddle Setback

Grip Reach from BB Grip Reach from BB

Notes will go here. Any notes that were entered in athlete set up screen will carry over to this text box. You can choose to add more notes and make changes to initial. All notes will be printed and transferred to final report.

N

CREATE REPORT SAVE

O **P**

Finish & start new session

- L. Use these fields to enter the bicycle measurements and components prior to the fit.
- M. Use these fields to enter the bicycle measurements and components after the fit.
- N The notes field is a continuation of the notes field that was present on the first screen. You will see any initial notes made and will be able to record new notes based on the outcome of the fit.
- O. Create Report: This will gather all data from the fit including:screen captures and angle data that were acquired and selected in the “Analyze Screen”, the client's information entered on the setup screen and any notes that were created. Note only results that were identified with a check mark to “Include in report” will populate.
- P. Save: Will save the fit session and all data gathered and entered. You will be able to revisit all aspects of the fit if reopened at another time.



Q. Finish & Start New Session: If you have not saved and/or created a report you will get a warning to save your file first. If you proceed without saving you will lose all data, video captures and information will be lost.

The Report:

The final report will aggregate the data and information that was collected during the fit. The output file is a .pdf format, be sure to download the free version of Adobe Reader if you do not already have it installed on your computer.

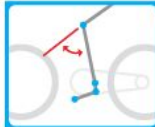
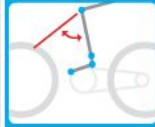
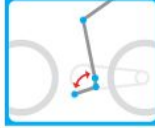



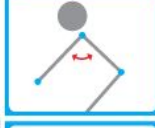
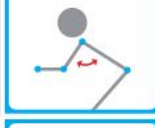
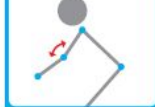
The report will include all of the data collected and entered throughout each fit. It will provide a nice report for both the fitter and the athlete.

Note: All data is stored locally on your system. Please be sure to backup your files and saved reports from time to time.

Interpreting the data:

Range of Right measures 9 different fit metrics. Learning how to interpret and use the data effectively is a skill that can not be taught easily in a written manual. We strongly encourage you to attend one of our Range of Right Level 1 courses to learn and practice the technique of placing the markers and also how to interpret the data correctly and to make fit decisions based on the results. The suggested ranges have been compiled from observation and experience working with riders in healthy and powerful positions. The Ranges have been compiled with athletes of all abilities, from pro athletes to totally new riders. Most athletes will do well if they are in a position that conforms to these angles but there are many other aspects of fit that still need to be addressed for success such as cleat positioning, contact point management and riding posture and technique.

SUGGESTED RANGES AND DEFINITIONS

MEASUREMENT	DEFINITION	ROAD	TRIATHLON	MOUNTAIN	CYCLOCROSS	EXAMPLE
Knee Angle Extension	The angle between the hip, knee and ankle when the knee is at maximum extension, near the bottom of the pedal stroke	35-40	37-42	35-40	35-40	
Knee Angle Flexion	The angle between the hip, knee and ankle when the knee is at maximum flexion, near the top of the pedal stroke	Less than 115	Less than 115	Less than 115	Less than 115	
Ankle Angle Maximum	Angle of the ankle at the bottom of the pedal stroke	90-100	90-100	90-100	90-100	
Knee-Foot Horizontal Offset	The horizontal offset between the knee and the 5th metatarsal head	+/-10mm	+50mm to +120mm	+/-10mm	+/-10mm	
Back Angle	Angle of the back measure via the shoulder-hip-horizon	40-50	20-30	45-60	45-60	
Hip Angle Closed	Hip angle measured when the foot is at the top of the pedal stroke	-	45-55	-	-	
Shoulder angle to Wrist	The angle between the hip, shoulder and wrist	80-90	-	70-80	75-85	
Shoulder angle to Elbow	The angle between the hip, shoulder and elbow	-	70-80	-	-	
Elbow Angle	The angle between the shoulder, elbow and wrist	150-160	-	150-160	150-160	

Marker Placement:

Accurately locating the markers is critical for best results with the Range of Right System. The fitter should instruct the athlete to assume their riding position before the markers are placed. The rider should be sitting with good posture with their hands on the shift hoods, grips or aerobars. Rubbing Alcohol can be used to clean the skin prior to marker placement. The Rider's skin should be dry to help the markers to stick. Markers can move on loose fitting clothing, instruct the athlete to wear tight fitting clothing and when possible place the marker on skin instead of clothing.

5th Metatarsal head:

Locate the 5th metatarsal head by palpating the side of the foot and sliding your thumb back and forth looking for the bony protrusion at the base of the little toe. Locate the marker centered on the 5th metatarsal head just above the sole of the shoe when possible. On some shoes, if you place the marker just above the sole, the kinect camera won't be able to see the marker, in these cases place the marker slightly higher, directly on top of the 5th metatarsal head.



Heel marker:

Locate the heel marker as far back on the shoe as possible, just before the shoe begins to wrap around the heel. Locate the marker just above the sole, just as you did when locating the 5th metatarsal head. The line created by the marker on the 5th metatarsal head and the heel should be parallel to the sole of the shoe.



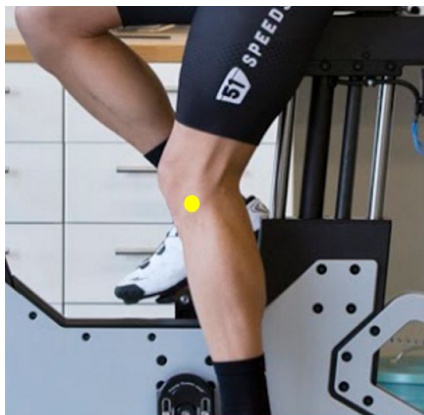
Lateral Malleolus (ankle):

This is a very easy one, locate the marker centered on the plateau of the bony protrusion of the ankle. This marker should be placed when the athlete's foot is at the bottom of the pedal stroke.



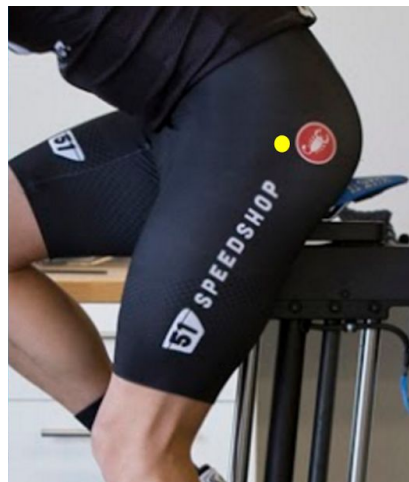
Knee:

The knee marker can be tricky and your technique applying this marker will make a big difference in your ability to locate the marker correctly. The marker should be placed in the center of the knee joint. To apply this marker, start with the athlete's foot at the front of the pedal stroke. Place one thumb in the groove between the athlete's femur and tibia on the front of the knee and place your other thumb in the groove between the athlete's femur and tibia on the back of the knee. With your thumbs in place, direct the athlete to move their foot to the bottom of the pedal stroke and place the marker in between where your two thumbs are located. We recommend that you sit down in a stool when placing this marker.



Hip:

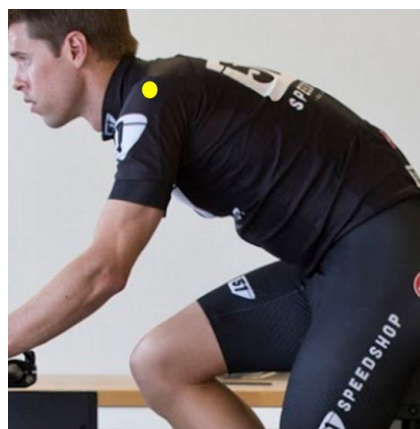
The hip marker should be placed directly on top of the greater trochanter which can usually be found by pressing your palm into the hip of the rider. You can confirm the location by using your fingers to palpate the edges of the femur. Sometimes the greater trochanter can be hard to find, if you are struggling, ask your athlete to try pedaling backwards or to internally or externally rotate the foot, this can help make the greater trochanter more apparent. Be sure to apply the marker with the athlete's foot at the bottom of the pedal stroke. We recommend that you sit down in a stool when placing this marker.



Shoulder:

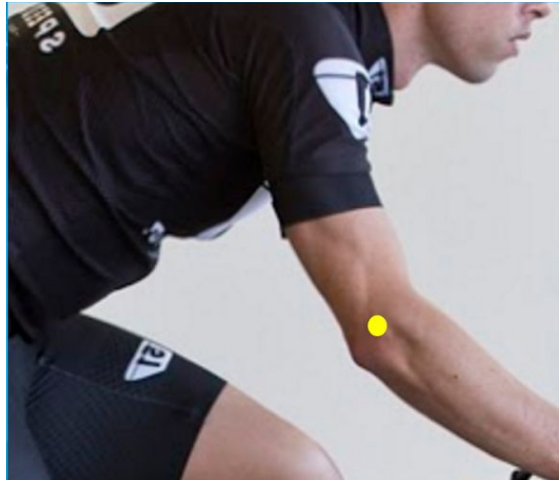
The shoulder marker is placed on the Acromion and is one of the easier spots to locate. The Acromion is located at the tip of the shoulder blade, it presents itself as a subtle point. If you have a hard time finding the point, try finding the top of the shoulder blade and sliding your fingers along its edge towards the arm.

We use a reflective ball on this landmark so that the Kinect camera can see it.



Elbow:

The elbow marker is also one of the easier landmarks to find. The marker is placed on the lateral epicondyle which is a small bony protrusion at the base of the upper arm. The lateral epicondyle becomes apparent when the athlete bends their elbow to about 90 degrees.

**Wrist:**

The wrist marker is the easiest landmark to locate. When fitting an athlete for a road or a tri bike locate the marker in the crease that is formed between the hand and the forearm. When fitting an athlete for a mountain or recreation bike, locate the marker on the side of the wrist on the bony end of the Ulna. You occasionally might have to move this marker slightly in order for the camera to see it.

