How to Make Your Own LEGO Guitar Hero Videos

For this tutorial, I will be assuming you have some knowledge of stop-motion animation.

Step 1: Figure out what song you want to make a video of. Making the video will be a lot easier if you use a song that's in Guitar Hero (or Rock Band) already.

Step 2: Go to "http://wiki.scorehero.com/MasterSongListGuitarHeroAlbum" and find the song you want. Print off this chart! It is very important that you do this in order to keep track of your position!

Step 3: Gather all the necessary materials.
- Camera (such as webcam, digital camera, etc.)
- Stand (should be made of Lego to clip onto Lego baseplate)
- Large baseplate
- Many Lego pieces!
- Stop-motion Animation Software (I use Animator DV Simple+)
- Video Editing Software (I use VirtualDub and Windows Movie Maker)
- An mp3 of the song in question

Step 4: Calculate the required frame rate. This is probably the most important part! Failure to do this correctly will cause your video to fall out of sync very quickly! All you need to do is use this simple formula: For 4/4 time, the frame rate required to make a smooth animation is Tempo/7.5. Tempo is the number above each measure. The first measure in the songs has a music note by it. Allow me to explain the above formula:

Assuming the time of the song is 4/4, there are 4 beats in one measure. I find that in order to get a good, smooth result, 32 frames should be in one measure. Dividing the 32 f/m by 4 B/m gives us 8 f/B. This gives us a result we can use for any time. We are looking for frame rate in f/s. Since tempo is given in B/min, we divide the tempo by 60 s/min. If the tempo is 100 B/min, then in B/s, it is 1.666... We now multiply our results, 8 f/B x 1.666... B/s to get 13.333... f/s.

$$\frac{\frac{32f}{m}}{\frac{4B}{m}} = 8f/B$$

$$\frac{\frac{100B}{min}}{\frac{60s}{min}} = \frac{1.667B}{s}$$

$$\frac{8f}{B}\left(\frac{1.667B}{s}\right) = \frac{13.333f}{s}$$

You may ask, "How do you get the other formula from before?" Simple, really. Divide the tempo (100 B/min) by the frame rate (13.333... f/s) and you get the division factor - 7.5. This works in every instant in 4/4 time because the only variable is tempo, everything else stays the same. Therefore: Tempo/7.5 gives the frame rate.

$$\frac{\frac{100B}{min}}{\frac{13.333f}{s}} = 7.5$$

Most animation programs will not allow you to use frame rates with decimals when filming. You can counteract this, however, by multiplying the frame rate by a positive integer to get a non-

decimal. For instance, multiplying 13.333... by 3 will result in 40. This frame rate is not even close to correct by itself, however. In order to keep this animation moving at the right speed, you must take a number of frames per movement equal to the integer you multiplied by to get the new frame rate. Therefore, at 40 f/s, taking 3 frames at a time, we really have 13.333... f/s. If you do this, you won't need much editing software.

If you want, you can also just use any frame rate (be careful to take note of it!) and change it later in an editing program. Some programs will allow you to change frame rates to decimals, so it shouldn't matter what frame rate it is. Do not try to combine both of these methods! It will be the end of you.

Here is a quick reference table for the frame rate formulae depending on the time of the song, where x is the value shown in the bottom row:

TIME	3/4	4/4	5/4	6/4	7/4	8/4	9/4	10/4
$\frac{BPM}{x}$	5.625	7.5	9.375	11.25	13.125	15	16.875	18.75

Step 5: Set up your Guitar Hero board. You can design your board however you like, but I find the best way to do it is outline the note highway in flat, light grey pieces. The note highway should be at least 5 x 10 studs in area. The length doesn't really matter as long as you can see the studs clearly before they strike the bottom. Put 5 black or dark grey studs at the bottom of your board, closest to the camera. These will be the targets. Set up your Star Power meter, Rock meter and Streak meter wherever you like, as long as they are close to the board and visible in the camera's frame.

Step 6: Set up your camera. I use a webcam to shoot my videos. Build a stable, unmoving base from Lego that can point downward at the board at an angle such that the displayed image of the Guitar Hero board resembles the one in-game. You'll want to have your camera placed a bit high off the baseplate to achieve the correct angle. A sturdy base is essential for filming, because even a slight jarring of the camera will cause major effects in the end result.

Step 7: Start shooting your video. Once you've set it all up, you're ready to go! I recommend familiarizing yourself with the note chart beforehand, keeping in mind that there should be 32 frames, and therefore studs, in one measure of music at 4/4 time. Space your notes accordingly.

When you place a note on the far end of the board, mark it off of the chart (In Pencil!!) so you remember where you are. I try to mark down every two studs I move my pieces, and therefore, every two unique frames I take.

When a note reaches the bottom of the screen, place a "flame" piece (a translucent orange cone) on the target and remove the note stud. The flames should disappear by the next frame, unless you have a sustain, in which case you should leave the flame on the screen until the sustain passes.

For sustains, just trail the note with square/rectangular pieces of the same color.

When you have a Streak meter, indicate hitting a note by filling in one unit on the meter in the same frame that you hit a note.

When you successfully hit a Star Power section (assuming you are using Star Power), indicated by starred notes and a green background on the note chart, fill in a quarter of your Star Power meter and place blue lightsaber blades, simulating the lightning in the game, in the tops of the orange cones so that the ends aren't shown on screen. You'll want to test this beforehand.

When unleashing Star Power, sections indicated on the charts with a blue background, when the first note in the blue section hits the bottom, turn all the studs a light translucent blue until the last frame in the blue section hits the bottom. The Star Power meter must drop by an appropriate amount, which depends on how you have constructed the meter. Basically divide the number of units filled on your meter by the duration in frames of the activation to get the number of frames until you empty the meter by one unit.

For a Rock meter, move the needle as little as you can every three or four notes until it reaches the limit.

You can loop bits that start and end the same. This part should be fairly obvious, but critical to get right. If you are looping the same section over and over, such as the intro of Through the Fire and Flames, make your first frame of the loop when the first note hits the bottom, and the last frame of the loop when the same note comes around again and is just about to hit the bottom. However, you must split the loop between frames right before the first note reappears and the one where it does reappear. This will allow you to easily transition the loops and cut back on animation when the loop ends. Of course, you can only loop a section if everything on the screen is to remain the same. You can't loop a section if a meter is changing over time (or has since changed if you're reusing a prior loop section) or if at one point, there is Star Power usage.

Keep in mind that you should not exceed 500 frames in any one extended section. This is about 15 ½ measures. After this amount of frames, your animator will slow down considerably and you'll just get pissed off. Save your files with appropriate names so you know how to order them. I find it handy to mark all loops with letters on the chart and name them accordingly and save everything else with numbers in order of appearance.

Step 8: Edit your video. If necessary, change the frame rate to the correct one in your editing program. Now save this into your desired format and drop it into your editing timeline. Add any titles you might want to add before slipping in the audio. Once you're done with that, drag the audio into the right position on the timeline. Align the audio and video so that the first note in the audio and the first note in the video are "played" at the same time. You may want to watch your creation from beginning to end before uploading, to ensure that you don't get too much out of sync.

Step 9: Upload it! Once you're pleased with your result, save the whole project as a YouTube-compatible file type and upload it! That's about it!