Servo Animator

Version 1.2.0

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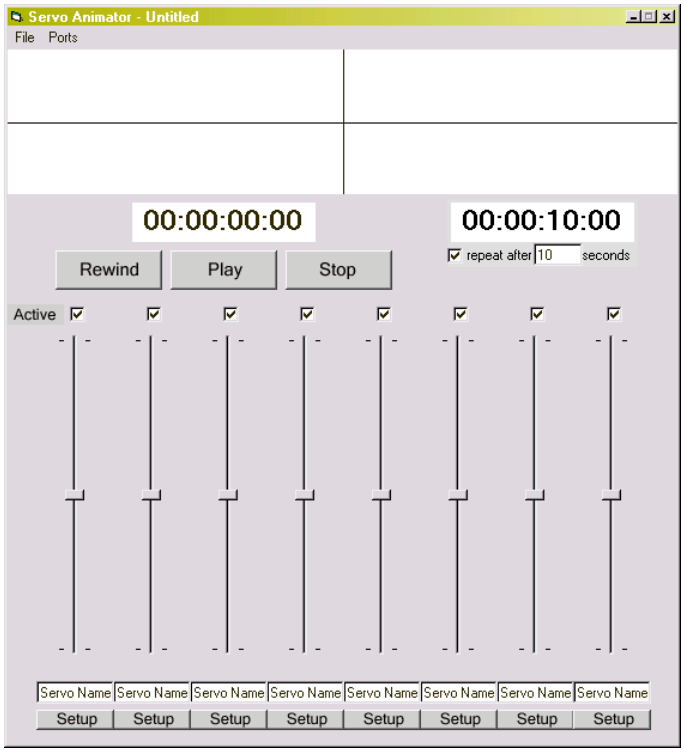
Table of contents

Getting Started

When you first launch Servo Animator you will see a splash screen. Shortly after that the main interface will appear. The three things that you need to know to get started are:



- How to connect a MiniSSC
- How to choose a serial port
- How to adjust the travel of your servos

In order to start animating in Servo Animator, you must first connect a MiniSSC or MiniSSC II servo controller to your computer via the serial port.

This manual will focus on the Mini SSC II servo controller, which is manufactured by Scott Edwards. You can purchase this servo controller at www.seetron.com.

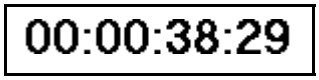
To connect a MiniSSC II servo controller to your computer you run a cable between either the telephone connector or the two pin header on the MiniSSC II and an available serial port on your computer. You can buy a cable directly from seetron.com (part number SSC-CBL) or there are instructions on their site for making your own. Once you have your MiniSSC II connected to your computer you should connect some servos to the MiniSSC and then run Servo Animator. Once Servo Animator is running, you will need to select the serial port that you have the MiniSSC connected to. There is a list of serial ports under the Ports menu. Available serial ports will be displayed in black. Other ports will be grayed out. Finally you will need to adjust the travel of your servos. By default Servo Animator has essentially no travel for each servo. This is to prevent breakage of your animatronic. Since this time you only have servos that are not attached to an animatronic, go ahead and click on the setup button below each slider and adjust the minimum and maximum as far as they can go. Go ahead and close that window. You should do this with each slider that you wish to use. At this point simply hit the Play button and any movement of the sliders will also move your servos!

Using sounds

An animation without sound is not very interesting. Servo animator has the ability to play a sound file that is in sync with your animation. This can allow you to do things such as lip-syncing or to animate to move with a rhythm. To add a sound to your project, select Import Sound under the File menu. Servo animator accepts .wav files of any sample rate, bit depth, or number of channels. Keep in mind that if you intend to export your project for playback using the Buffington Effects CD playback module, Servo Animator would prefer that you give it a 44,100khz, 16 bit, Stereo .wav file. More information about this is listed in the Menus section of this manual

Once you have your sound loaded you will see a representation of your sound in the waveform graph and will hear your sound when you play your animation.

The interface



SMPTE timer

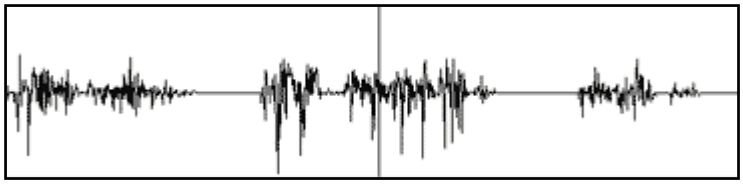
The SMPTE timer displays the current hour, minute, second, and frame of your Animation. This timer increments at 30 frames per second. The SMPTE timer will allow you to locate an exact part of your animation when you scrub through your animation.

Countdown timer

Sometimes you might like your animatronic to repeat its actions at regular intervals. An example would be a store display or a show that repeats every hour. The countdown timer allows you to do this. If you have the checkbox in the coundown timer checked then it will allow your animation to repeat indefinitely. Input to the countdown timer is in seconds. The display of the countdown timer is hours:minutes:seconds:frames. You should keep in mind that if you do not have a sound loaded then your animation will never repeat because Servo Animator does not know where your animation ends. If you would like to have an animation that does not have any sound but still repeats then you should create a sound file the length of your animation that is full of silence. Once you import that into Servo Animator, you will be able to have your animation repeat.

Play, Stop, and Rewind

The purpose of these buttons should be fairly obvious. Rewind will take you to the beginning of your animation. Play plays your animation from the point that it is stopped, and Stop stops playback of your animation. Since you may not always find it convenient to press the Play and Stop buttons, you can also use the space bar to start and stop the playback of your animation.



Waveform graph

At the top of the window is a waveform graph that displays the waveform of the sound that you are using. Loud parts of your sound will have a thick waveform. Quiet parts of your sound will be thinner. There is a blinking cursor in the waveform graph that shows where in your sound you currently are. At any time you can "scrub" through your animation by clicking and dragging left or right in the waveform graph. Scrubbing allows you to preview your sound and animation. What happens when you scrub is that every time your cursor moves, a short piece of the sound is played from the current position of your cursor. Your servos will also go to the position that you have animated for that part of the sound.

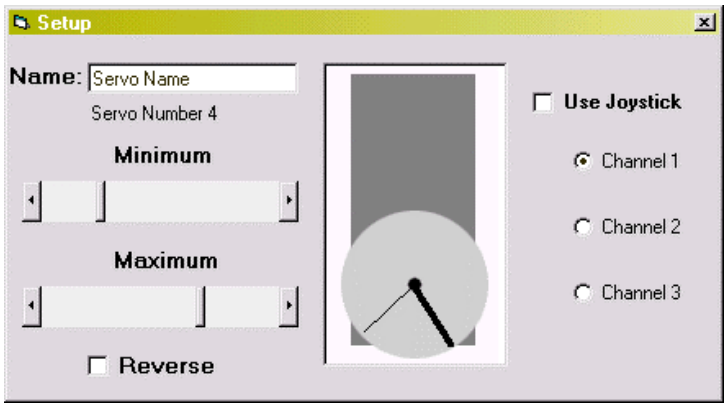
Sliders

The sliders are where the main action of Servo Animator takes place. When you are in play mode, the sliders and servos will automatically move as you have previously moved them. If you click on a slider's handle and move it around while it is playing, the movements that you make will be recorded. Any movement of a slider is played on its corresponding servo.

Above each slider is a checkbox. This checkbox allows you to enable or disable the playback of that slider and servo. Disabling a servo's playback can be useful if you want to animate one part of a character at a time without being distracted by other parts.

Below each slider is a textbox that allows you to name each slider. This allows you to keep track of which slider controls which servo.

Also below each slider you will find a Setup button. This button brings up the Servo Setup window.



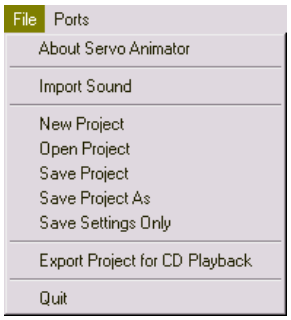
Servo Setup Window

The Servo setup window allows you to control everything that relates to a particular servo. At the top is a textbox that allows you to name your servo. Below that are two sliders that allow you to set the minimum and maximum travel of the current servo. As you move these sliders, the servo graphic to the right of them will give a representation of the minimum and maximum travel for a servo that has 180 degrees of travel. You can also choose to simply grab the handles on the servo graphic to adjust the servo positions. You should keep in mind that the graphic represents an ideal servo. All servos differ so while you are adjusting the minimum and maximum travel of your servo, the real servo will move to these positions as well. There is a checkbox below the sliders that reverses the travel of the servo. An example of this might be if you have a movement on your animatronic that moves up when you move your slider down. It may make more sense to you to reverse the travel of that servo so that it corresponds to the travel of the slider or your joystick.

Setting the travel of your servos is important so that you do not attempt to drive your animatronic to a position that would damage it. By default your servo setup will have essentially no travel and will be positioned at the center of its travel. This is a safeguard against the damage of your animatronic and its servos.

Finally, on the right side of the Servo Setup screen you will see a checkbox and three radio buttons. These allow you to use a joystick as an input device for Servo Animator. These controls will be covered in more detail in the Using a Joystick section of this manual.

Menus



About Servo Animator

This menu item will show window that tells the version number of Servo Animator and has contact information for Buffington Effects.

Import Sound

Import Sound allows you to import any Windows audio file (.wav) for use in your animation. Servo Animator can accept files with any sample rate, any number of channels, and bit depths of 8 or 16 bits. If you intend to output your project for playback using the Buffington Effects CD playback module, it would be best for you to use a sound file that is the following format: 44,100kHz, 16 bit, Stereo. This is the format that Servo Animator outputs the audio file as. If you do not have your sound file in that format, then Servo Animator can usually convert it to that format but it will take extra time to generate the CD playback file.

New Project

New Project allows you to start with a fresh slate by removing any sound file that you may have loaded, removing any animation that you may have, and resetting the sliders to their original positions and ranges of travel.

Open Project

Open Project allows you to open any previously saved animation project file. (.pjt)

Save Project

Save Project allows you to save your current animation project to your harddisk.

Save Project As

Save Project As allows you to save your current animation project to disk under a new name. This is useful if you would like to save multiple versions of your animation, or if you would like to use one animation as a starting point for another.

Save Settings Only

Save Settings Only allows you to only save the servo setup information of your current animation. This is useful when you are going to be doing multiple animations with the same character. If you save the settings only then you can use that file as a starting point for future animations. You will not have to set up and name your servos.

Export Project For CD Playback

With this menu item you can create a .wav file that you can burn to a CD. When this CD is played in a portable CD player that is connected to the Buffington Effects CD playback module, you are able to control your servos without the need for an expensive and bulky computer. This can be great for store displays or other on-location animatronics.

When you select this menu item, Servo Animator will first check the format of your sound. If it is a 44,100kHz, 16 bit, stereo file then it will not need to convert your sound. If it is not of that format then it will convert your sound into that format and use that new format when saving the output file. This conversion is fairly lengthy so it is recommended that when you create your sound file that you simply save it in this format so that you can avoid this conversion. Servo Animator is unable to convert files that have more than two channels, have a sample rate greater than 44,100kHz, or are of a bit depth other than 8 or 16. Those formats are not common though. If the sound file that you are using is in a format that Servo Animator cannot convert, you can use a program such as Sound Recorder to convert it into a PCM 44,100kHz, 16 bit, stereo file. If you have a full installation of Windows, Sound Recorder is located under the Start menu – Programs – Accessories – Entertainment – Sound Recorder.

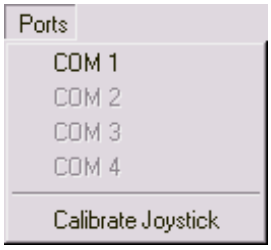
When you convert a project for CD playback it will save the resulting file in the same directory as your sound and will add "(for CD)" to the end of the filename. For example:

My sound.wav

Becomes

My sound(for CD).wav

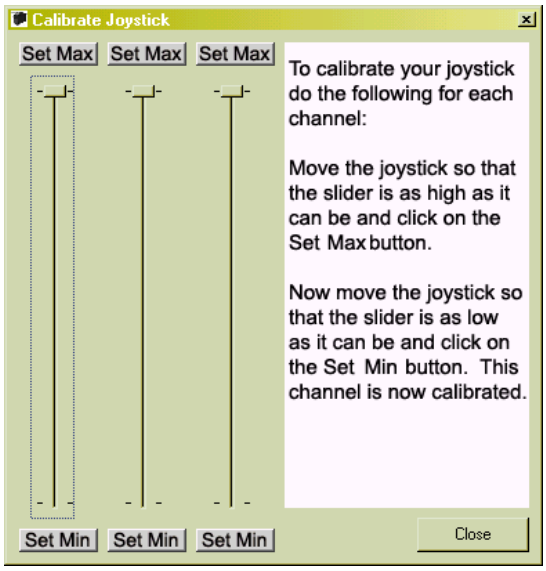
See the CD playback module manual for information about how to burn this file to a CD.



COM 1-4

The Ports menu has four COM selections. These correspond to the serial ports on your computer. If they are installed and available then they will appear in black. If they are not installed or currently being used by another application then they will appear grayed out. The illustration to the left is from a laptop that has one available serial port. When you select a serial port, a checkmark will appear next to it signifying that it is the currently selected serial port.

Calibrate Joystick



A good way to animate your animatronic is to use a joystick. It provides an excellent method of input because it will not get off track and will allow you to animate up to three servos simultaneously. A good example of something that a joystick would be ideal would be when you are animating eyes. You could assign the joystick's X and Y channels to the left/right and up/down movements of the eyes. It would be a fairly easy task to then make the eyes look in any direction that you wanted.

To calibrate your joystick channels, follow the directions on the calibrate joystick window. What this window is doing is making sure that the full range of your joystick corresponds to the full range that you have specified for your servo.

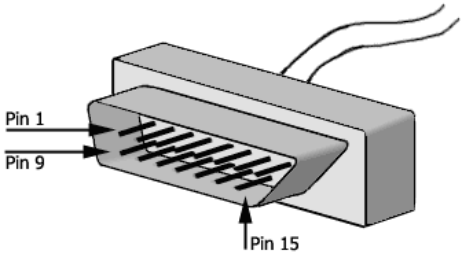
Custom Input Devices

You may prefer to use your own custom-built input device with Servo Animator. An example of this might be a device that straps on to your jaw so that you can animate a jaw just by moving your jaw. This could be really useful for lip-syncing. Instead of having a joystick hooked up to you computer, you would have your custom input device connected.

Pinout of a joystick connector

Here is what each pin does:

1 - +5V	9 - +5V
2 – Button1	10 – Button 3
3 – Joystick 1 X	11 – Joystick 2 X
4 – Ground	12 – Ground or MIDI
5 – Ground	13 – Joystick 2 Y
6 – Joystick 1 Y	14 – Button 4
7 – Button 2	15 – No connection or MIDI
8 – No connection	



Servo Animator does not currently support the joystick buttons or Joystick 2 Y. To assemble your input device, connect a 100K Ohm variable resistor between +5V and the input pin that you are using. (ex: Joystick 1 X) Use any sort of mechanical apparatus to move your variable resistor and you will be able to use that to animate.

The MiniSSC II

The MiniSSC II is the servo controller that is currently recommended for use with Servo Animator. You can purchase it through www.seetron.com. This section will describe how to configure your MiniSSC II for use with Servo Animator.

There are three jumpers on the MiniSSC that you will need to configure. The first is labeled "R". This is the range jumper. If you place a jumper on these pins, the MiniSSC will drive your servos through approximately 180 degrees. If the jumper is not installed then the MiniSSC will drive your servos through 90 degrees instead. The second jumper is labeled "I". This jumper should be left off for use with Servo Animator. The final jumper is labeled "B". This jumper determines the baud rate that the SSC accepts. Place a jumper on these pins to select 9600 baud. 9600 baud is the baud rate that Servo Animator outputs its data.

Servos

You can use any type of hobby servo with Servo Animator. A good source of servos is www.servocity.com. Additionally there are a few places that provide solutions for driving larger movements such as www.spiveydesigns.com, which has large linear actuators and www.roboscience.com/systemcomponents_power.html which sells electronics that drive high power motors.

Troubleshooting

Here are some problems that you might encounter and possible solutions.

I am moving my sliders but my servos are not moving.

Is your MiniSSC connected to your computer and its power is on? If you have the power to the MiniSSC connected correctly the green LED will be lit and your servos will go to their center position.

Have you selected the correct serial port? Without the correct serial port being selected under the Ports menu, your animatronic will not move.

Are you sure that you have the MiniSSC's jumpers configured correctly? The "I" pins should have no jumper and the "B" pins should have a jumper.

Are you sure that you have your MiniSSC connected to your PC correctly? If you are using the header pins instead of the telephone connector to connect to your computer, you may have the signal and ground wires reversed. The LED on the MiniSSC should flicker when it is receiving data.

My servos are jittering, causing my animatronic to "shiver."

You have chosen to power both the servos and the SSC using the same power supply or battery. This can work in some situations but not all. The issue is that the MiniSSC's processor is not receiving enough power when your servos are encountering too much resistance. This causes the processor to stop driving the servos. When the servos stop receiving their control signal, they power down. At that point the processor can receive enough power to run again. It starts to drive the servos again, which restarts the cycle. There is a way to drive your servos and your MiniSSC from the same power source. Take a look at http://www.medonis.com/battboost5_1.html.

Future upgrades

Version 2.0 of Servo Animator is currently being planned. Version 2.0 will have a different interface and will be geared towards professional level productions that need to control hundreds of movements, lights, motors, and even pyrotechnics. There will also be a Version 2.0 that will be targeted at the hobbyist. It will look much the same as the current Servo Animator but will allow you to run it on slower machines without dropping frames.

At the same time that version 2.0 is released; a servo controller, an analog controller, a digital controller, and a high current load controller will be released. Soon after that will follow the pyrotechnic controller.

Other planned products are a special input device that will allow you to animate up to eight movements at the same time, a device that will allow you to puppeteer your animatronic without a computer, and a radio link that will allow remote control of your animatronics.

Revision History

1.0.0 - Initial release
1.1.0 - Added joystick input and fixed some minor bugs
1.1.1 - Fixed an issue where Servo Animator could not open sounds that had spaces in their filename or file path.
1.2.0 - Added Export Project for CD Playback.
Added the ability to "scrub" through an animation that has no sound.
Added a progress window for long operations such as saving.
Removed the need to click "Apply settings" when configuring a joystick.

For the latest information about Servo Animator or other Buffington Effects products, visit www.BuffingtonFX.com