JUCE:

In our homework, we used JUCE for the development of effects applied to arpeggiation.

Among the effects we developed, we included a panner, a distortion and a delay.

Panner: the panner was developed by applying the dsp module “Panner” already present in JUCE. It is presented as a oneknob effect, which as soon as it is opened is positioned in the center and moves the signal into the left and right channels consistent with the current position of the knob.

To achieve this effect without having artifacts when changing the parameter in real time, we use the “setRule” function with argument “squareRoot4p5dB.”

Distorsion: the distortion is always designed as a one knob effect, where basically the dry/wet ratio between input and effect is managed (0% dry, 100% wet)

the effect for convenience was developed in a special source called “distortion” and named within the processblock of the PluginProcessor.

The distortion effect is implemented always using JUCE's dsp modules, specifically for the final output a chain of effects is created that include a pre-gain, a waveshaper and a post-gain

The pre-gain amplifies the signal before it is distorted, then follows the waveshaper that applies the actual distortion based on the value indicated by the knob, and finally the post-gain that adjusts the signal after distortion so that there are always controlled volume levels.

Plugin state is managed via XmlElement, which allows saving or loading plugin parameters via instances that are then converted to a binary format accessible to DAWs.

Delay: this is the only effect that has more than 1 parameter that can be controlled in real time, since it is a simple delay, in addition to dry/wet we also have parameters that handle feedback and tempo.

This effect also uses a JUCE internal dsp, specifically DelayLine. The delay logic basically clears all unused output channels from the input, updates the delay time if it has changed, recalculating it according to the sample rate, processes each audio channel individually, mixing the dry and wet signals according to the DRYWET parameter, and uses a feedback mechanism in which the delayed sample is fed back into the delay line with a feedback factor controlled by the FEEDBACK parameter.  
To avoid glitch audio when changing the TIME parameter in real time, each time it is changed, there is a reset of the buffer.