

An Intelligent Drum Machine for Electronic Dance Music Production and Performance

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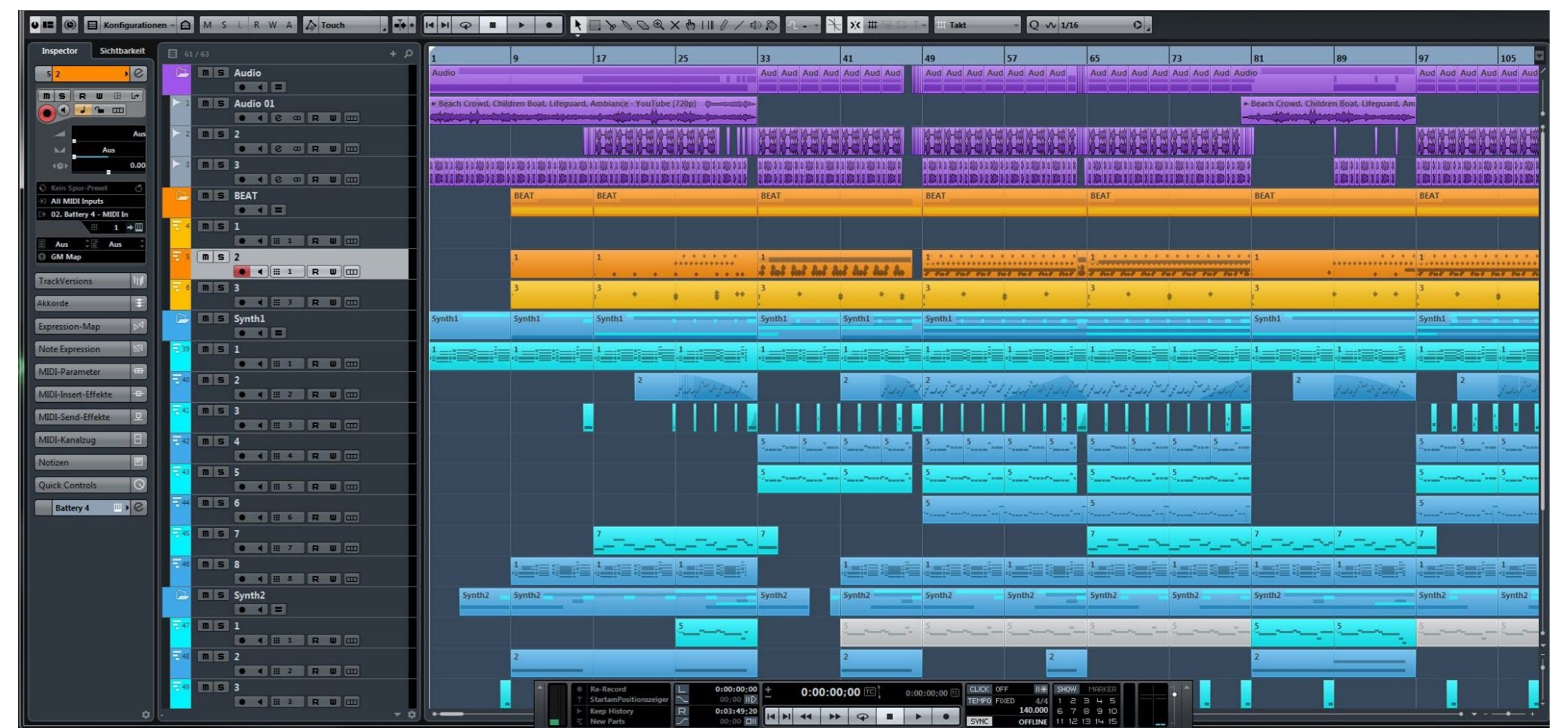


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screenshot of an EDM track in a DAW

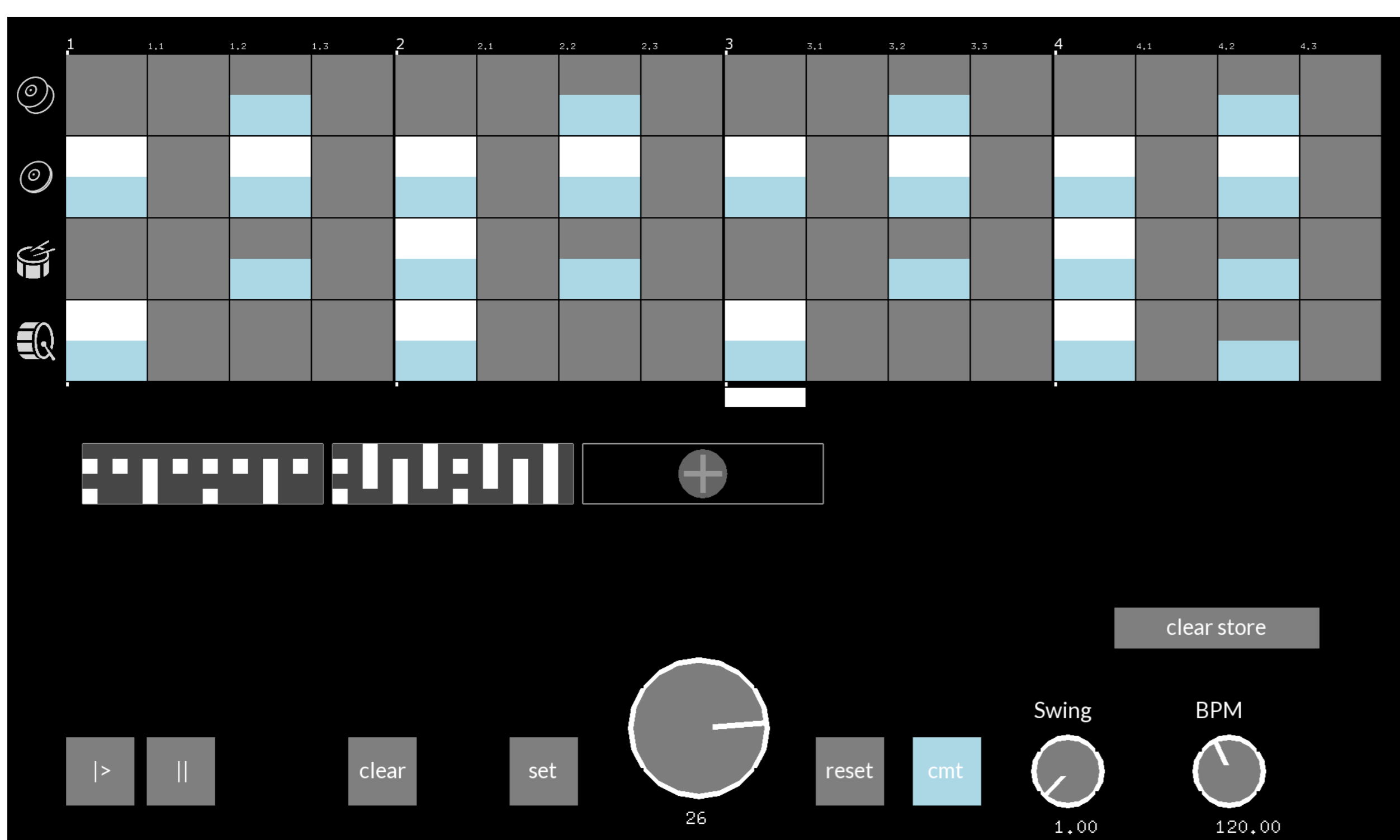


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introduction

- > drum tracks for electronic dance music (EDM) arrangements are usually built by repetition and variation of drum patterns
- > patterns are manually created or predefined patterns from a pattern library are used
- > manual composition and creating variations is a labor intensive task but often the preferred method
- > in this work an intelligent agent to improve the workflow for this task is introduced
- > a goal is to make the process fun and spark creativity

screenshot of prototype



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prototype

- > drum step sequencer interface to enter seed patterns and visualize pattern variations
- > touch screen based, for easy interaction
- > controls for playback, pattern variation, as well as tempo and swing are part of the UI
- > MIDI input and output for easy integration and synchronization

variation algorithm

- > as variation method an artificial neural network in the form of a restricted Boltzmann machine (RBM) is used
- > the RBM is trained on a data set of ~2,700 one bar EDM rhythm patterns
- > to create variations the seed pattern is entered in the visible layer of the RBM and varied using Gibbs sampling

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evaluation

- > qualitative interviews with ten experts
- > special aspects evaluated using a questionnaire using five point Likert scales (see evaluation results)
- > participants were exploring the prototype and comparing it to the previous, hardware-controller-based version
- > two different variation algorithms were evaluated

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conclusion

- > participants found the interface to be intuitively useable
- > acceptance for live scenarios was improved compared to the previous prototype
- > consistency of patterns improved, but only at the expense of the capability to generate fills
- > the additional features were received positively
- > while the touch interface was generally seen as an improvement, acceptance for physical knobs on the touch interface was low

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evaluation results

	algorithms		new features		
	B	A	mean	-	+
consistency	3,90	3,70	touch (v.s. MIDI)	3,70	1 6
musicality	4,40	4,20	knobs (v.s. touch)	2,10	7 2
difference	2,90	3,20	preview	4,70	
diff. RMSE	0,30	0,60	storage	5,00	
interestingness	4,00	3,80	bar-start	4,40	
substitute	4,40	3,80			
fill	3,60	4,00			
	UI				
	touch	MIDI			
usability	4,70	4,30			
live	4,00	3,50			
production	4,70	4,60			

