Horizon
The EU Research & Innovation Magazine

European Commission

Get your dancing shoes on! AI and virtual reality team up to bring the party to you

Staying home to dance the night away may soon be the next big thing. EU-funded researchers are using AI to create an online dancefloor for the whole world to share.

26 December 2024 - By TOM CASSAUWERS

The festive season can be a lonely time for many, and too much time spent online can add to the feeling of isolation.

“We have this fantastic tool with the internet, which is really changing the way the people interact,” said Pieter van der Linden, co-founder of French digital solutions company Vivitnet. But the way we use the internet can inhibit real human connection.

“Today’s interaction online is passive. It is about the brain. It’s only about thinking and much less about feeling and emotions,” he said. “For many people, the internet acts to isolate them instead of bringing them closer together.”

This is something that van der Linden and a team of researchers from Germany, Finland, the UK and France have set out to change. Their aim is to overcome the limitations of online interaction by extending it to include movement. And they have chosen dancing as their main use case.

Dancing the blues away

Van der Linden is part of an EU-backed research project called CAROUSEL that has brought together AI and immersive interactive technologies to enable people to connect and dance with a partner – real or virtual – online.

While loneliness has been shown to be detrimental to both physical and mental health, the opposite is true of dancing. Dancing offers a wide range of health benefits that span physical, mental and emotional well-being.

“Dance is a profoundly human activity,” said van der Linden. “Dance is used for celebrating, for rituals, and also for having fun.”

For the researchers, the most interesting aspect of their work is the deep connection created by dancing, where you have to concentrate on the other person and follow their movements.

“Dancing is something very natural. It’s not something you have to learn, even babies and toddlers dance spontaneously,” said van der Linden.

One of the driving motivations of the research team was to find a way to help combat loneliness in society, particularly in the wake of the COVID-19 pandemic.

In an EU-wide survey in 2022, 13% of respondents reported feeling lonely most or all of the time over the four weeks before the survey, while 35% reported being lonely at least some of the time. Following the pandemic, loneliness is increasingly recognised as an issue of public importance, along with mental health problems.

Keeping in sync

The research is being led by the German Research Center for Artificial Intelligence (DFKI) in Saarbrücken, Germany, which has partnered up with Grassroots Arts and Research UG, an SME based in Cologne, Germany, as well as with Aalto University in Finland, Edinburgh Napier University in the UK and Vivitnet.

The research team has come up with a combination of technologies that allows users to sense each other’s presence and movement, even if they are not physically in the same space.

Cameras first capture the dancers’ movements, while AI then transforms their bodies into avatars that accurately reproduce their movements on screen. One of the technical challenges was getting rid of any time lag in the communication which would make it difficult for dancers to stay in sync.

An effort was made to use equipment that was as standard as possible – virtual reality headsets, movement trackers and 3D cameras. In the future, the researchers envision being able to use mobile phones and standard headsets.

“Our dream is to make this accessible to the mass market, so we have to bring down the price of the equipment to something in the area of a mobile phone,” said van der Linden.

Disconnecting to connect

German professional dancer Alexandra Schmuklermann is a research assistant on the CAROUSEL project. Her experience as a dancer was invaluable to the team effort, and she is enthusiastic about the results.

“I think it’s a great addition for the dance world for many reasons,” she said. “The fact that two people from different places in the world can dance together in the same digital environment is amazing, even for professional dancers.”

If you want to collaborate with a choreographer who lives in the USA, for example, it can be very expensive, she says. “But you could meet in this online space and dance together, even choreograph together.”

For Schmuklermann, the ability to completely disconnect and tune into another world is also important.

“You are transported immediately into this different world and it helps on a psychological level,” she said. “Even in a very crowded place, I could personally use this game to shut the whole world out.”

Not too easy, not too hard

To make the system accessible to everyone, whatever their age or fitness level, the team recognised that it was important to select moves and dances that are both creative and easy to copy.

“It is a challenge,” said Schmuklermann. “The dance moves need to be creative, but they also cannot be too crazy. You cannot have people being afraid to dance with the system.”

To avoid accidents, a virtual boundary is set out before the game starts. The user is alerted as soon as the boundary is crossed and the game instantly switches mode so that instead of being in the virtual space, the user is standing in their room again and can see any obstacles.

Users can also choose the environment they want to dance in. Van der Linden acknowledges that although some people love going into the virtual reality worlds created by the game, this is not the case for everyone.

For this reason, the team also created an augmented reality mode for one application. Instead of being immersed in an imaginary environment, users can invite others into their own room.

“For a number of people, this can be reassuring,” he said.

Avatar on the dancefloor

As well as real virtual dance partners, the CAROUSEL researchers have designed dancing avatars powered by AI systems.

“They are a kind of digital icebreaker,” said van der Linden. “It makes dancing with others feel less awkward.”

AI dancers were trained using several different approaches and algorithms. Getting into the spirit of things, the research team even recorded themselves dancing a salsa-type dance, as well as a group of semi-professional lindy hop dancers.

These sessions were recorded in the experimental motion capture studio at the Max Planck Institute for Intelligent Systems in Tubingen, Germany. Adam, the AI avatar disco dancer, was trained by two professional dancers in Finland wearing motion suits.

Healthy mind, healthy body

While much work remains to be done to turn this into a mass-market product, researchers are already contemplating the next steps. The vision is to have a mass-market application that can be used by anybody, but is also geared towards medical needs.

The aim is to combat isolation and loneliness – and also promote a healthy lifestyle. CAROUSEL will encourage people to move rather than just sit at their desks, for example.

“Moving has a lot of benefits, a lot of studies show how useful it is,” said van der Linden. Dancing is also a great mood lifter, helping people feel happy and connected. “That is basically what the project is about,” said van der Linden.

Research in this article was funded by the EU’s Horizon Programme. The views of the interviewees don’t necessarily reflect those of the European Commission. If you liked this article, please consider sharing it on social media.

**This article has been amended to change the location of the German Research Center for Artificial Intelligence (DFKI) from Kaiserslautern to Saarbrücken.*

More info

- CAROUSEL
- CAROUSEL project website
- Loneliness in Europe before and after COVID
- Tackling loneliness in Europe
- AI research, funding, policy and related publications