

## ABSTRACT

Development of an interface called DOSIS for the sketchbook Processing software, where the interface allows to generate live coding for the creation of visuals and the connection with SuperCollider for the modification of sound synthesis through interaction devices like Kinect, Arduino and Joysticks.

## INTRODUCTION

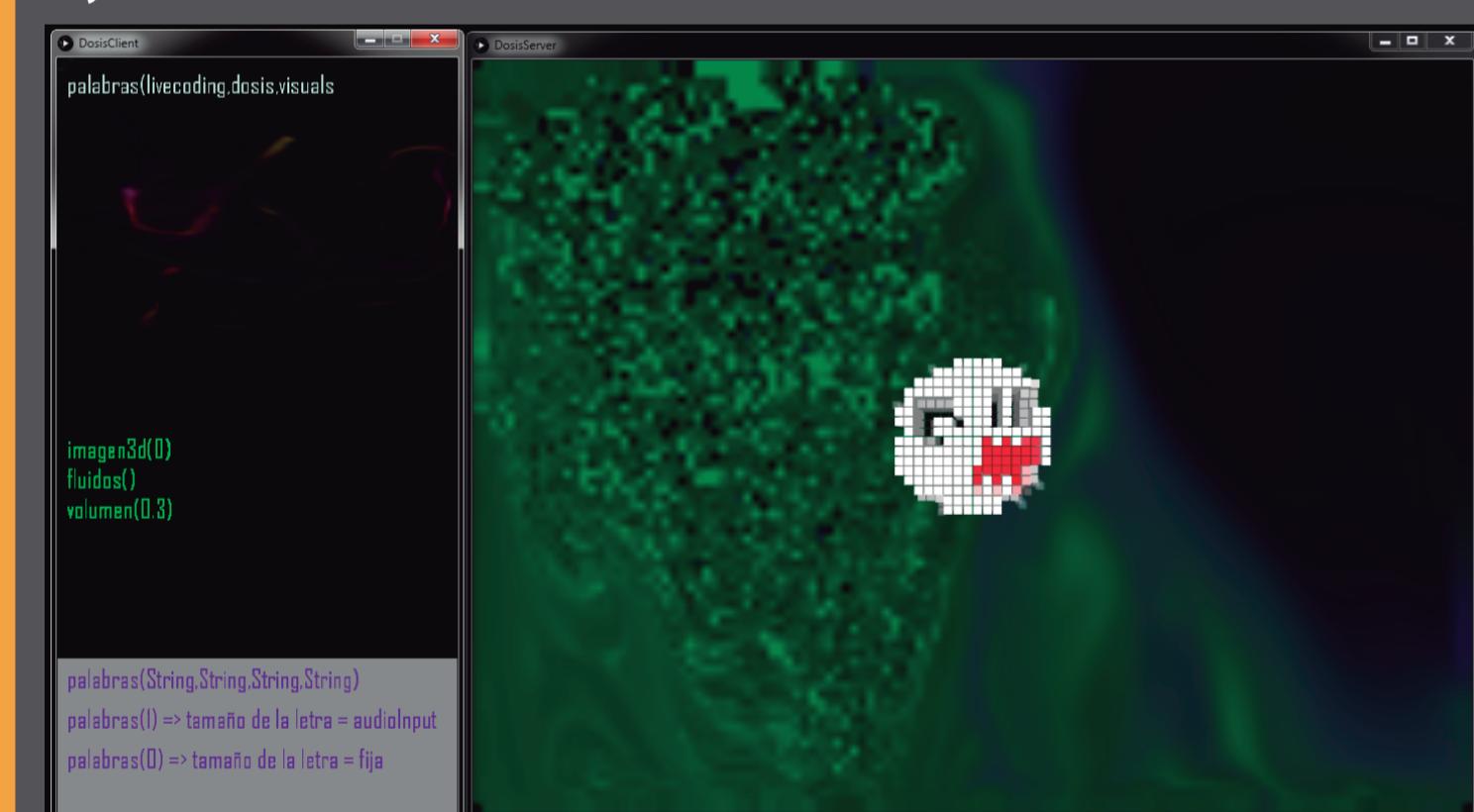
Dosis is an interactive environment focused on live coding, with a dynamic language, which allows algorithms to run while they are being modified in program execution time, generating audio and visuals in real time by code. This interface is open and free, and does not attempt to imitate or copy existing live coding tools (SuperCollider, Tidal, Praxislive, Hydra, Field) focused on the production of audio and visuals through code, but aims to be an environment of interaction of live coding, where you can use interaction devices (Kinect, Wired Glove, Gamepads, Joysticks, sensors, Arduino) in an easy and simple way, providing the artists with other types of controls parallel to the code, to create audio and visuals during the performance.

These interaction controls use input devices to the system such as the Kinect or Joysticks, where from the movements of the user or the public, or by pressing the Gamepad's buttons, it sends data to the interface to modify the audio synthesis or to create visual compositions. Likewise, Dosis can also generate as a system output, sounds from objects, also called, hardware hacking through conversion from digital to analog by taking the digital information from live code and mapping them to voltage signals and turning on Arduino's analog and digital pins to generate Arduino musical performances.

## DESIGN, COMPONENTS AND CONNECTION

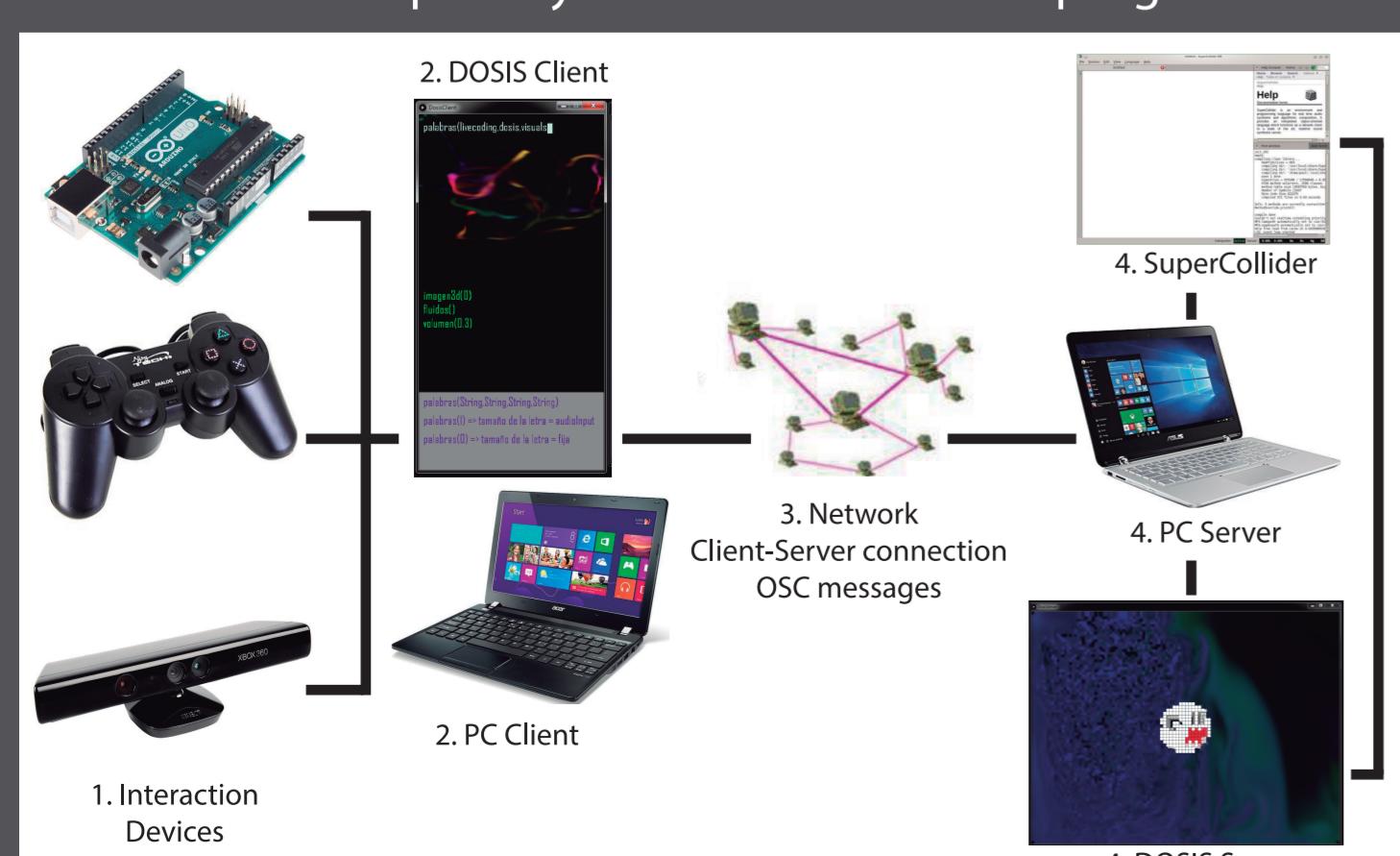
Dosis interface was designed with objective, where the artist uses the interaction devices through simple codes, allowing performers to engage directly with Kinect, GamePads or Arduino sensors to create musical and graphical performances.

Next, the detailed interaction environment operation of live coding Dosis is presented, where its components are shown and the connection between them, to send the data that is typed in live code from the Client Dosis component to modify in real-time audio in SuperCollider, generate visuals in Dosis Server or activate interaction devices like Arduino, Kinect and Joysticks.



The Dosis interface is composed by two main components, a server application and a client application, where the server is responsible for displaying the interactive visualization of the implemented sketchbooks and these visualizations change from the codes that are sent by the Dosis Interface Client.

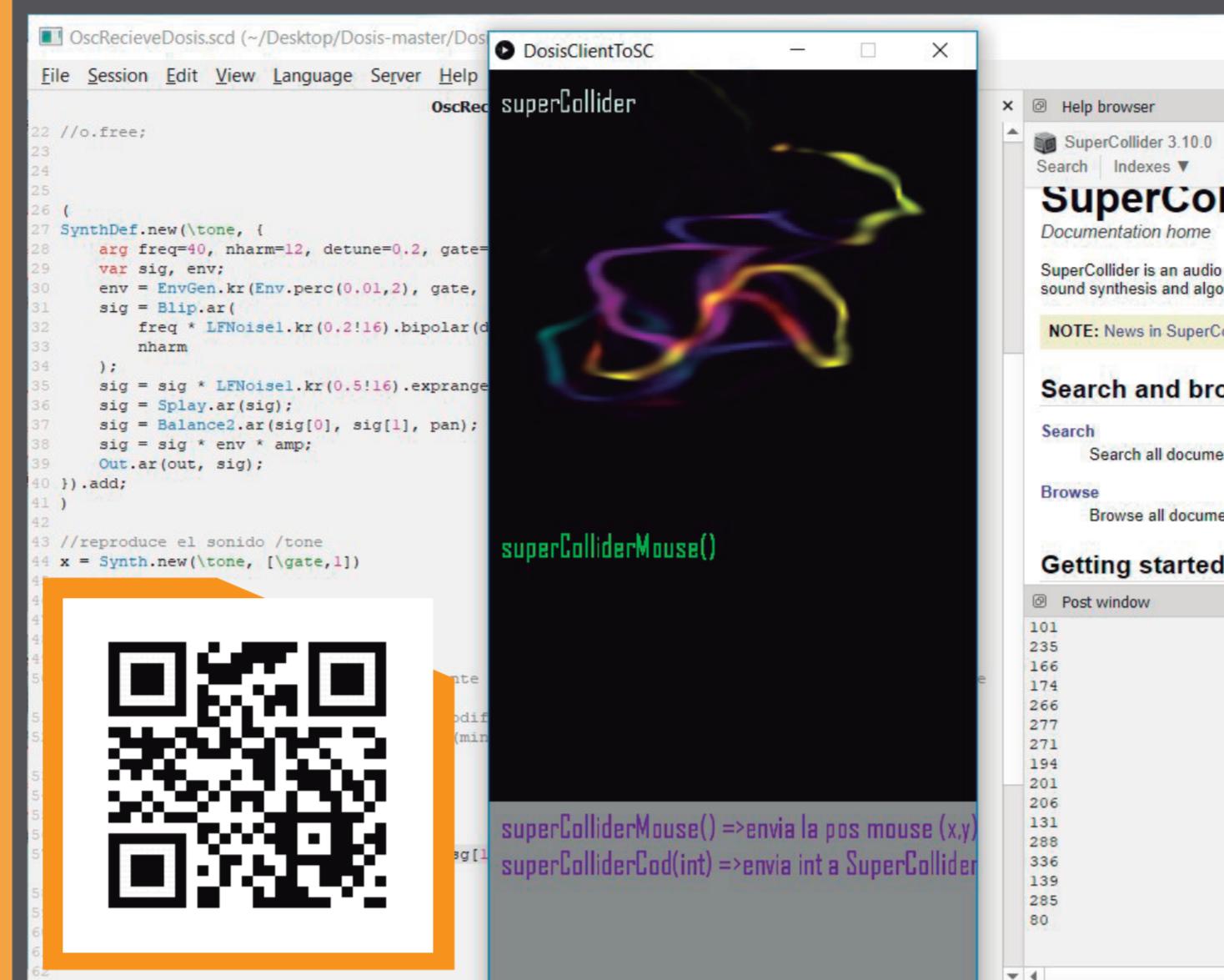
The client program is where the code is written at runtime, the one that detects and uses the interaction devices (Kinect, Arduino, Joysticks), furthermore it sends this data or codes to the server program to show the image and affect the visual from all the determined inputs by the user in the client program.



## DEVELOPMENT AND IMPLEMENTATION

### DOSIS CLIENT TO SUPERCOLLIDER

Dosis allows its connection with SuperCollider (SC) sound application. This connection is made by OSC, by sending one or more integer values from the Dosis Client Interface to the SC interface, to modify sounds in "real time", since the messages are sent to SC every 500 milliseconds to not over saturate the communication buffer and give it enough time to process the data and execute the sound synthesis events.



### ARDUINO DOSIS CLIENT

Dosis use Firmata and Serial libraries to make the connection between the Dosis and the Arduino device, in order to send bytes that are typing letters with the keyboard on the Dosis Client Interface where each letter reflects a digital pin or analog pin in Arduino. Thus, the keys from 2 to 9 turn on the digital pins from 2 to 9, the letters from A to D turn on the digital pins from 10 to 13, the letters from E to H turn on the analog pins from A0 to A3, and the other letters continue the sequence starting once again from the digital pin 10 to the analog pin A3.



### KINECT DOSIS CLIENT

Dosis use the SimpleOpenNI library and Kinect SDK v1.7 to obtain the user's data, thus, each point of the articulations as a vector (X, Y, Z). This is how the Dosis Interface shows the depth image where the user is tracked and the data of the head, the torso, the right hand and the left hand are sent through the pre-established code, Kinect(), by which the information is transmitted by OSC message to the Dosis Server Interface to display a visual where it shows the user's head and hands movement and position.

On the other hand, this information is also sent to SuperCollider, whereby you can modify or reproduce the sound syntheses. This is how the audio engine receives four messages, the first one is the horizontal position of the right hand, the second one provides the horizontal position of the left hand, the third one, the "push" gesture generated by the user with the left hand (left hand extended in front of the Kinect camera) and the fourth message is the same gesture with the right hand.



### DOSIS SERVER

This application is in charge of receiving the OSC messages that the user typed in the Dosis Client Interface, by processing and converting the messages into visuals in real time. These visuals are interactive and change from the pre-established codes, also from the location of the mouse in the client interface or from the ambient sound.

The structure of this application is object oriented programming (OOP), where a sketchbook made in Processing can be converted into a class and integrated into the Dosis Server Interface, declaring and initializing the class in the DosisServer.pde code, and in the protocol() function, the pre-established codes are determined to display the implemented visuals, when the message with the pre-established code is received.



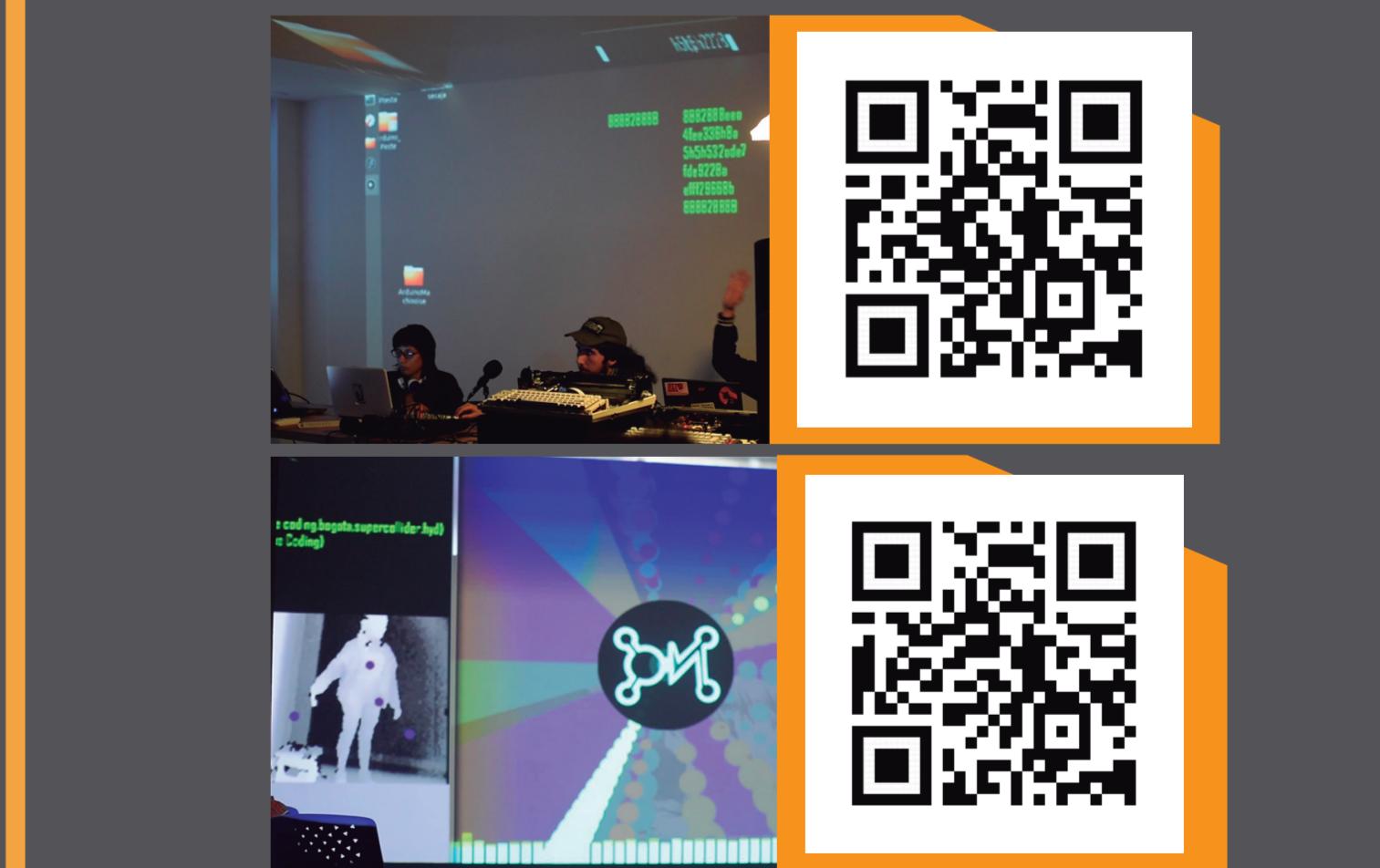
## CONCLUSIONS

This interface has been used in live coding samples as a result of the Synchronic Audiovisual Live Coding Workshop held in Bogotá - Colombia in 2018, where participants interacted through the Kinect device to modify the sounds in SuperCollider and the visuals in Hydra, using the Dosis Interface. Dosis was used in this same sample, as a control interface for Sebastian Gómez's Machine Noise project, where electronic writing machines were hacked with Arduino and data was sent to Arduino by Dosis interface to create rhythms through live coding.

Initially the interface allowed the integration of Kinect, then further functionalities were added for the use of other input devices such as Joysticks and output as Arduino, to use different tools to control, modify and generate audio and visuals.

The use of Processing allows an easy inclusion of any sketchbook inside the Dosis Server Interface in order to visualize any exercise in Processing, using the practice of live coding generating visuals in real time.

In performance, the Dosis interface allows collaborative productions using different computers that can be communicated by sending messages for the creation or modification of sounds and visuals through programs such as SuperCollider and Hydra, also allowing the participation of the public in the performance without the need for them to type coding but by means of the movement of the body with the Kinect, in this way an inclusion is generated with people who wish to participate in performance but who do not know how to make a code in the audio or visual platforms.



## INFO AND DOWNLOAD PROJECT

