

evolutions [3]. They are composed of a Raspberry Pi 3 model B+, a stereo soundcard, a class D amplifier of 2.1W, a surface transducer and a 10000mAh battery.

After a prototyping phase to validate the design using cardboard (cf. Fig. 2, left), final boxes have been made using laser-cutted 3mm Medium-density fiberboard and 3d printed pieces for internal components. The *diffuseurs* have been realized using simple white-painted cardboards (cf. Fig. 2, right), allowing to desacralize the installation and to encourage the audience to playfully manipulate it.

V. SOFTWARE IMPLEMENTATION

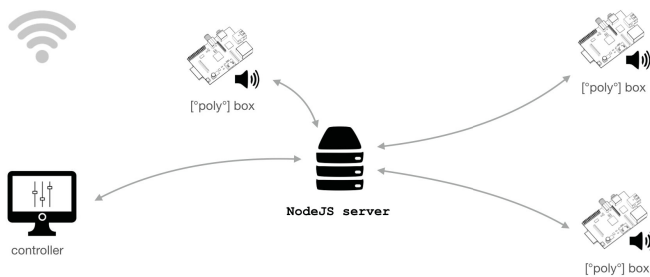


Fig. 3. High-level architecture of [°poly°].

The software system was developed using *soundworks* (<https://collective-soundworks.github.io/>), a full-stack JavaScript framework for the development of distributed WebAudio and multimedia applications [5]. As illustrated in Fig. 3, each module runs a *Node.js* (<http://nodejs.org/>) client connected to a *Node.js* server through WiFi. A dedicated Web interface allows for monitoring and controlling the application from a centralized position.

Audio synthesis is achieved using *node-libpd* (<https://github.com/ircam-jstools/node-libpd>), a *Libpd* [9] binding for *Node.js*. The library enables the instantiation and orchestration of *PureData* patches directly inside the JavaScript code.

VI. COMPOSITIONAL ASPECTS

In compositional terms, [°poly°] can be described as a generative system based on algorithmically generated rhythmic and polymetrical patterns—using techniques inspired by G. Ligeti and early american minimalists—from which emerges a counterpoint of evolving melodico-rhythmic structures.

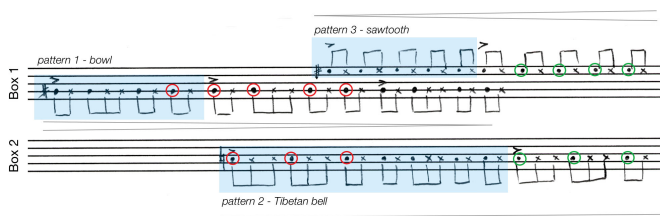


Fig. 4. Score of a possible result of the generative processes. Green and red circles highlight melodico-rhythmic structures that can emerge between several patterns.

The modules are synchronized on a common pulse of 200ms and generate patterns mainly defined by three dimensions: a rhythmic sequence inspired by *aksak* rhythms, a pitch randomly picked on a blurred modal scale, and a soundbank of recorded percussions (e.g. bells, bowls) or simple synthesized sounds (e.g. sine, square). Each pattern is finally modulated through an envelope that gradually makes it appear and disappear for a total duration varying between 45 and 75 seconds. These different aspects allow for creating a dynamic network of spatially distributed melodico-rhythmic cells that emerge from the layering and the interleaving of the different patterns (see Fig. 4).

VII. DISCUSSION AND FUTURE WORKS

This project has offered an interesting playground to test, implement and refine ideas that led to the implementation of several software libraries, tools and to the novel version of our framework *soundworks*. Concerning hardware, the modules described here provided an important milestone in the design and implementation of a more generic device, that could support a wider range of artistic and research practices. In the two public presentations, informal discussions showed that the installation has been generally positively received by the public.

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