JamFloor: Collaborative Musicmaking for everyone

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ABSTRACT

Though everybody enjoys making music, least people know how to play an instrument. By providing an instrument on the floor, JamFloor eliminates the time learning an instrument requires before one can join a jam session. Users that already play an instrument receive help by visual feedback and guidance.

The music the JamFloor produces makes users think less about harmony but sets focus on rhythm and playing together.

INTRODUCTION

jam session is an event where people come together and make music. In general this happens without preparation and mostly results in improvisation. These people do not have to know each other necessarily. Further on we refer to this as *jamming*.

The musicians tend to organize themselves into two categories. According to the type of instrument they are playing, they either belong to the rhythm section or the harmony section. The rhythm section plays patterns that help to keep the session on beat. It is the basis for every session, whereas the harmony section varies more and provides the melody.

Figure 1. (left) Johannes playing his bass guitar, (right) the Laboratorium Orchestra during their jam session at Freiland in Potsdam.

As Johannes from *Freiland-Sessions: Laboratorium Orchestra* [1] states, an experienced jam is normally based on people's feelings and hearing without any guidance or technical help. The musicians just follow each other and the music changes smoothly and continuously throughout the session.

Further he points out, that it is really hard for beginners as there are no sheets to play after but a few patterns. Thus you have to learn which chords and notes sound good together
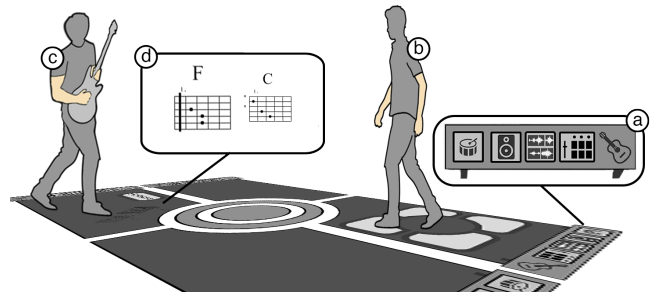

Figure 2. Users select (a) their instrument by taking it from the cupboard. This either is a floor instrument (b) or their own instrument (c). Musically matched chords (d) are shown to users who select the latter.

and especially how to create tension to make the music more interesting. This either requires skills in music theory or experience.

A significant component of jam sessions are soli. One musician gets into focus by playing louder and trying out new melodies. Everyone else calms down and supports the soloist. In the past years a type of jam evolved which is different from the native kind. Musicians use digital audio controllers and processing as well as samples (snippets cut out of music). We learned about that talking to *springintgut* [2].

JamFloor enables even beginners to join a jam session. It provides guidance for people who play an instrument but are not able to improvise. Floor instruments enable users without any musical experience to join as well.

WALKTHROUGH

In this scenario two users *Bob* and *Dillon* will be jamming on the floor. As seen in figure 3 both choose a stage and get prepared.
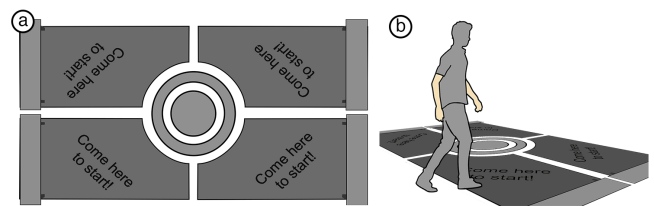

Figure 3. (a) JamFloor and its stages in initial state. (b) User Bob steps onto a stage.

Bob favours to play his guitar. *Dillon* chooses to play a virtual instrument.
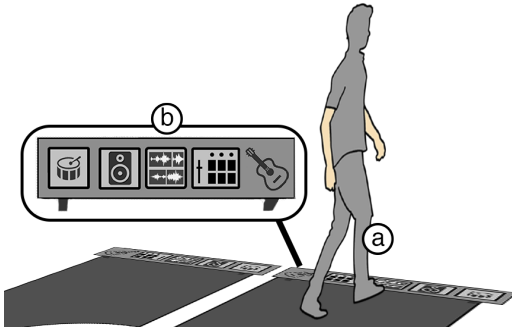

Figure 4. (a) Users select an instrument by taking it from the cupboard. (b) Bob brings his own instrument and Dillon chooses from *Drums*, *Bass*, *Samplesounds* and *Spherics*.

The users activate their stage by selecting an instrument. Jam-Floor immediately starts playing a background beat to provide a basis for the musicians. As displayed in figure 6, *Bob* and *Dillon* start to jam and discover their instruments.
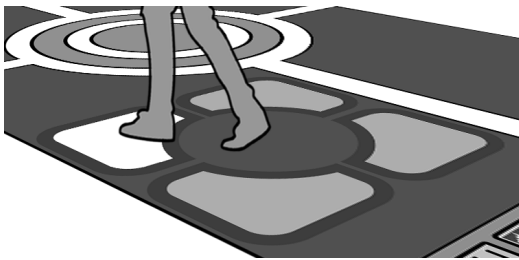

Figure 5. Dillon can tap on the buttons of the floor instrument and a sample is played until he releases the button. The tapped button gets highlighted.
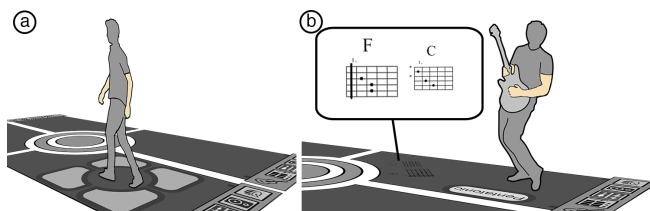

Figure 6. Bob and Dillon warm up. (a) Dillon discovers his instrument by trying out his sounds. (b) Bob gets hints by matching chords to Jam-Floor's sounds.

To get to know ones instrument, each user has the chance to play for himself without being disturbed by others.
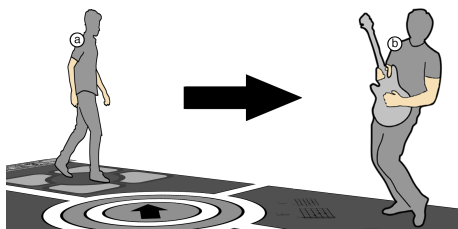

Figure 7. (a) The spinner starts and selects Bob to play alone. (b) Afterwards Dillon has the chance to play undisturbed.

The warm-up finishes and both musicians grow into a homogeneous team. Figure 8 shows how the actual session continues.

Figure 8. The jam session starts. Bob and Dillon jam along. Periodicaly one musician is encouraged to play a solo.

DESIGN

We used 3D objects to make our design look more real. It is composed of different 3D objects floating above a virtual wooden floor. The users should feel like they are staying on a stage above the ground. The focus of the layout is set to the center of the floor.

The different objects in our design are four stages. One for each user and a notification area in the center. The notification area consists of a circle in the center and a ring around it. The ring is used to show text messages to the users and the circle to show the beat and some special actions. All these components are discussed separately in the following sections.

Creating space for users by quartered stages

Each musician has its own area on the floor to move around freely. We decided to give each musician his own space, so we can arrange them to stay in circular order and look at each other. The results of our contextual inquiry show that people during jam sessions tend to line themselves up in a circle, so they can communicate with each other keeping eye contact. This as well encourages the feeling of making music together.

Figure 8 shows the progression of the stage design. Our initial layout suggests that each user space is similar to a slice of a circle. But the slices are to narrow to place any floor instruments or notification on them. Rectangular shapes have proven to fit the layout accordingly. The extraction of a circular shape from the middle of the floor makes space for a notification area. Thus focus is set to the center and we emphasize that users keep eye-contact.
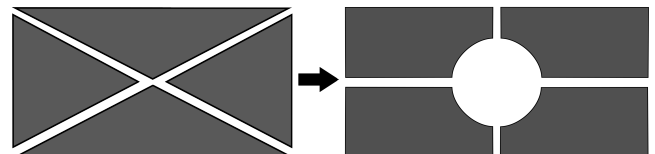

Figure 9. Slices evolve to rectangular shapes.

The stages must be activated to use them. Our first idea proposed the activation of stages as soon as a musician stepped onto them. But in the heuristic evaluation we discovered that

users tend to cross the entire floor to reach their favored position. Thus they accidentally activated stages. So we decided to only activate a stage when an instrument is chosen. To give clear instructions we placed a label on each stage.

Choosing the instrument from a virtual cupboard

JamFloor provides two complete different kinds of usage. On the one hand you can play your own instrument which you brought with you. On the other hand there are four different floor instruments to choose from.
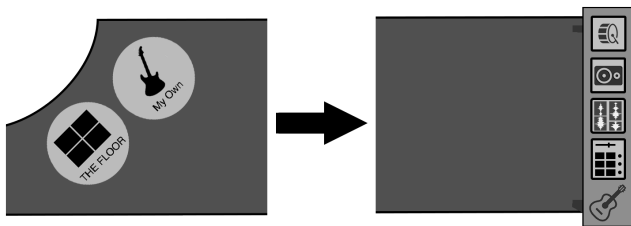
Figure 10. Users select their instrument directly from a cupboard rather than be guided by a menu.

To separate these concerns we started with a button based menu like in figure 10. This menu has two layers. First one for choosing between playing a real instrument and the floor instrument and the second to choose the kind of floor instrument. This worked out well in the paper prototyping for the initial choice of the instrument. But this way it is quite difficult to change the instrument afterwards, because we had to provide an extensive menu for that purpose.

By providing all possible options at once, there is no need for a menu at all. Therefore we added a cupboard next to each stage, where users can directly choose their instruments from. The cupboard shows four icons - one for each floor instrument - and one icon for support while playing your own instrument. The currently selected instrument is highlighted, so users know the current state of their configuration. All instruments are part of our virtual world and the interaction feels more natural.

Centered notification area instead of personal notifications

Figure 11 shows how we coordinate amateurs during a jam session by displaying notifications. Because the users do not loose sight of the center of the floor, it makes the perfect spot for instructions. Placing notifications next to the users might distract them. Text notifications for all users are shown on the outer ring. Continuous feedback like the beat is shown by the circle.

The circle has several functions. It pulses to the beat during warm-up and the jam session and thus functions as metronome. Johannes stated that a metronome is a big advantage for beginners to help them keep in time.

Furthermore the circle turns into a spinning wheel. A randomly chosen user has to play a solo. As we learned from several interviews with experienced jammers, the group has to feel when one of the musicians wants to play a solo. Meanwhile the others play basic rhythms and calmer. The soloist
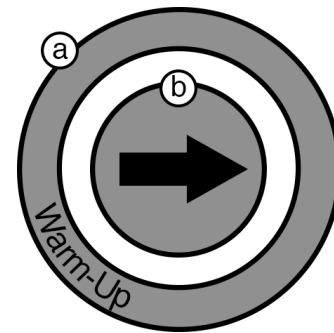
Figure 11. Centered notification area consists of (a) an outer ring providing labels and (b) a circle which pulses to the current beat and turns into spinning wheel.

shows the others that he finished by changing the way he plays his instrument. This is one of the hard parts of jamming. By introducing the spinning wheel we delegate the selection of a soloist to JamFloor. Each user immediately realises who is going to play a solo. Further JamFloor reduces the volume of the other players.

As seen in figure 6, the spinning wheel is also used during the warm-up. The arrow points at one user after another so each musician can try out his instrument. This is mainly used to give the users a chance to come up with first patterns. A solo during the warm-up is especially important to give users playing the floor instruments the chance to discover the provided samples.

Floor instrument with four buttons only

According to the jammers, it is a true challenge to learn to jam with an harmonic instrument even if you are able to play with sheets. Though by playing drums or other percussive instruments we were easily involved during the jam session we attended.

Making music with a drum machine is suitable for beginners. In the interview with springintgut we learned about *controllerism*. Controllerism is a new way of making live music and is accomplished by using prepared and mastered samples. A drum machine behaves like a percussive instrument, plus it is more flexible and can be used to play harmonic instruments as well. It uses a predefined set of samples to play from, which limits the necessary knowledge on music theory, but sets focus to rhythm and sequences instead. Thus even musically inexperienced users can make music.

By providing flat buttons our design should match an actual drum machine. This decision allows user to anticipate the usage of the virtual instrument. Sounds will be triggered while a button is pushed. Sounds will stop when a button is released.

As shown in figure 12, we decided to only present four buttons per instrument. In previous iterations we proposed a set of twelve buttons aligned towards the center of the floor, seen in the first step of figure 12. This approach does not use all the provided space of the stage, because the alignment limits the boundaries. We refined the design by axis-aligning the buttons to the stages. This is a trade-off towards circle align-

ment. As we found out during the heuristic evaluation users did not feel separated from the group though.

Having many small buttons makes it hard to step on them precisely. Additionally beginners get confused with a huge variety of samples to choose from. Presenting too many options at once limits the capability of memorizing the mapping of sounds and buttons. Also the distance between the buttons must not exceed one and a half step lengths. Otherwise it is really exhausting to stay on beat and trigger keys across one's stage. If the user stays in the center of those four buttons, he does not encounter any difficulties in reaching out for the keys.

Four buttons only force users to listen to each other. One virtual instrument alone produces interesting samples but rich patterns and diversified jams can only be produced by combining all of the floor instruments. Users have to focus on each other, similar to an actual jam session. So this design decision enhances the natural feel of a jam.
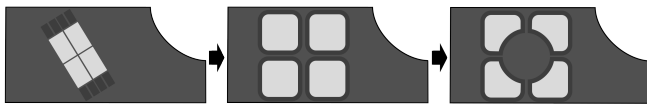

Figure 12. Evolution of the floor instrument

To allow users to stay idly in the center of the floor instrument we extracted a circle from the center of the virtual keyboard. During the heuristic evaluation we saw users taking a break without leaving the stage. So they always triggered sounds from the buttons they were staying on. This behavior is similar to musicians pausing during a jam session, though jammers have to put down their instrument and therefore tend to go aside. Because users of a virtual instrument do not have to put down any weight, they take a pause without leaving their position. Additionally the layout of the keyboard resembles the overall layout of the stages.

No hints for floor instruments
Though our target group mainly consists of beginners in music and jamming, we decided to omit tips for players of the floor instruments. These tips included showing a 'Tap here' label during the warm-up when the underlying sample fits the tunes of the session. The heuristic evaluation showed that first time users are far too much concerned with triggering sounds at all. They could not concentrate on additional hints.

The buttons are highlighted when they are triggered. This minimal visual feedback is sufficient to let users know, they successfully played a sample. We saw users learned fast and were prepared for the main session nonetheless.

Musical Instructions
We provide two ways of displaying notes to support musicians with their own instrument. This prediction is generally possible because all samples of the floor instrument have the same key.

At first we display a sequence of chords called cadence which fits to the given key. Participants of the session can primarily use this to play calm harmonic sounds. The chords are sliding from the left to the right according to each fourth beat respectively at the begin of each 4/4 clock.

The second display shows the pentatonic of the given key which is usually needed by guitar player for their solo. The users can change between the views by tapping a switch button.

In spite of the musical support, it is still possible for users to disharmonise because musicians with an own instrument are playing independently from the floor instrument users. All participants have to grow into an homogeneous team.

TECHNICAL BACKEND
Our floor is created to send MIDI-signals which are commonly used for musical purposes. As it did not make sense to program our own audio workstation backend we used already existing programs and protocols for musical output. The Jam-Floor receives specific signals (e.g. the beat signal) and sends signals to trigger samples or make control changes.

For an optimal musical output we chose *Ableton Live* as our digital audio workstation. We created a project that holds various samples that fit together and can be grouped into the named groups *Drums*, *Bass*, *Spherics* and *Samplesounds*. The use of this software made it easy to simply change the musical output and the used samples and sounds and also encourages advanced users to create their own projects for the JamFloor. They can also attach their own audio devices as the floor automatically adapts to tempi of other devices when connected.

CONCLUSION
User interaction techniques are kept clear and simple with usual buttons and a reduced menu flow. The aim is to make the user ready for the jam as quickly as possible - even quicker than for usual jam sessions.

We think the idea of JamFloor is usable more broadly in future. For example Dancers could use it to trigger music with specific moves during their performance or disc jockeys (DJs) could add additional samples to their liveset. The floor could be used as a public interface for collaborating on music or visuals in a bar or on a party.

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