

To Whom it May Concern.

I am Dr. Giuliano Graniti, Assistant Professor of Music at Middle Georgia State University, where, among other music-related courses, I designed and currently teach a four-level course of Class Piano, which is at the core of the music program at MGA, in all major and minor tracks. I am the inventor of the patent-pending *Piano OpenLab* software application.

## 1. INTRODUCTION

**The *Piano OpenLab* provides a system and related methods for a virtual digital piano lab infrastructure, for one-to-one and one-to-many in-class and remote collaboration.**

In the *Piano OpenLab* system, each piano station in the lab (e.g, 1 teacher + 12 students) consists of a digital piano, connected via USB to a mini-PC bundled with an audio interface, headphones, microphones, and a small touchscreen for the users' operation. Each mini-PC contains a customized version of the *Piano OpenLab* software application, and related Graphical User Interface. The app runs on a Linux OS such as Ubuntu Desktop, which has full accessibility features and is compatible with the most comprehensive and up-to-date security requirements for Higher Ed institutions (security tools such as Qualys, Trellix, and so on).

## 2. *Piano OpenLab*

In the next few paragraphs, I summarize the main characteristics of my invention, how it differs from the traditional systems, and how my project can be beneficial for college level group-piano instruction.

***Piano OpenLab* is opensource.** It works with non-proprietary software, regulated by opensource licenses. It is therefore sustainable and technologically innovative. I intend to start a mass production of the system as soon as I have sufficient testing data and a patent approval (which is in progress).

**The system created by *Piano OpenLab* is completely new and groundbreaking.** Nothing like this has ever been created and/or used for group piano instruction in this country or in the world. Yamaha Corp. basically has the monopoly of the piano lab systems in US institutions, keeping – in my opinion - an outdated philosophy and expensive methods. It is my intention to show an alternative way. I have presented a prototype version of it in several presentations, getting enthusiastic feedback.

*Piano OpenLab*, given its great sustainability, can have a very high potential in the **internationalization** of the group piano education. A few countries besides the US are aware of the benefits of this educational model, and most of them anyway cannot afford the traditional labs currently on the market.

In drawing the idea for *Piano OpenLab*, I analyzed the possible weaknesses and criticalities of the systems currently in use (e.g., the Yamaha LC4), especially in Higher Ed institutions, including MGA:

- There is a strict hierarchy between components: the expensive and sophisticated central unit controls all the dependent modules in the lab.
- The quality of the sound entirely and only depends on the digital pianos which are used.
- Installation and wiring are complex and are subject - in my teaching experience - to service disruption and consequent long assistance waiting time.
- Obsolescence and components incompatibility.
- Costs.

In the worst-case scenario, if the central unit stops working, the whole system is useless for instruction purposes until the panel and the connections get fixed or replaced. Repairs usually need a specialistic maintenance.

*Piano OpenLab*, by changing the philosophy underneath a piano lab system, responds to the criticalities above with the following caveats:

- **It is software based.** Except for the digital piano instruments and the PCs used in the lab, all the system assistance, maintenance, and updating/upgrading can be done from remote, through a ticket submission service on a dedicated platform.
- Sound libraries stored in the PCs are used, which gives more flexibility and compatibility.
- It reduces wired connections. High quality audio is exchanged with **non-perceptible latency** (below 16ms) on a local network (for in-person instruction) or over a dedicated server (for remote instruction).
- **It is modular.** It reduces the hierarchy between the components, so that a malfunctioning part does not affect the functionality of the entire system. In doing so, it assigns some basic collaboration tasks directly to the students. The instructor, however, is always able to control the students' work in real time.
- It makes the system **adaptable** to many activities and projects, such as music composition, music production, live music coding, and so on.
- It can receive virtually endless updates, upgrades, and software/hardware integration, so to solve the problem of obsolescence and enhance **sustainability and environmental health**.

In the worst-case scenario of a connection failure, a system like *Piano OpenLab* will be reactivated once the connection is restored. It is unlikely that an internet/network failure will last more than a few hours, and it can be usually handled by any IT dept.

Moreover, *Piano OpenLab* provides other features that are not included or are not available accessible in the traditional systems, such as:

- Routing audio from any software application running into the PC, including but not limited to audio streaming service.
- Potentially embedding web-based piano instruction tools such as *ENovative Piano*, *Piano Marvel*, and so on.
- Real-time collaboration on browser-based music apps, such as *Noteflight* and *Soundtrap*.
- Easily recording, saving, and sharing of audio files.
- Possibility to add/remove/modify the audio connection plan anytime and as desired without physical intervention on the hardware.