Title of Proposed Research or Creative Project:
Instrument Design and Construction of Custom Instruments for Senior Composition Thesis Recital

1. Describe the proposed research or creative project:
(PLEASE NOTE: Avoid jargon or terms unique to the discipline. If you must use such terms, please define them so all committee members can understand your proposal.)

As a composer my main interest has been to design, build, and compose for custom instruments. My work so far has included the construction of custom mallet and invented instruments, which I build using common materials found at hardware stores. I am intrigued with the future development and exploration of sound. My previous projects have allowed me to explore aspects of sound and timbre but on a much smaller scale due to the limited resources at my disposal. This proposal seeks funding so that I can pursue this endeavor on a much larger scale, and fully contextualize new, contemporary sounds.

Now that I am a senior Music Composition major (with my major instrument of study being percussion), it is a degree requirement to compose a senior thesis piece. With the proposed resources and materials I will construct several unique percussion instruments that will be employed in my thesis composition. This composition will be written for a percussion trio and will be performed by two percussion colleagues and myself. The total length of the composition itself will be around 30 minutes.

This work for percussion will be broken into three parts, or movements, each movement utilizing different groups of instruments I will construct.

Part I- A Str(i/a)ng(e) Trio:
Part I will utilize instruments that are based off an instrument called a “whamola.” A whamola is a single stringed instrument that is stood upright, much like an upright bass, and struck with a stick. While the instrument is being struck there is a lever at the top of the instrument that changes the tension of the string in order to raise or lower the note being played. Most whamolas are amplified using a common guitar pickup. This instrument is most commonly used in more popular, progressive rock music.

My version of this instrument (which I will call the turnola) will have two different sized strings; each connected to a lever, and will be played sitting down as it rests on a table. The two strings will be amplified by the use of a guitar pickup installed below the strings. I will make three turnolas, one for each player, and will make each a different size to have high, middle, and low range pitches.

Part I will be much like a traditional string trio, but with a twist. The reason why I chose to construct the turnola is because the whamola fails to have any kind of artistic subtleties. The whamola gets one sound, simply the percussive sound of the string being struck while pitch is bent, unlike traditional string instruments (like violins and cellos), which have seemingly endless sonic possibilities. The turnola will bridge the gap between traditional string instruments and the whamola. The turnola will be bowed, plucked, struck with different mallets, and rung using a devise called an e-bow (a devise that excites strings by creating an electromagnetic field). The guitar pickup on the turnola will not only be used to amplify the instrument but will help process the sound through a variety of filters such as reverb and delay.

Part II- Bells, Tiles, and Pipes:
In Part II each player will have a different constructed mallet instruments (like a marimba or xylophone) but using non-traditional materials to make the bars. Player one will use an instrument made from electrical
metal tubing (EMT), player two from plates of steel, and player three from ceramic tile. I choose these materials for four reasons. First is because they are very easy to find. You could walk into any hardware store and purchase these materials. Secondly, they are extremely simple to tune with a few common tools. I will hand tune each bar on each mallet instrument using a strobe tuner, and a hand held grinder. Third is for accessibility. If another group wanted to play this part of the piece, it would be no problem to replicate; all I would have to do is specify the lengths of each bar associated with the material. Last is due to the resonant qualities of the sounds. The EMT is extremely resonant; and warm in tone. The ceramic tile has a gong like timbre and rings with much force. And finally the steel plates sound like hand bells that are played in churches, but much more rustic and industrial in timbre.

Listen to the piece entitled To Hammered Hearts With Drifting Dreams on the attached DVD. This is a recent composition I composed my percussion trio (the same trio this will perform this project). This composition is written for steel plates and EMT, both of which I also hand tuned to fit in a certain scale.

Part III- Spin

Part III will employ the use of the instruments in the previous two parts as well as a new one. This new and final instrument has two elements that will be combined. The first element is a corrugaphone, or more commonly called a whirly tube or sound hose. The sound hose is a corrugated piece of plastic tubing that is swung in a circle. As the tube is swung, air is pulled through the tube as the corrugations on the tube bounce the particles passing through it in different directions, creating a pitch. If the speed of the spin is changed different partials of the harmonic series are hit. Basically, the faster you spin it, the higher it sounds, and the slower you spin it, the lower it sounds. These instruments can be found being used at sporting events, and are often uses as a children’s toy. The sound hose has an ethereal, flute like tone, which creates a unique atmosphere.

The second element is a ceiling fan attached to a dimmer switch. The blades of the fan will be removed and replaced by different lengths of sound hose. The dimmer switch is to change the speed of the fan, and in return, the pitch of the tubes attached to it. Each player will have control of one fan, which will be remotely controlled using a dimmer switch. The ceiling fans will be attached to stands and spread out through the performance space to surround the audience with sound and create a unique sonic atmosphere.

Attaching the sound hoses to fans serves three purposes. First is so that multiple hoses can be swung at once. With three players, two hands each, that means only six tubes can be swung at one time. I will use three fans, each with four tubes; this means twelve possible pitches at once. The second purpose is for control. It is not only tiring to swing these tubes for long periods of time, but also very hard to control what pitch comes out of the tube. The dimmer switch on the fan will lock the speed of the tube and allow for the tube to be spun for as long as written. The last purpose for the fan is for more sounds to be happening at once. With only three players it is difficult to create rich textures of sounds, and this is why I will use fans. The fans can be activated and left running while the performers play the other instruments.

The proposed instruments for this project have been budgeted for $1,500 (see expenditure statement attached to this form). If the full amount of funding is not available adjustments can be made to compensate.

2. **Describe the end goal, specific aim or hypothesis of the proposed research or creative project:**

The end goal of this creative project is to have the composition performed around the Ohio University campus and showcase my instruments to the public. The premiere concert will be held in the School of Music and will feature works composed by myself. The premiere will happen sometime in April of 2014 (recital dates are not formalized until the semester in which they occur). The first half of the concert will feature previously composed works and the second half of the concert will be my senior thesis, this proposed project.

I also hope to perform this composition in multiple venues around Athens. Performing my composition in venues such as Jackie O’s or The Union would expose the public to new sounds in a setting that is not intended for contemporary chamber music. I would also like to perform this work in Baker Student Center during the day. My goal is to blur the boundaries between “popular” and “classical” music and to have my music reach an audience that would not commonly attend school of music recitals.
3. **Describe the methodology you will use to accomplish the end goal or specific aim of the proposed research or creative project:**

   These proposed instruments would be constructed using tools that I own. Each instrument will have a specific process to achieve a final product.

   **Part I Turnola:**

   The three turnolas being constructed will be exact replicas of each other, but they will vary in size. The largest will be five-feet long, the second will be four-feet long, and the shortest will be three-feet long. The bodies, which support the tension of the strings, will be made of two 1”x4” pieces of solid oak glued on top of each other. Once the pieces of wood are glued, the bridge (which holds the strings at the bottom of the instrument) and lever will be attached on either end of the frame. The final step before the strings are strung over the instrument is to install the guitar pickup near the bridge. The pickup will be inlaid into the piece of wood, so that it does not rise above the wooden frame and interfere with the strings’ vibrations. The last step is to string the instrument. I will use piano wire, due to its high tensile strength and resilience to tension change.

   **Part II Mallet Instruments:**

   Over the past year, I have had a great deal of experience tuning different materials for personal compositions. I have even been approached by other percussion students to tune various materials for pieces they are rehearsing.

   The first step of making these instruments’ bars is to determine the length of the lowest-sounding bar. Using a hand held grinder with a cutting wheel attached, the material is cut to the desired length. Once the bar is cut, it is placed on two pieces of foam (so that it can ring freely when struck) with a musical tuner positioned next to the bar. The bar is struck, and the pitch is calculated on the tuner. Most likely, the pitch will not be in tune, meaning that the bar will not fit within the desired scale for the composition. With these materials, the pitch must always be adjusted upwards by taking the grinding wheel, with a grinding attachment, and removing small amounts of material off the end of the bar. On a mallet instrument, the lowest bars are always the longest, and the highest bars are the shortest. Therefore, removing material from the end of the bar, and making it shorter, will always make the note higher in frequency. I keep taking small amounts off the end of the bar and check the adjustments with the tuner, until the desired pitch is obtained. Once I have one pitch, simple calculations can be made to determine the length of any note in the scale. I often consult a book titled *Making Marimbas and Other Bar Percussion Instruments* by Bart Hopkin and Carl Dean to check on the exact ratios.

   Even though I can find the exact length of the next bar in the scale, I must cut the bar slightly larger due to imperfections in the material. Once the bar is cut, I again remove small amounts of material off the end until the bar is at the desired frequency. These steps are repeated until all bars have been constructed.

   Simple frames made from 2x4s will be constructed for the bars to rest on, after all the bars are made. Bars will be set on the frames exactly like all keyboard instruments—natural notes on the bottom (like white keys on a piano), and accidentals in groups of twos and threes on top (like the black notes on a piano).

   I am attaching photos of previous bars and pipes I have built and frames I have constructed for a percussion sextet I composed called *100 mouths full or steel and take* for an upcoming percussion ensemble concert in November. The premiere of this piece is under direction of Roger Braun, Professor of Percussion at Ohio University:
Pieces of wood, metal pipes, and rebar I tuned.
A simple frame each performer will play on.
The first rehearsal with all instruments and frames constructed.
Part III Fans:

The fans being used in the last part of the piece will be normal ceiling fans with four blades. These ceiling fans will be purchased from Craigslist, because they are not being used for their intended design and do not need to be new, only functional.

First, sound hoses will be attached to the fan. These sound hoses will be of various sizes, so that multiple pitches can be achieved. The next step will be to wire the fan so that it can be plugged into an ordinary electrical socket. The wire being plugged into the wall will be interrupted with a dimmer switch to control the amount of voltage entering the fan, which results in speed control. These fans will finally be attached vertically to a small stand, which lifts them far enough off the ground so that the sound hoses do not hit the ground.

4. **Please describe the significance of your research. Why is it important to the discipline?**

It is my goal to expand the boundaries of what is accepted as or considered “music,” as well as create new sounds never before imagined. I believe all sounds are equally valid and should be embraced. It is a mistake to limit our imaginations to what is culturally accepted as music, when there are an infinite number of possibilities waiting to be discovered. I’m not saying my instruments are better than all common instruments because they make “new” sounds; what I am saying is that no matter what kind of musician you are, it is critical to always push the boundaries of your art. I believe as musicians it is one of our duties to expand and experiment upon the possibilities of sound. Music would never progress if new sounds were not found.

Whether you are a trumpet player, trying to find a new tone that sets you apart from thousands of other trumpet players in the world, or an instrument maker experimenting with new materials to make instruments that have never been seen or heard, new sounds are waiting to be discovered to inspire future generations of musicians.

This is why this project is important to the discipline of music. I am attempting to stretch the cultural expectations of music, as well as share this new music with my community. My project will hopefully inspire other musicians to make similar leaps of experimentation and sound exploration.

Listen to the piece entitled *I Won’t Let You Be Alone Down Here*, which is on the attached DVD. The piece is one of my original compositions and employs an instrument I designed and built, which I call the steel harp. The instrument is comprised of a propane tank with the top cut off (to help with resonance), and an 8’x 3” piece of aluminum is fixed to the tank (see photo below). On the piece of aluminum, where it is fixed to the tank, a contact microphone is attached to amplify the instrument and also allows effects to be played (such as delay and reverb). The piece of aluminum is bent and bowed, much like a musical saw, and creates a spacey wavering tone. This composition is another example of how I am striving to expand the discipline of music and experiment with sound.
**ONLY if your project is part of, or fits within the research being conducted by a faculty member or your faculty advisor, describe specifically how our project fits within or is distinguishable from your faculty advisor's research.**

**Requested Funding**

Please note:
- If you request funds to purchase expensive equipment, such as computers, hardware, printers, cameras, etc., you must justify that the equipment does not exist elsewhere on campus for your use. If such equipment is funded, it will not become your personal property, but must remain in the academic department.
- If you request funds to pay for tuition at another institution, you must justify why your project cannot be completed unless attending another school.
- If you request funds for a hotel room while at a conference or for research-related work, the committee will award funding only for two nights in a hotel.
- If you request funds for travel to present your research results, indicate the name and date of the conference and provide specific travel plans.

**Itemize each amount needed for each specific purpose. Be specific!**

<table>
<thead>
<tr>
<th>Amount</th>
<th>Item</th>
<th>Justification for this expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100x3=$300.00</td>
<td>E-Bow (3)</td>
<td>To vibrate the strings of the turnola for long periods of time.</td>
</tr>
<tr>
<td>$20x2=$40.00</td>
<td>1&quot;x4&quot;x10' oak board (2)</td>
<td>Body of turnola.</td>
</tr>
<tr>
<td>$14.00</td>
<td>1&quot;x4&quot;x6' oak board</td>
<td>Body of turnola.</td>
</tr>
<tr>
<td>$80.00x3=$240.00</td>
<td>Guitar Pickups (3)</td>
<td>To amplify turnola. One pickup per turnola.</td>
</tr>
<tr>
<td>$15x3=$45.00</td>
<td>Bridge (3)</td>
<td>To anchor and raise the strings off the board of the turnola. One bridge per turnola.</td>
</tr>
<tr>
<td>$30x3=$90.00</td>
<td>Crank Mechanism Parts (3)</td>
<td>To tighten strings on turnola with a hand powered lever. One lever per turnola</td>
</tr>
<tr>
<td>$75.00</td>
<td>Piano Wire</td>
<td>Strings for turnola.</td>
</tr>
<tr>
<td>$10x26=$260.00</td>
<td>Steel plates (26)</td>
<td>26 Steel plates to use as mallet instrument bars.</td>
</tr>
<tr>
<td>$4x10=$40.00</td>
<td>18&quot;x18&quot; ceramic tile (10)</td>
<td>To make 30 ceramic tile mallet instrument bars.</td>
</tr>
<tr>
<td>$7.00x6=$42.00</td>
<td>10' of EMT (6)</td>
<td>To make 30 EMT mallet instrument bars.</td>
</tr>
<tr>
<td>$50x3=$150.00</td>
<td>Ceiling fan (3)</td>
<td>To spin corrugaphones.</td>
</tr>
<tr>
<td>$30.00</td>
<td>Sound Hose</td>
<td>To attach to fans and be spun.</td>
</tr>
<tr>
<td>$10 \times 3 = $30.00</td>
<td>25' extension cord (3)</td>
<td>To plug fans into wall. One per fan.</td>
</tr>
<tr>
<td>$10 \times 3 = $30.00</td>
<td>Dimmer Switch (3)</td>
<td>To adjust fan speed. One per fan.</td>
</tr>
<tr>
<td>$114.00</td>
<td>Materials for mallet frames and fan stands</td>
<td>This price includes 2x4s, screws, glue, and drill bits to assemble stands.</td>
</tr>
</tbody>
</table>

NOTE: If you are requesting travel funding only, please explain how you funded the other parts of your research project.

Have you requested funds for this project from your department or college?  
Yes  \(\times\) No

Are you receiving funding for this project from your college, school, department or any other source?  
Yes  \(\times\) No  
If yes, amount you will receive: 

Provide an expected timetable for research: e.g., when it will start, how long it will take, when it will be completed?
The construction of the instruments will be started as soon as the funding is available. I hope to have the instruments completed by the end of this year’s winter break, so I can focus on the compositional aspect of the project during the second semester of this academic year. The project will be performed sometime in April during my senior thesis concert.