SensorSynthFM capstone check-in

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PROJECT LINKS: SensorSynthFM build and research ↗ · Current build synopsis ↗

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What I need from this check-in

SensorSynthFM is the iPad instrument I proposed for my Passion Project in December 2024. It uses the iPad's motion sensors and microphone as musical controls. For example, a player can tilt the iPad or make a sound into its microphone and use that input to change the instrument's tone or volume.

A working prototype now runs on my iPad. It makes sound, responds to motion and microphone input, and lets a player connect a sensor to a sound control. Testing also exposed several interaction problems. I will not finish the larger instrument by December. I need to define a smaller capstone that I can complete well, evaluate honestly, and submit in time to graduate.

I am asking for decisions on four points before I continue:

1. whether the revised project scope is appropriate;
2. how my use of agentic AI should be documented and evaluated;
3. what evidence the final project must include; and
4. whether the proposed completion boundary and schedule are sufficient for this fall.

My proposed final project has three connected parts:

1. a working and evaluated prototype in which a player enters notes by touch while the iPad's sensors shape the sound;
2. a record of how research and testing changed the design; and
3. a case study of the agentic development method I used, including what I decided, what AI agents contributed, what failed, and how I checked the work.

The prototype remains the center of the capstone. The development method belongs in the record because it materially shaped the product and became a UX problem of its own. Unfinished features will remain documented product work, not capstone claims.

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What exists now

The current prototype is a one-screen native iPad application. It uses frequency modulation, or FM synthesis, to make sound. In simple terms, FM synthesis changes the character of one sound by using another signal to shape it. SensorSynthFM lets an iPad sensor control that change.

A player can choose a sensor and connect it to a sound control. The player can then set the strength and direction of that connection, hear the result, and return the setting to zero. The current build includes motion and microphone input, visible play controls, a screen for connecting sensors to sound controls, and a left- or right-hand layout setting.

Before I accepted the current build, 22 automated tests passed. I then installed and ran it on my 11-inch iPad Pro. It launched, produced sound, and responded to motion and microphone input. I can demonstrate both the working features and the failures described below.

This prototype is an interim milestone. It does not yet prove that the instrument is easy to learn, musically useful to other people, reliable over time, or ready for public release. I have not completed outside-user evaluation.

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The next interaction I need to design

The current screen proves that the sound engine and sensor mappings work together, but it is still a test screen. The next page turns that system into something a person can play. A player will touch the screen to choose notes while sensor inputs continue to shape the sound.

Note input raises the core interaction-design questions for the bounded prototype: touch-to-pitch mapping, multi-finger and slide behavior, how scale and range are shown, handling of accidental touches, feedback for the active note, and reach for left- and right-handed players. I will specify those states and test an editable Figma prototype before accepting implementation work.

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What testing changed

On August 3, I performed a cognitive walkthrough on the physical iPad. A cognitive walkthrough is a structured first-use review: I followed eight basic tasks and checked whether the interface gave enough information to complete each one.

Seven tasks worked. I could start the instrument, connect a sensor to a sound control, tell which connection was active, hear and see the microphone response, and return a connection to zero.

One task failed in an important way. Moving the iPad changed the sound, but the screen did not clearly show what the motion sensor was doing. The gyroscope produced a visible response, but it was too subtle to explain the change. A player could hear that something happened without understanding why.

The walkthrough found two more problems:

- A sensor connection set to zero did not look selected, even though it still existed.
- Removing a connection depended on a shortcut that the interface did not explain.

These findings changed the next build. It now needs to:

- make sensor activity easy to see;
- keep an existing connection visible when its amount is zero;
- provide an obvious Remove action; and
- show all nine sensor sources without hiding one or making the touch targets too small.

The left- and right-hand layout switch works mechanically, but I have not tested it with left-handed players. That remains an open question.

This evaluation also showed the limit of testing my own design. I already knew where the controls were and what the instrument was supposed to do. A new player will not have that knowledge. The next evaluation therefore needs people who did not design the interface.

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How coursework changed the project

My interaction design coursework helped me identify problems with state, mapping, feedback, and recovery. Accessibility coursework gave me practical criteria such as clear labels, large touch targets, and cues that do not depend on color alone. Evaluation coursework gave me a method for testing the interface instead of relying on my own familiarity with it.

The requirements engineering work added a missing step: I now define what success means before I build or test a feature.

A note key is a simple example. The player's need is straightforward: when I touch a note, I should hear the correct note quickly enough that touch and sound feel like one event. The system must then do several specific things: play the assigned pitch, avoid missed or doubled notes, follow the intended release behavior, and keep touch-to-sound delay below an agreed limit.

My first wording asked for "no delay." That cannot be tested because every digital instrument has some delay. The revised requirement calls for a measured threshold that does not disrupt playing. This changed the work from a personal judgment to a claim I can test.

I now keep a requirements record that links each important player need to:

- what the application must do;
- why the requirement exists;
- how I will test it;
- what evidence I have; and
- what changed after testing.

The current record contains 15 stakeholder, system, and process requirements. Seven system requirements are also shown on the public project page. Their evidence states make the limits visible. Three failed on the current build. Two are accepted but not yet tested. Two passed only within the narrow boundary of my own review on one iPad.

This record improves traceability, but it does not prove usability. No recruited-participant evidence exists yet.

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Agentic AI, authorship, and the policy question

In March 2026, I began building Clarence, a persistent agent system for carrying project context between tasks. It connected research, design, coding, testing, and documentation. Earlier tools repeatedly lost decisions between sessions. Code could change without the design reason beside it, and a completion message could arrive without proof that the result worked on the iPad.

Clarence helped me recover and organize research, compare technical approaches, prepare bounded coding tasks, inspect tests and build results, preserve handoffs, and draft project documentation. SensorSynthFM gave me a real project in which those methods could succeed or fail visibly.

I remained responsible for the project. I chose the problem, scope, architecture, interactions, and musical direction. I operated the physical iPad, accepted or rejected builds, controlled what was published, and take responsibility for this submission. AI systems made material contributions, so I do not want to describe the work as if I produced every line of code or prose alone.

This creates an academic-policy question that I need to resolve with you. The Passion Project guidance permits generative AI for basic information gathering, clarification, idea generation, and brainstorming with attribution. My use went farther and included implementation support, review, testing support, documentation, and coordination. Attribution makes that work visible, but it does not by itself settle whether the broader method is acceptable for this capstone.

I will continue to follow your instruction not to provide new course content to AI systems while University policy remains unresolved. For the final project, I propose a concise method statement that identifies:

- where agentic AI contributed to named SensorSynthFM results;
- which decisions and evaluations remained mine;
- what failed;
- how I verified consequential work; and
- what evidence supports the account.

I also keep a more detailed private ledger that can support review if needed. I need your direction on whether this is enough and how the method should be assessed.

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What I can complete by December

I must complete the final review in December to graduate. The capstone therefore needs a firm boundary. I propose finishing the academic work around the strongest prototype I can evaluate honestly, rather than promising a finished product that I cannot deliver.

August 13 to 23: agree on the boundary and repair evaluation blockers

After you approve the boundary, I will stop expanding the feature list. I will repair the current problems that would prevent a fair evaluation: make sensor activity readable, keep a connection visible at zero, and add an explicit Remove action. I will rerun the automated checks and repeat the walkthrough on the physical iPad.

August 24 to September 20: design the note-input page before coding it

I will define how the page maps touch to pitch and handles several fingers, sliding, scale and range, handedness, feedback, accidental touches, recovery, and accessibility. I will set the acceptable touch-to-sound delay, compare interaction alternatives, and test an editable Figma prototype before accepting implementation work. I will also prepare the participant tasks and evidence plan for the outside evaluation.

September 21 to October 18: evaluate with people who did not design it

I propose five to seven moderated sessions lasting 30 to 45 minutes. If possible, the group will include at least one left-handed participant. With consent, I will record the sessions or otherwise preserve an accurate record, use the same task script for each participant, and connect findings to design changes.

October 19 to November 22: freeze the prototype and finish the capstone record

I will make only the changes needed to address important evaluation findings within the approved boundary. I will then freeze the prototype, document what remains unfinished, reconcile the project-hour ledger, report what passed and failed, complete the development-method account, and write the final reflection. December will remain available for advisor review, corrections, and graduation requirements.

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Decisions I need from you

1. **Scope and completion:** Do you approve a capstone built around a bounded SensorSynthFM prototype, outside evaluation, a record of design changes, an agentic-development case study, and the final reflection, even though the larger instrument will remain unfinished?
2. **AI method:** Is the proposed method statement, supported by a private detailed ledger, sufficient to document AI contribution and my responsibility for the work? If not, what must change?
3. **Outside evidence:** Is my proposal for five to seven moderated sessions appropriate? What other physical-device or measured evidence do you require before final review?
4. **Schedule and final form:** Is this bounded August-to-November plan sufficient, with December reserved for review and corrections? What exact final deliverables, reflection depth, and submission date do you require?

Once I have those answers, I will turn this check-in into the formal revised plan and use it to govern the remaining work.

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References

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