ECE 1100: Discovery Project Pitch

Your Name:	Ridwan Haque
Brief Descriptive Project Title: (<10 words)	AI Powered Piano Tutor
Summary: Provide a brief overview of your intended project idea.	An interactive AI-powered piano tutor that uses a MIDI keyboard and LED visualization to teach and provide real-time feedback to users. The system detects notes played on a MIDI keyboard, analyzes performance using AI (cloud-based), and lights up LEDs above the keys to guide and motivate the learner. The project combines hardware (MIDI keyboard, Arduino, LED strip) and software (web app, AI backend) for an engaging, hands-on learning experience.
Planned GT resources (if any): List the Georgia Tech resources you plan to use, such as the Interdisciplinary Design Commons ("Hive") or ECE Instructional Labs.	• Interdisciplinary Design Commons ("Hive") for prototyping and hardware assembly • ECE Instructional Labs for Arduino programming and troubleshooting • Access to lab computers for software development and testing
Planned Online Resources (if any): Include links to any tutorials or videos you plan to follow. Using tutorials is encouraged!	• YouTube video tutorial on piano LED visualization • pianoled-arduino GitHub repository • React and Web MIDI API documentation • AWS or Azure documentation for cloud-based AI processing
Approximate Parts List: List the parts you think you'll need for your project. While the exact parts may change later, provide your best estimate for now. Start planning how you'll acquire these parts. Do ***NOT*** email the Hive or Instructional Lab about their current inventory, as their stock varies. If you have questions, visit them in person.	• MIDI keyboard (already owned) • WS2812B LED strip (3 feet, 144 LEDs/meter) (will acquire through Amazon) • Arduino Leonardo or Arduino Due (rent out) • Jumper wires (Already owned) • Micro USB cable (Already owned) • Laptop or PC (Already owned)
Designed Outcome: Describe the specific goals your project must achieve to be considered complete.	• The system must detect notes played on the MIDI keyboard in real time. • LEDs above the keyboard light up to visualize played notes and guide the user. • The web app provides real-time feedback and tracks user progress. • Cloud-based AI analyzes performance and adapts lesson difficulty.

	• The project is demonstrated live, showing hands-on interaction between hardware and software.
Detailed Timeline: Outline the major steps to complete your project, including approximate dates. Remember, your project must be completed by the Showcase.	• **Week 5:** Research and order parts; review tutorials • **Week 6:** Assemble hardware (LED strip, Arduino, MIDI keyboard) Integrate LED visualization with Arduino • **Week 7:** Develop basic web app and MIDI input detection. Start cloud backend • **Week 8:** Set up cloud backend for AI feedback. • **Week 9:** Combine all components and test full system. • **Week 10:** Polish UI, document project, prepare for showcase
Hands-on ECE Skill(s): Specify the hands-on ECE skill(s) you aim to develop through this project. Keep in mind that it must have a hands-on (physical) element and should include some ECE aspect (e.g., not only a 3D printed model or a website). If you have trouble with this section, you may need to rethink your project idea.	• Circuit assembly and hardware interfacing (Arduino, LED strip, MIDI keyboard) • Embedded programming (Arduino for LED control) • Digital signal processing (MIDI input handling) • Cloud computing integration (AWS/Azure for AI feedback) • System integration and troubleshooting • Version Control (Git & Github)