DREU Final Report:
Augmented Reality Spin Coater for Semiconductor Processes (LithoReality)

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Project Desc:
The Augmented Reality Spin Coater project aimed to create an immersive learning experience for students in semiconductor processes, with a focus on the spin coater technique. It utilized Unity, Vuforia, AI integration, Arduino, and a keypad interface to provide a comprehensive educational tool. The AR application simulated the spin coater process, allowing users to control the program, switch scenes, and adjust settings. The real 3D model of the spin coater was overlaid with the augmented simulation, enabling users to observe changes in the simulation while physically interacting with the actual spin coater.

Introduction:
The Augmented Reality Spin Coater project sought to bridge the gap between theoretical learning and practical application in semiconductor processes. AR technology was utilized to create an interactive environment, allowing students to gain hands-on experience virtually. By integrating AI, Arduino, and a keypad interface, users could control the simulation. Unity and Vuforia facilitated image tracking, making the AR experience more immersive and engaging.

Project Development Overview:

During Week 1, extensive research was conducted to understand project requirements, focusing on AR development, semiconductor processes, and related literature.

Week 2 saw the selection of Unity and Vuforia as the primary tools for AR development. Suitable 3D models representing nanotechnology elements were integrated into the AR environment, and an LCD display was added for customizable spin coater parameters.

In Week 3, a demo was presented, featuring the spin coater and an informational symbol. Gaze interaction was explored, and a list of necessary items, including an Arduino, was compiled for input capture and output simulation.

Week 4 involved the implementation of keyboard functionalities for program control, allowing the simulation of photolithography processes. Plans were made to observe semiconductor processes at SCRO Lab for accuracy.

AI integration was achieved during Week 5 through scripting. Feedback from SCRO Lab was incorporated into the script, and additional scenes were added to replicate photolithography processes. Research on embedding educational videos into the scene commenced.

Regular meetings with mentors continued in Week 6, and particle effects were implemented to enhance user actions. Certain elements were scaled to improve the experience.

In Week 7, the AI aspect was prioritized and revised the script to enhance material understanding. Feedback from SCRO Lab further refined the script.

During Week 8, the application was deployed to an Android device for testing and development. The team decided on Android development considering available resources.

Week 9 focused on merging all elements for the final demo. The Arduino and keypad interface allowed users to control the program. The augmented reality application successfully overlaid the spin coater's 3D model, offering a mixed reality experience.

Conclusion:
The project demonstrated a great sense of collaboration, resulting in a valuable resource for students interested in semiconductor technologies and processes. The final demo showcased a successful integration of augmented and real elements, paving the way for future advancements in this technology.