

AutoCam

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18-500 Capstone Design, Spring 2026
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AutoCam Website

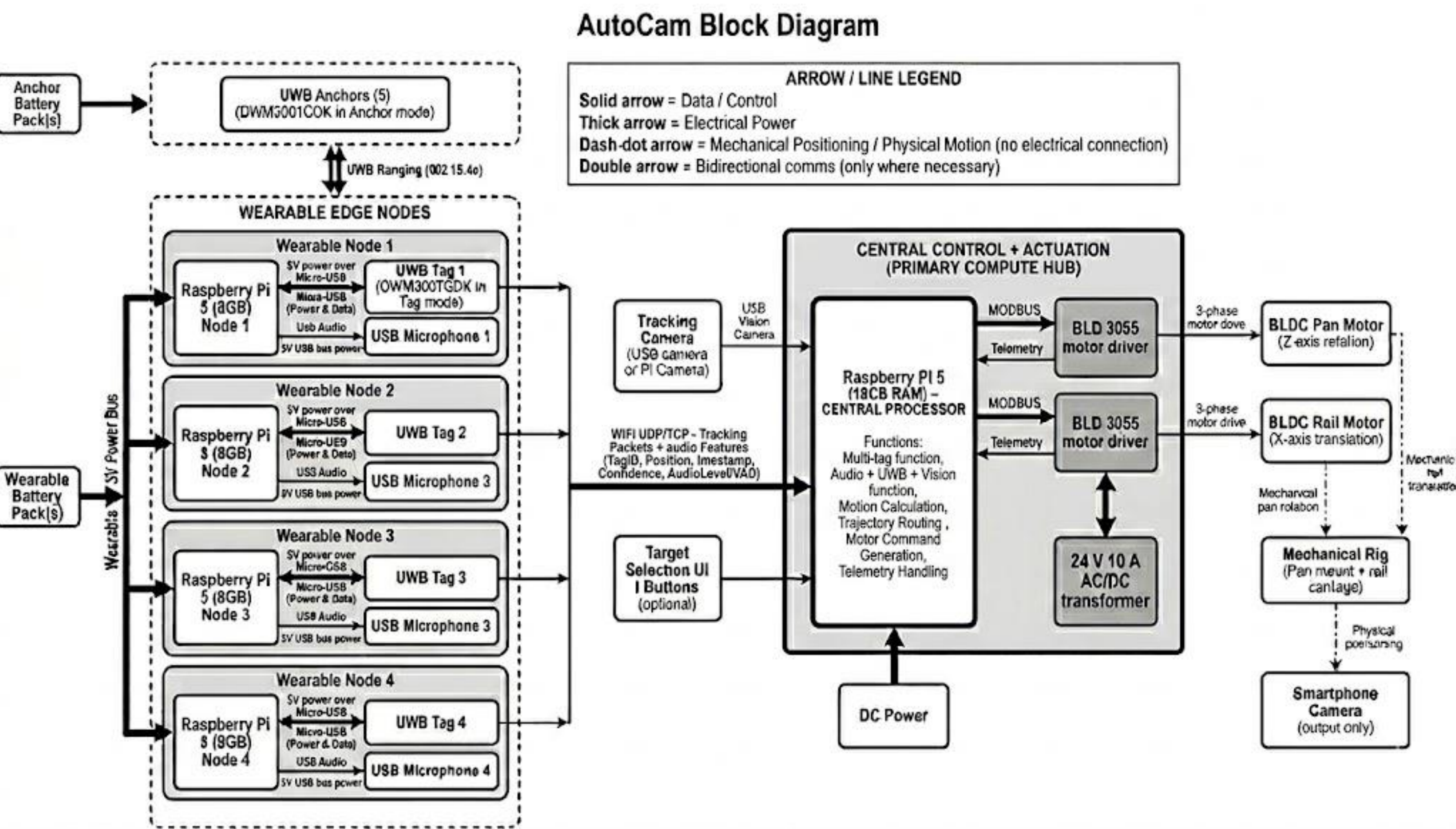
Product Pitch

Low-budget theater and opera productions struggle with recording performances due to human error, jittery movement, and incorrect choreography. AutoCam solves this issue, automating the cinematographic process and providing greater creative control to the director with its smartphone-agnostic nature and easy setup process.

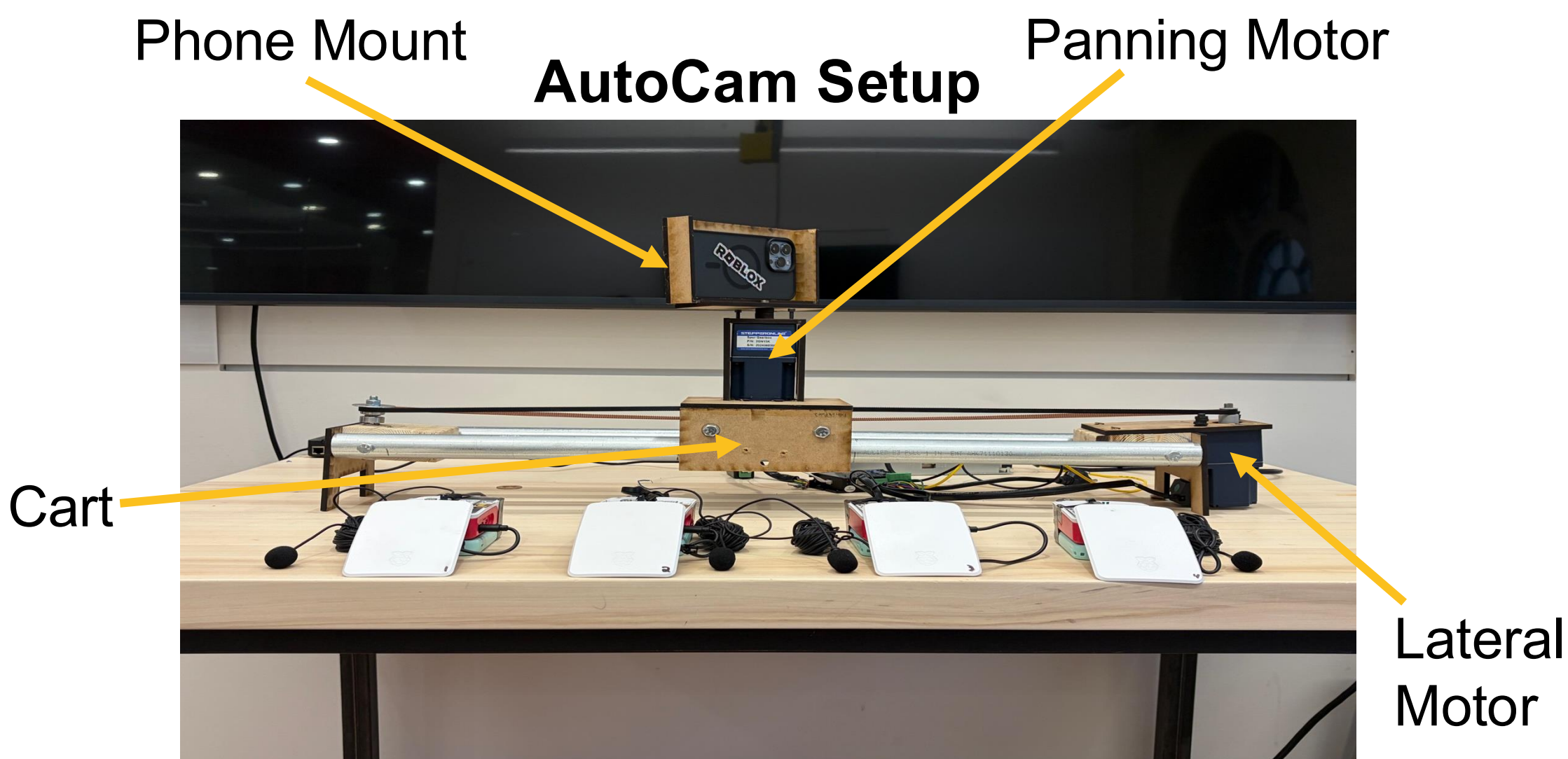
Our most critical requirements were that the system should be able to perform reliably for at least 4 hours, the wearable node must be under a pound for comfort and safety, the system sound output should be at most 40 dB at 5 meters, and the entire system should be easy to set up.

Our product was comfortably able to record under full system load **for over 4 hours**, the wearable node was **0.639 pounds**, less than the 1-pound requirement, and the system sound output was **60 dB**, which was more than we expected but still acceptable because of the environmental sound factor.

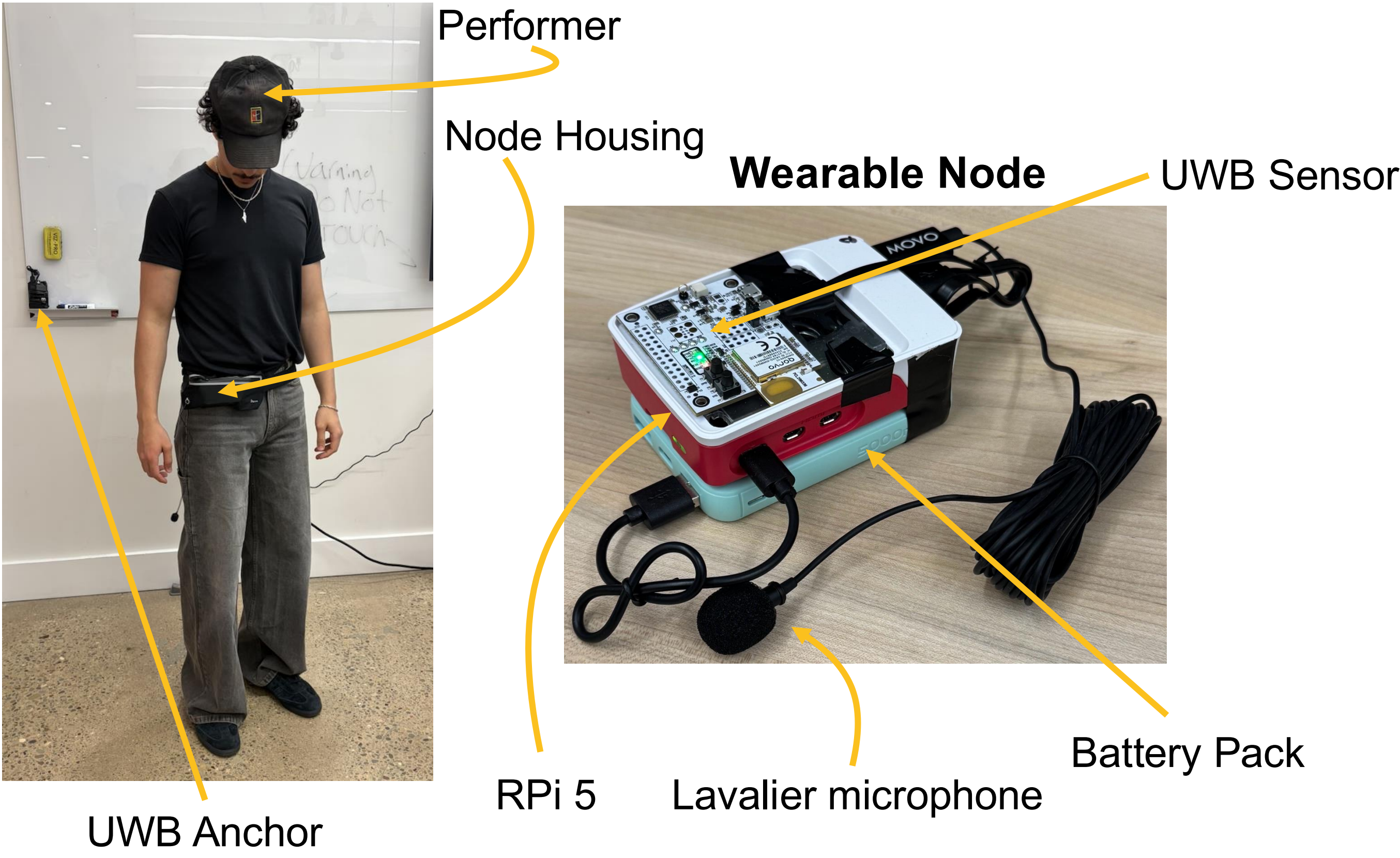
System Architecture



System Description



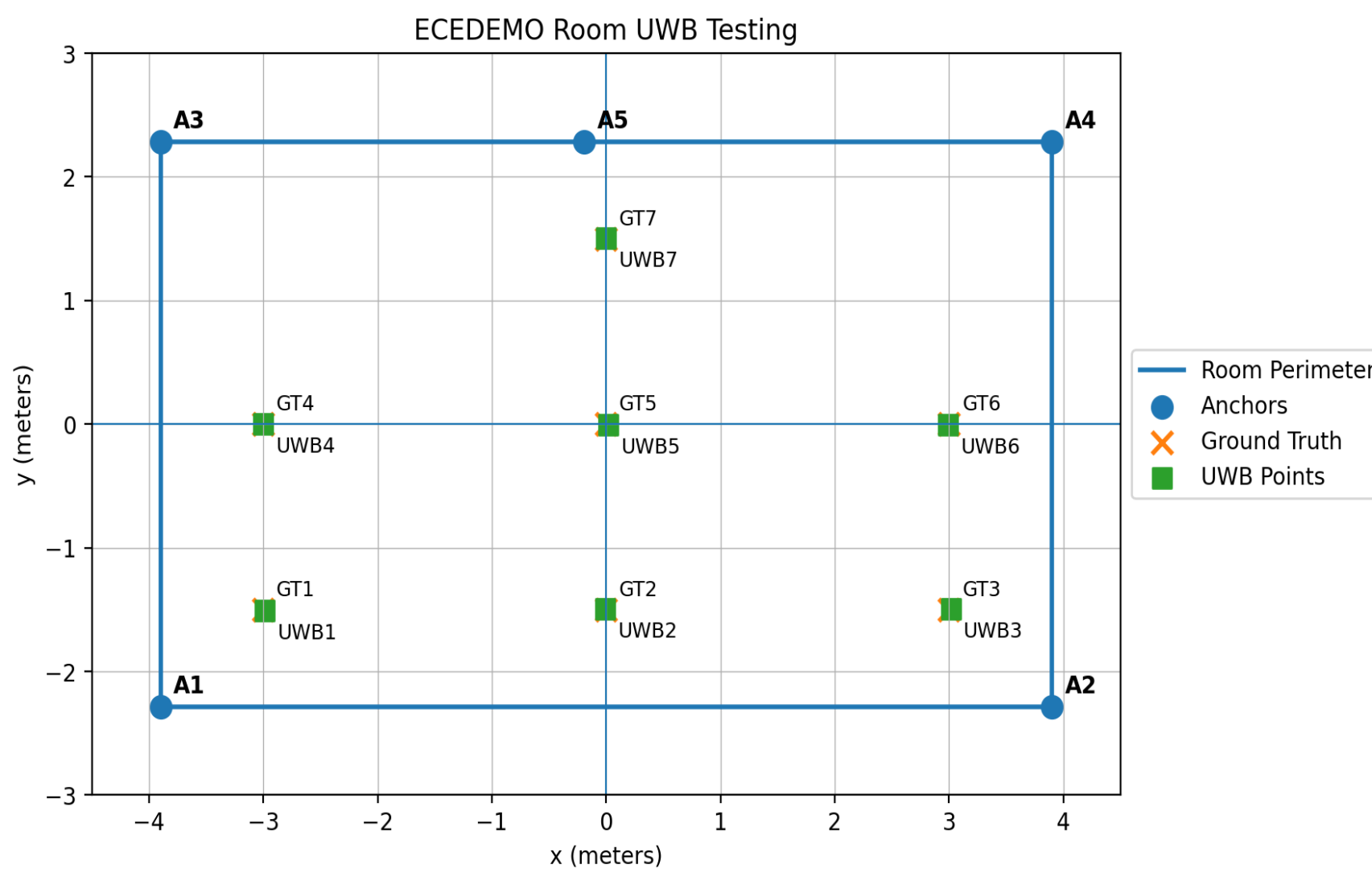
Performer Setup



System Evaluation

To test AutoCam, once we had subsystems that were completed and testable, we ran relevant tests for them based on benchmarks we created. Certain design trade-offs were also made during our design/testing process, such as the decision to switch motor controllers, usage of 3D-printed parts over machined parts, and usage of Accomplice software for operatic performances.

ECEDEMO ROOM UWB TESTING



Conclusions & Additional Information

One key lesson we learned as a team was that it's better to be safe than sorry and order extra parts early on; the motor controller we borrowed from ECE broke, and the replacement we ordered was faulty, so we had to scramble for a new replacement. Also, rather than waste time worrying about unimportant design details, it's good to start building and adjust as needed, since the real world never exactly correlates to equations. Lastly, it's important to have fun while working on a project and not be demotivated by setbacks.

In the future, teams can work on integrating Accomplice better with the system so that it's easy to switch between a theater setup and an opera setup. Also, improvements could be made to the ASR system so that other languages and versions of English (primarily Shakespearean English) could be better recognized. Another cool addition would be to use a more advanced camera that can zoom in and out automatically and employ computer vision for more accurate following and tracking. Finally, they should add a panel in the back of the phone mount that allows users to start recording while the phone is already mounted.

We hoped to have this completely ready for directors to use, however, some of the setbacks slowed us down. One aspiration we had was to have AutoCam be used live in a stage setting, but with limited time and limited access to theater plays and stages this goal was unfortunately not met. Lastly, with awareness that UWB sensors have limited accuracy, Computer Vision (CV) was meant to be used to stabilize our image and fine tune any image errors. However, due to the accuracy we were able to achieve with the nodes using various filtering techniques like Gaussian Multilateration, CV seemed to unnecessarily push the RPi5. On the other hand, CV would still provide a ground truth visual when the BLDC motor goes off course.