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Geopositioning in the Active-Learning Classroom: Automating a technique to Improve Teacher Orchestration (Salitse MiniGrant)

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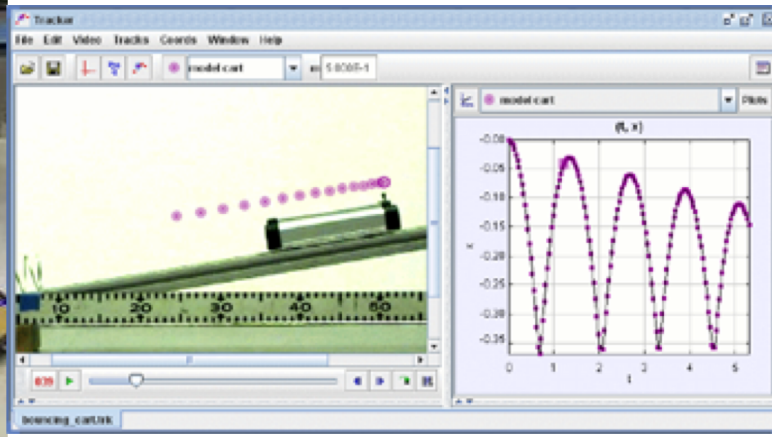
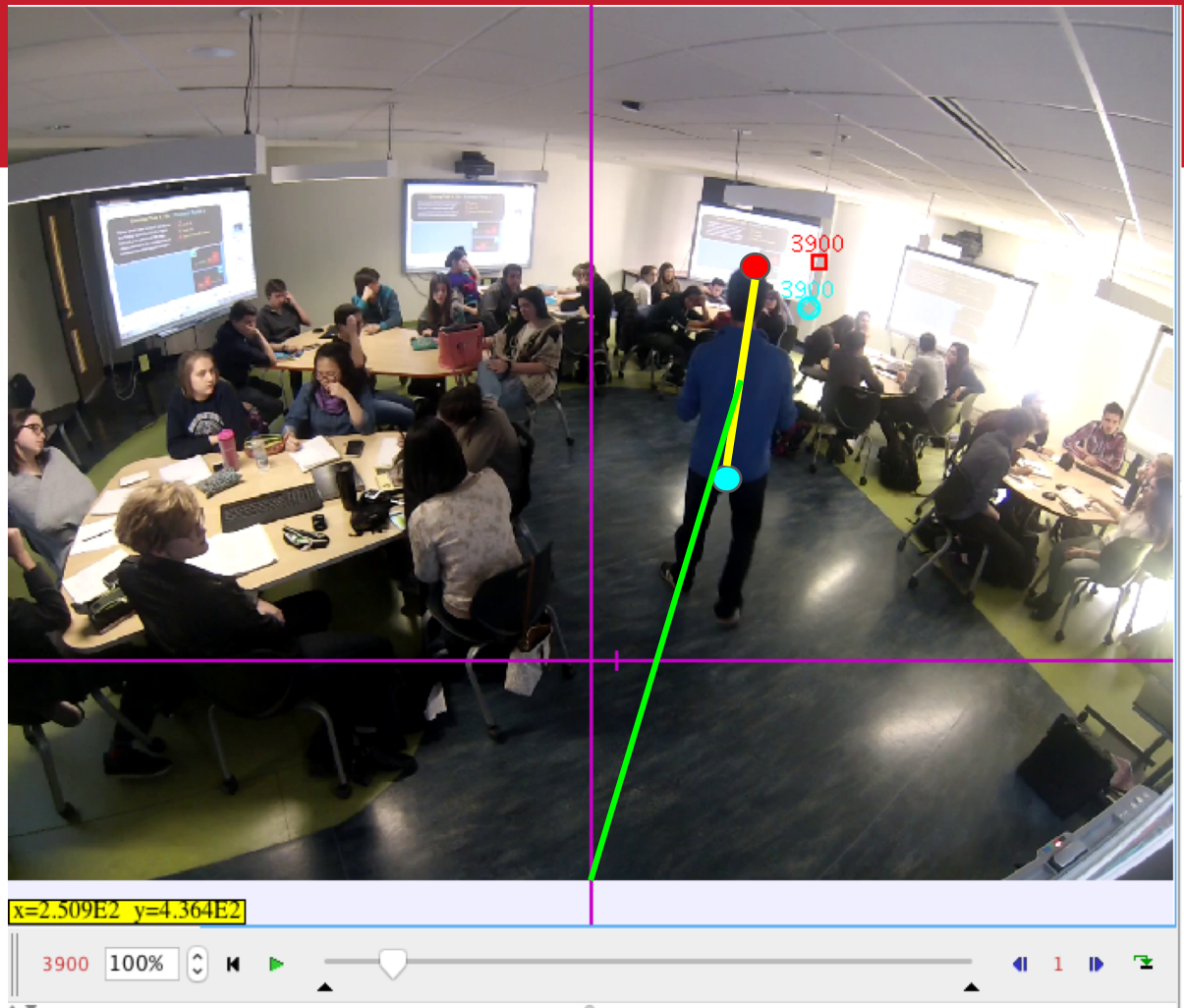
@ SALTISE (session 3F.38 10h15) - June 3, 2019

Physics Tracker

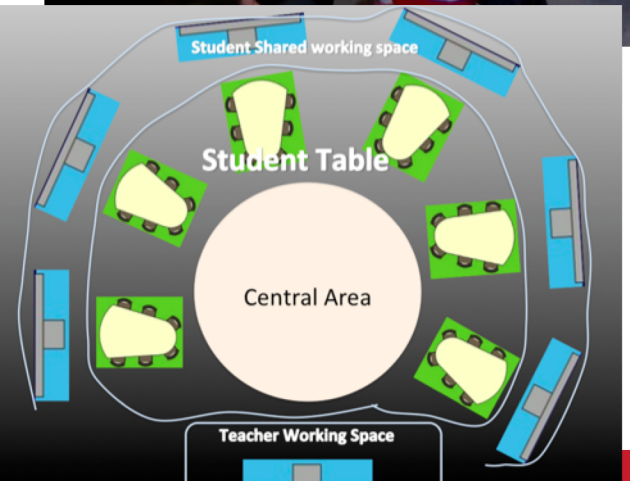
https://physlets.org/tracker/
Manual and automated object tracking on video

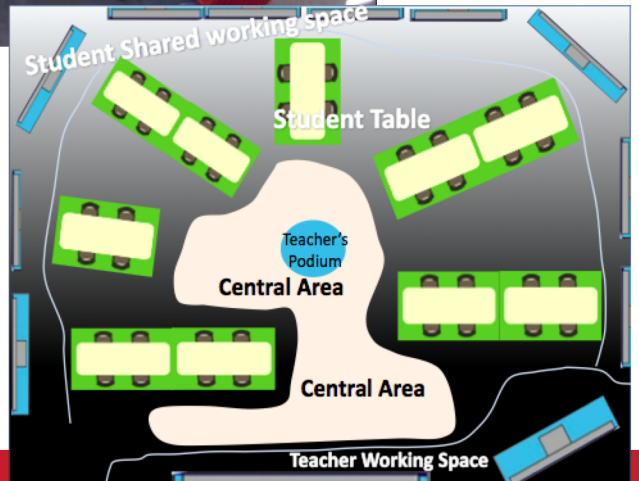


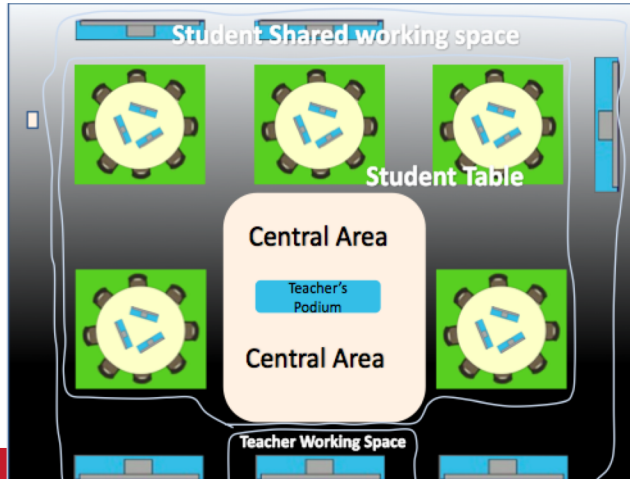


Using Tracker to track teacher position in the classroom

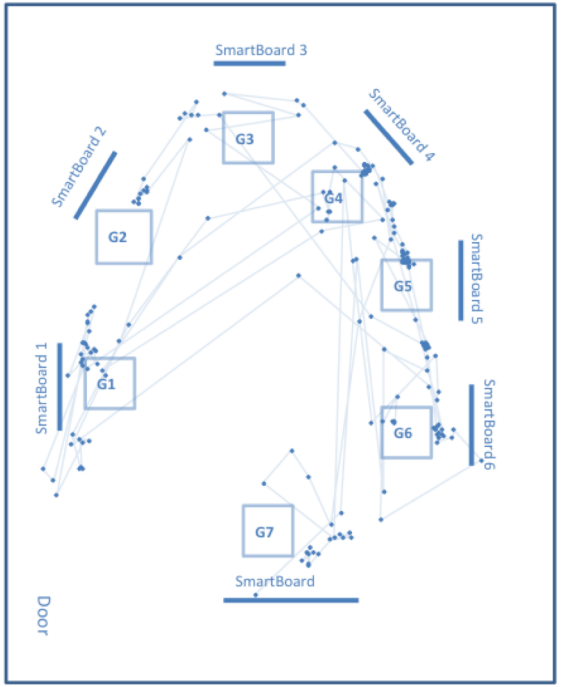
How do teachers [and students] manage their space resources in active learning classrooms?

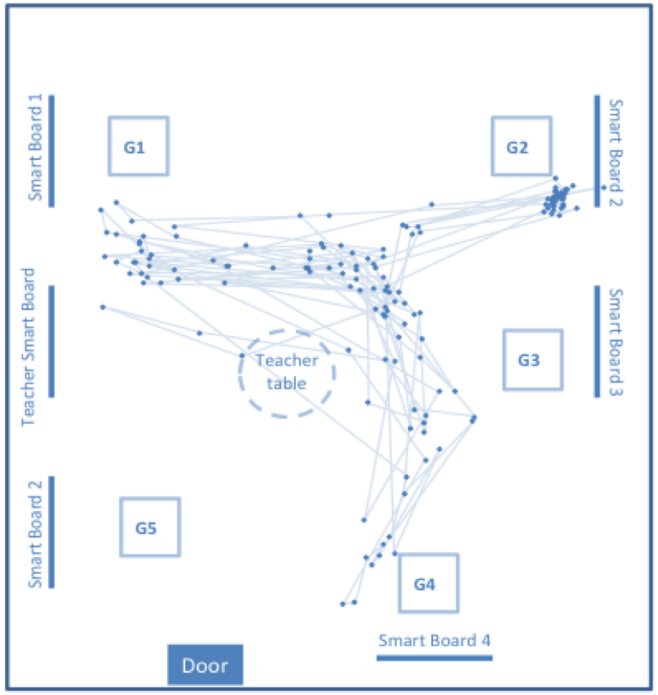






Results from Two Classrooms: Each dot represents 5 sec





Tracking analysis of the teacher's physical location within classroom V and classroom D.

Limitations of Video Tracking

- Difficult to automate, labour intensive manual data collection the norm.
- Not that accurate [~1m]
- Issues of teacher moving off-camera, bending over etc. add to data problems.

Looking for a better way of tracking objects in the classroom.

Indoor Tracking Technologies

GPS [does not work reliably indoors, and has low resolution, although this is improving],

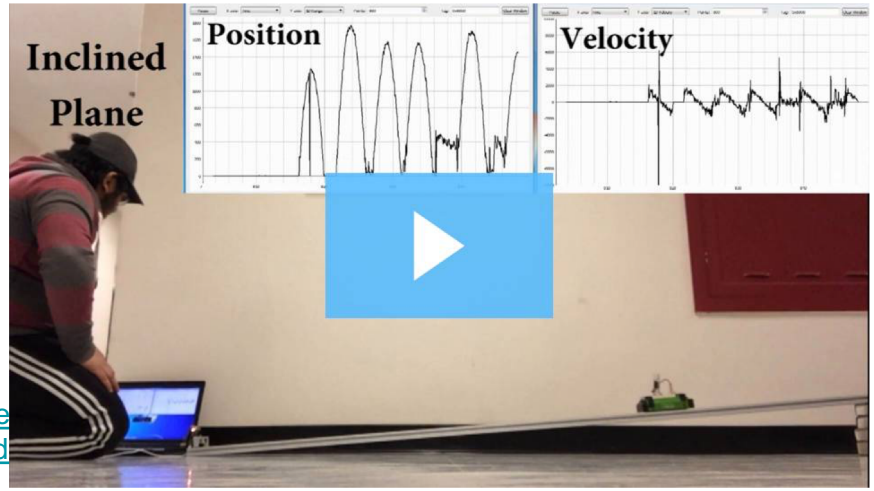
Wifi [maps to the relative strength of local wifi signals]

Blutooth beacons [very sensitive to signal obstruction

The UWB technology [Ultra Wide Band 500mHz] was chosen as the best for this application. This technology basically runs like a mini GPS, with tags measuring time-of-flight of signals to a series of anchors place around the room.

Pozyx: a recommended UWB 3D Developper's Kit

University of Portland



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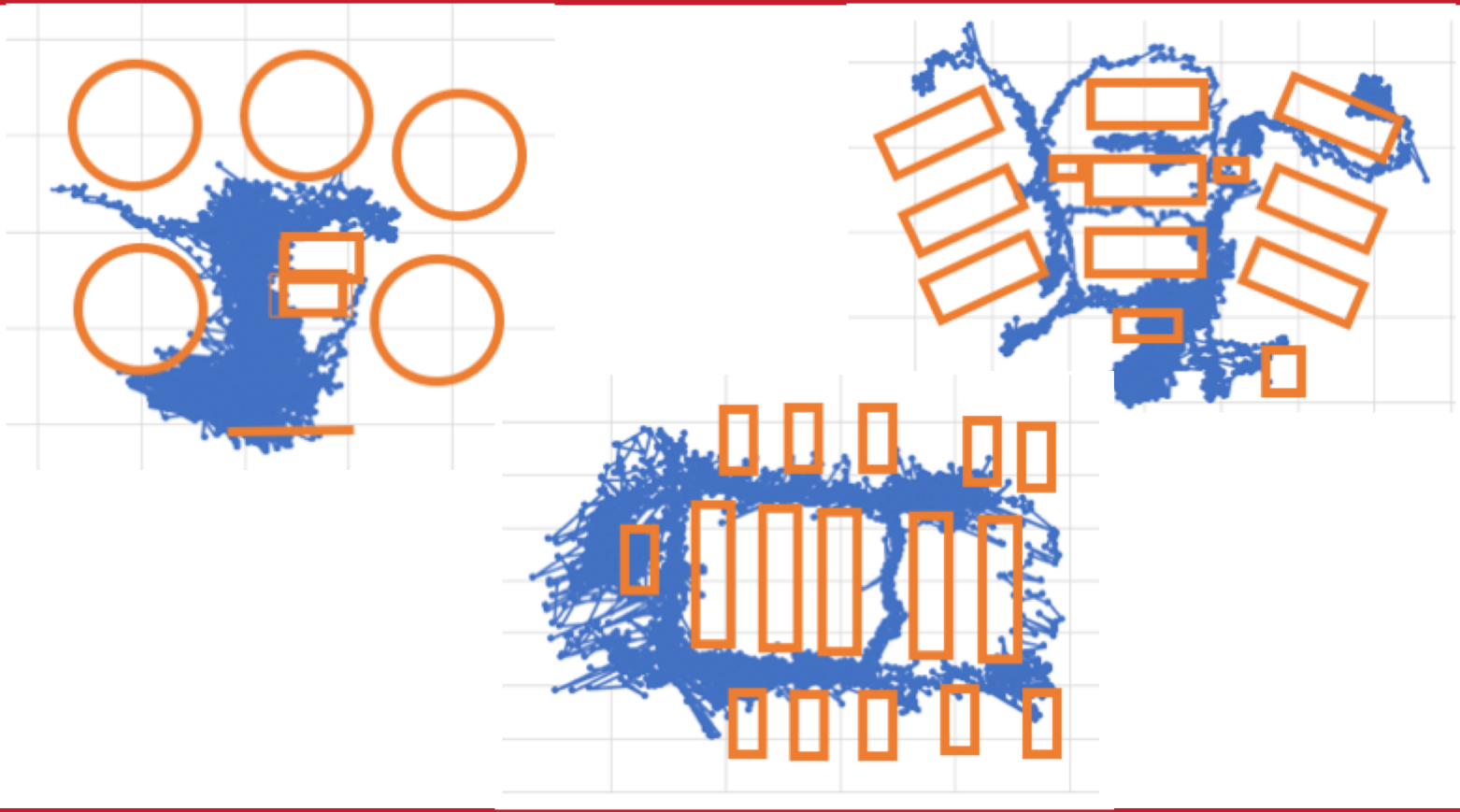
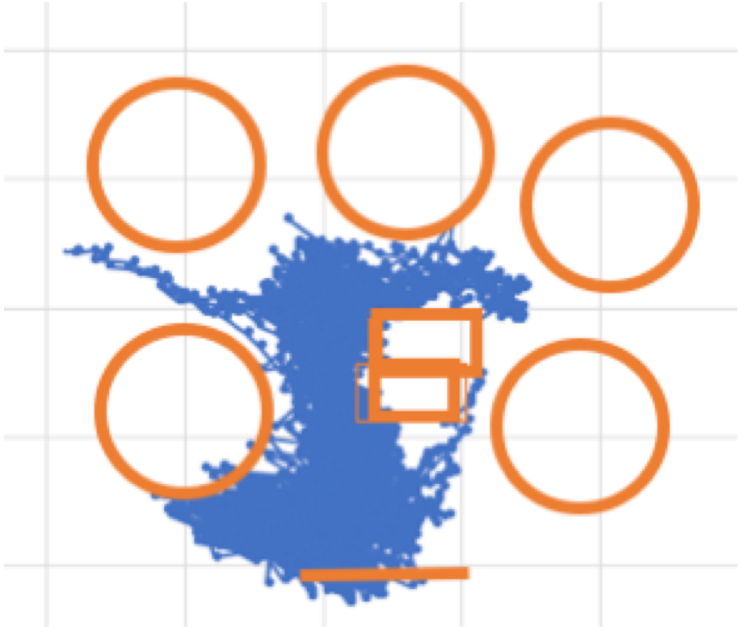
https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?art
4&context=studentsymposium

Teacher Tracking in 3 Classrooms

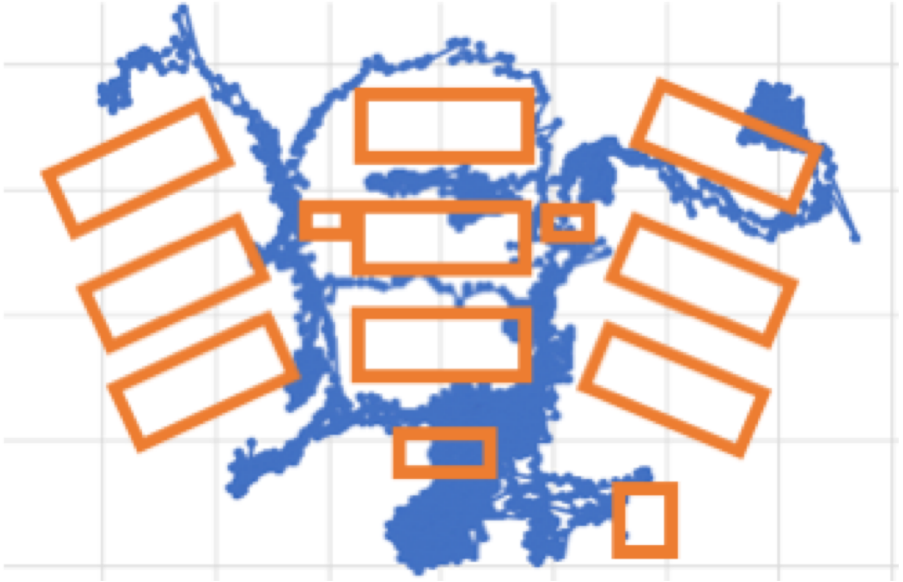


Teacher Tracking N515



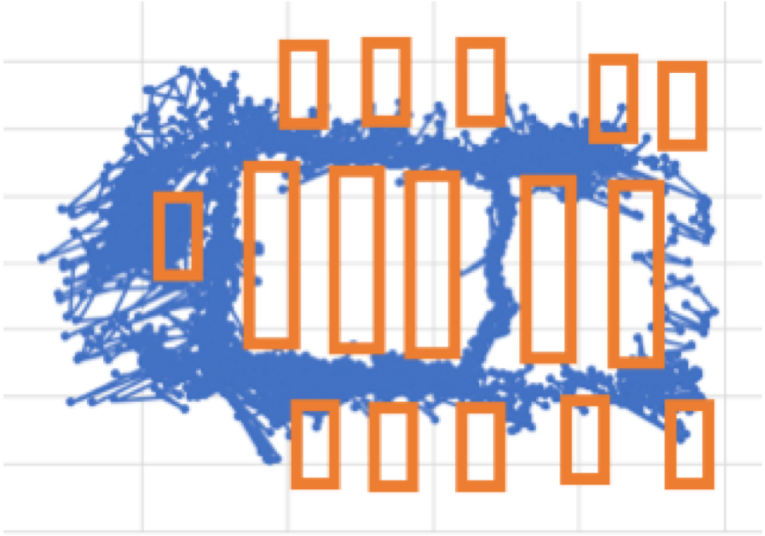
N515

Teacher Tracking in B429



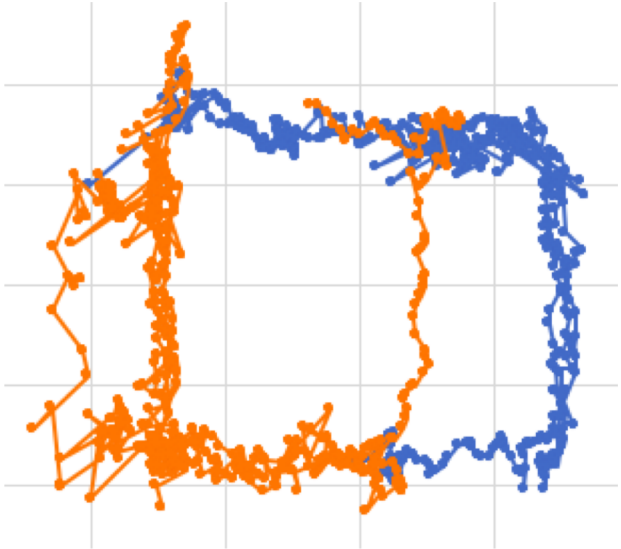
B429

Teacher Tracking in D221

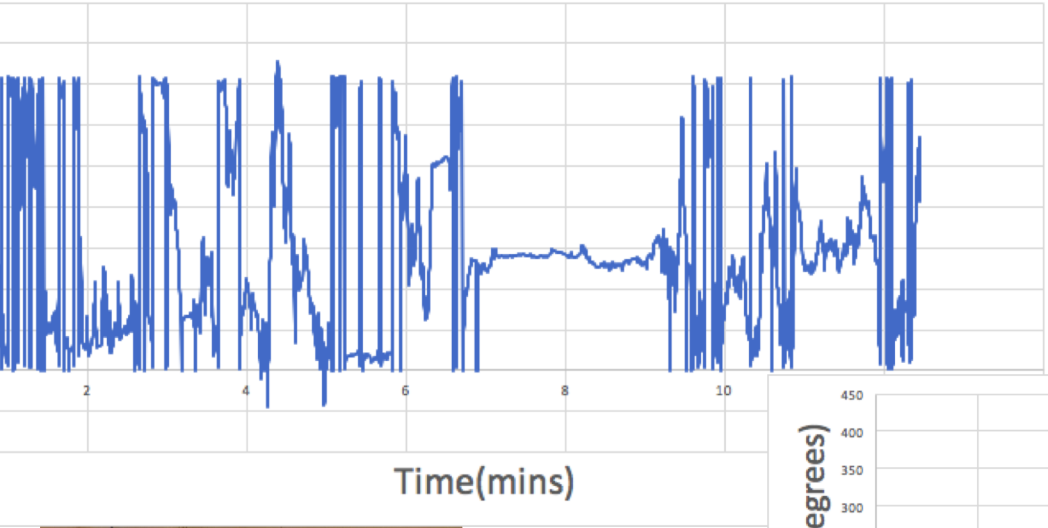


D221

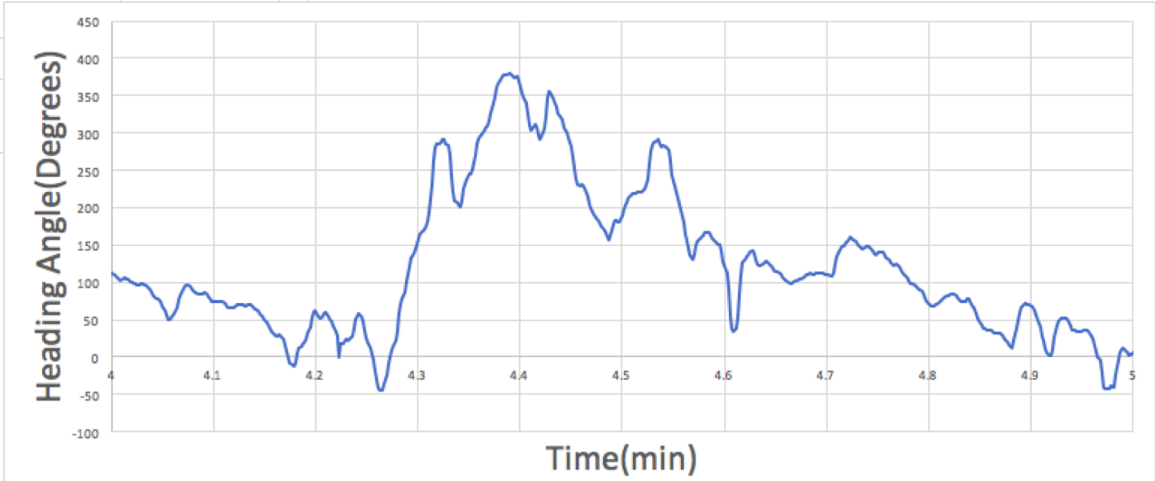
Multiple Tracking: Teacher/Tutor Simulation in D221



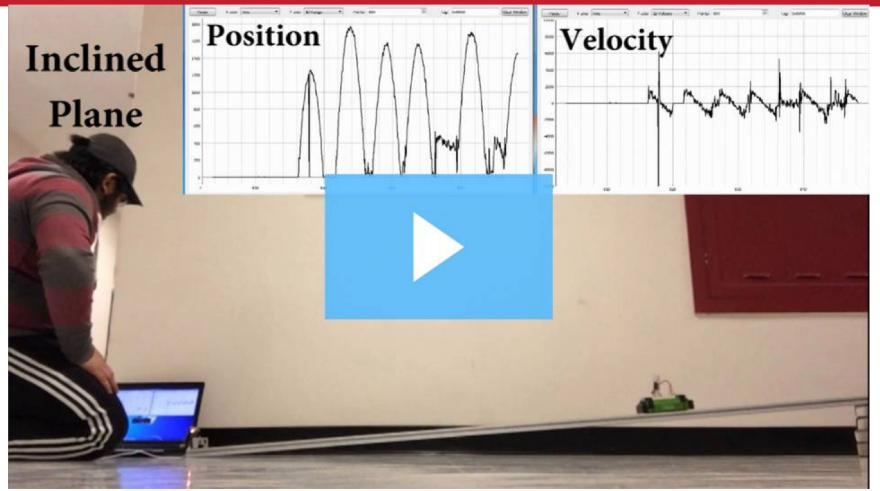
Tracking Head Orientation: Where does the teacher look?



Assumption:
Head Orientation=
proxy for Gaze



Student Problem Based Learning Opportunity



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Where Next:

- Moving onto beta testing: more classrooms, same teacher/same activity in different classrooms.
- Lots of data: almost too much, requires a big data approach.
- Applications for student activities need to be further investigated and developed.