

## Brainstorming Session (SCAMPER in red)

1. Doing a mobile app to keep track of history of routes you've climbed
2. **Multiply: creating a database of history of routes with the community of rock climbers.**
3. Building a mobile app to get notified of new routes when available at gyms and preview their descriptions
4. **Combine: Have a mobile app that has a database of current/past routes & their descriptions and tutorials, future routes notifications, and allows the user to add routes to a list.**
5. Doing a smartwatch app for new route notifications on the go
6. Building a smartwatch app for convenient personal tracking history after a climb
7. **Combine smartwatch app with bluetooth sensors so you can indicate your start of a climbing route on the watch, and end by touching the top rock sensor**
8. Doing a web application for notification of route changes
9. Doing a web application for route history at a gym
10. **Combine: Have a web application that has a history of routes built at the gym, and notify new members of upcoming routes for preparation via email/text subscription**
11. Have a physical screen in the gym at the front that details new route changes
12. **Modify: Allow users to interact with the screen to plot their routes given the new routes.**
13. Have an AR system that can detect and track route information to log it down
14. Have bluetooth sensors that can track the time when you reach the top rock and send it back to your mobile phone
15. **Combine: Link the bluetooth sensors with a physical screen in the gym to track what routes you've climbed**
16. **Combine: Download routes you've climbed from a physical screen to a personal mobile application.**
17. Have a mobile app that uses previous climbing history to recommend new climbing routes.
18. **Put in other use: Using the previous climbing history from the community of rock climbers to make better changes on the courses.**
19. Using the gym speakers to announce new route changes when a visitor walks in
20. **Put in other use: Using the gym speakers to announce the available routes.**
21. Having a system that notifies you if you've beat your personal best on a certain route
22. **Modify: have a platform so that you can see if you've beat your friend's personal best on a certain route or the entire gym's best record.**
23. **Combine: Use a wearable visual interface that displays your time while you climb and gives visual indicators for if you beat your record or if too much time has elapsed.**
24. Doing a web application to have video tutorials of beginner routes
25. **Put to another use: Doing a web-application to have video tutorials of more skilled/harder routes for proper form**
26. Building a VR application that shows you how to climb certain difficult routes
27. **Put in other use: Building a VR application that lets you test climb beginning routes in a virtual environment.**
28. Building mobile application to have video tutorials on demand per route
29. Doing a mobile application for showing how you climb with proper form and grips
30. **Combine: Pair the mobile application with bluetooth sensors that strap onto the body and will assess if your form is proper.**
31. Doing a web application with PDFs guides on how to properly climb
32. Have a ubiquitous wearable that tracks user gestures while climbing rocks

33. Combine: With machine learning algorithm, identify if there is something going wrong during rock climbing and give proper warning.
34. Combine: Using the existing data from the database to give the users recommendation on how to properly climb similar routes.
35. Have a real time LED board tracking of your hand gestures when you touch rocks
36. Substitute: Have a heat/pressure sensor hold that registers your grip.
37. Combine: Have a feedback system that logs your grips and provides feedback on if your grip was good or needs work.
38. Have an audio wearable similar to an audio book of a coach guiding you on predefined routes
39. Adapt: Have an audio wearable that instructs you how to climb a route that only triggers when your hands or feet touch a specific rock
40. Substitute: Have a Smartwatch app that shows a visual of what holds are next on the route.
41. Have video tutorials for each respective levels (V0-V10) available online
42. Combine: Have a physical touch screen on each wall section that shows people how to climb every route in that section with video tutorials done by professional climbers. Could also preview upcoming routes too
43. Having a stationary camera in the gym that records your climbing route and then you can compare it later
44. Put in other use: use the camera to track professor rock climbers's gesture and upload it to a database for comparison.
45. Modify: use machine learning to compare your climbing with the professional's to evaluate technique.
46. Implement audio cues that activate automatically depending on when you touch the appropriate rocks.
47. Have an audio wearable for a live coach to guide you through routes when they are too far away during a training session.
48. Use a wearable AR system that provides moment-to-moment tutorial as you proceed through the climb
49. Combine: Implement an AR system with personalized tracking feature that allows for user to compare a visual representation of climber's route and coach's route
50. Use machine learning to automatically generate the most efficient route depending on your physical stats and route statistics
51. Modify: Machine learning technique can generate all possible routes with a scoring system for each depending on your physical statistics
52. Substitute: Rather than using an automatic machine learning system for recommendation, another simpler system can be implemented, by which the system recommend routes based on previous records of those with similar attributes as the users.
53. Combine: Combine the machine learning algorithm with an AR system to generate scenarios of competition between users and their "optimized best".
54. Have bluetooth sensors that sense which rock you touched and can audio alert when you touch a wrong rock
55. Put in other use: Have bluetooth sensors that sense which rock you touched and can audio alert when you touch a correct rock
56. Combine: Have bluetooth pressure sensors on each rock that can detect the grip you are doing and send it to a physical screen to see afterwards
57. Have visual height indicators of when to bend your knees/barrel roll depending on wall height
58. Having a warning system where rocks can detect how much chalk you have on your hands to warn you to re-chalk
59. Have an wearable AR system that teaches you how to properly chalk your hands.
60. Have a system in the gyms that automatically chalks your hand properly when you place your hands underneath
61. Implement a tactile feedback system that notify climber if their next point of interest (rock) is optimized or not
62. Combine: Combine this tactile feedback system with route recommendation to indicate if you are following the route correctly or not
63. Implement automatic LED tracking and recording depending on which rock you touch when climbing a specific route
64. Combine: Combine the LED tracking with a system that tracks routes you have climbed on the board and builds a climbing history.
65. Use machine learning to implement automatic mapping of your climb video recording to the gym's route maps
66. LED rock board that lets you personalize routes and training sessions based on saved personal profiles on a mobile application
67. Substitute: A smartwatch application that is connected to the LED rock board for personalization of the routes.

68. Have an interactive web application to set personalized routes to a personal profile prior to the gym
69. Combine: Add a system that rates the difficulty of the route and recommends similar routes nearby.
70. Have an AR system that can scan the LED board and show you the route path on Google Glass
71. Have a VR system that can show you the route path simulation on a blank rock wall.
72. Modify: Have a VR system to create the course of rock climbing on your own.
73. Have an on-touch system where every rock you climb will add it to a personalized path
74. Combine: Add this with a system that saves which routes you took so that you can redo the route with altered decisions for more personalized paths.
75. Have a score-based system so that touching rocks of higher difficulties results in more points added to an overall score.
76. Put in to other use: Have a score-based system where you receive points based on how many routes you have completed in a week
77. Combine: Implement the scoring system through an AR system, allowing system to see the rocks and their respective scores in real-time
78. Smartwatch apps that show the LED board map on your wrist while you climb.
79. Put in other use: Smartwatch apps that allow you to edit the LED board map
80. Create a simon-says climbing exercise where you have a partner climb with you according to LED colors
81. Put to other use: Create a speed climbing exercise on an LED board where you have to match the color marquee as it goes higher
82. If you climb on a LED board where you touch a rock not in your path, it lights up a red color to notify you climbed wrong rock
83. Adapt: Using AR and google glasses, you will get a notification about whether or not you have climbed the right rock
84. Use AR to create super imposed obstacles on the courses like Super Mario.
85. Put in other use: Use AR to create power-up items for getting more points on harder to reach rocks.
86. Gamify climbing process by having personal time limits on each LED rock hold set by blinking color timers
87. Have rotating rocks on a board that you have to time yourself to climb it like an obstacle course
88. Put in other use: Have a score based system for rewarding based on climbing the wall in a specific period of time, using the rotating rocks
89. Modify: Create rocks with weird shapes for challenging courses.
90. Implement a numbering system for individual rocks within a route in order to encourage route tracking
91. Have a community leaderboard of the top public created routes on the LED board
92. Put to other use: Have a community leaderboard of the fastest/most climbed routes on the LED board
93. Have a physical screen in gym that can show the current LED personalized routes
94. Put to other use: Have a physical touch screen at the gym that allows you to change an LED board route for on demand route customization
95. Instead of LED, implement special gloves with tracking capability when interact with individual rock
96. Combine: Implement a tactile feedback system with these gloves in order to help climbers navigate towards their recommended routes
97. Put to other uses: A grip system can also be implemented for these gloves in order to substitute for the chalk system
98. Combine: These gloves can be combined with an audio feedback system in order to assisting climbers in navigating through the correct route
99. Having a conveyor belt wall system that changes itself to generate new routes every week
100. Adapt: have a conveyor belt wall system on a flat board that allows user to change through physical screen controls



Augmented/Virtual Reality Systems	Physical Touch Screen Integration in Gyms	Web Applications for Tracking/Learning
<ul style="list-style-type: none"> <li>● Building a VR application that shows you how to climb certain difficult routes</li> <li>● <del>Put in other use: Building a VR application that lets you test climb beginning routes in a virtual environment.</del></li> <li>● Have an wearable AR system that teaches you how to properly chalk your hands.</li> <li>● Have an AR system that can detect and track route information to log it down</li> <li>● Have a VR system that can show you the route path simulation on a blank rock wall.</li> <li>● <del>Modify: Have a VR system to create the course of rock climbing on your own.</del></li> <li>● Use a wearable AR system that provides moment-to-moment tutorial as you proceed through the climb</li> <li>● <del>Combine: Implement an AR system with personalized tracking feature that allows for user to compare a visual representation of climber's route and coach's route</del></li> <li>● <del>Combine: Implement the scoring system through an AR system, allowing system to see the rocks and their respective scores in real-time</del></li> <li>● <del>Adapt: Using AR and google glasses, you will get a notification about whether or not you have climbed the right rock</del></li> <li>● <del>Use AR to create super imposed obstacles on the courses like Super Mario.</del></li> <li>● <del>Put in other use: Use AR to create power-up items for getting more points on harder to reach rocks.</del></li> <li>● Have an AR system that can scan the LED board and show you the route path on Google Glass</li> </ul>	<ul style="list-style-type: none"> <li>● Have a physical screen in the gym at the front that details new route changes</li> <li>● <del>Modify: Allow users to interact with the screen to plot their routes given the new routes.</del></li> <li>● <del>Combine: Have a physical touch screen on each wall section that shows people how to climb every route in that section with video tutorials done by professional climbers. Could also preview upcoming routes too</del></li> <li>● Have an on touch system where every rock you climb will add it to a personalized path</li> <li>● <del>Combine: Add this with a system that saves which routes you took so that you can redo the route with altered decisions for more personalized paths.</del></li> <li>● <del>Put to other use: Have a physical touch screen at the gym that allows you to change an LED board route for on-demand route customization</del></li> <li>● <del>Adapt: have a conveyor belt wall system on a flat board that allows user to change through physical screen controls</del></li> </ul>	<ul style="list-style-type: none"> <li>● <del>Doing a web application with PDFs guides on how to properly climb</del></li> <li>● <del>Doing a web application for notification of route changes</del></li> <li>● <del>Doing a web application for route history at a gym</del></li> <li>● <del>Combine: Have a web application that has a history of routes built at the gym, and notify new members of upcoming routes for preparation via email/text subscription</del></li> <li>● <del>Have video tutorials for each respective levels (V0-V10) available online</del></li> <li>● <del>Have an interactive web application to set personalized routes to a personal profile prior to the gym</del></li> <li>● <del>Combine: Add a system that rates the difficulty of the route and recommends similar routes nearby.</del></li> <li>● <del>Doing a web application to have video tutorials of beginner routes</del></li> <li>● <del>Put to another use: Doing a web application to have video tutorials of more skilled/harder routes for proper form</del></li> </ul>

LED/Smart Rock Boards in the Environment	Machine Learning/Camera Tracking of Routes	Other Technology Enhancements on Body/Wall
<ul style="list-style-type: none"> <li>• Have a real time LED board tracking of your hand gestures when you touch rocks</li> <li>• <del>Substitute: Have a heat/pressure sensor hold that registers your grip.</del></li> <li>• <del>Combine: Have a feedback system that logs your grips and provides feedback on if your grip was good or needs work.</del></li> <li>• Implement automatic LED tracking and recording depending on which rock you touch when climbing a specific route</li> <li>• <del>Combine: Combine the LED tracking with a system that tracks routes you have climbed on the board and builds a climbing history.</del></li> <li>• <del>Substitute: A smartwatch application that is connected to the LED rock board for personalization of the routes.</del></li> <li>• Implement audio cues that activate automatically depending on when you touch the appropriate rocks.</li> <li>• Having a warning system where rocks can detect how much chalk you have on your hands to warn you to re-chalk</li> <li>• <del>Create a simon-says climbing exercise where you have a partner climb with you according to LED colors</del></li> <li>• Implement a tactile feedback system that notify climber if their next point of interest (rock) is optimized or not</li> <li>• <del>Combine: Combine this tactile feedback system with route recommendation to indicate if you are following the route correctly or not</del></li> <li>• <del>Put to other use: Create a speed climbing exercise on an LED board where you have to match the color marquee as it goes higher</del></li> </ul>	<ul style="list-style-type: none"> <li>• <del>Modify: Machine learning technique can generate all possible routes with a scoring system for each depending on your physical statistics</del></li> <li>• <del>Combine: Combine the machine learning algorithm with an AR system to generate scenarios of competition between users and their "optimized best".</del></li> <li>• <del>Combine: With machine learning algorithm, identify if there is something going wrong during rock climbing and give proper warning.</del></li> <li>• <del>Combine: Using the existing data from the database to give the users recommendation on how to properly climb similar routes.</del></li> <li>• <del>Modify: use machine learning to compare your climbing with the professional's to evaluate technique.</del></li> <li>• Use machine learning to automatically generate the most efficient route depending on your physical stats and route statistics</li> <li>• <del>Substitute: Rather than using an automatic machine learning system for recommendation, another simpler system can be implemented, by which the system recommend routes based on previous records of those with similar attributes as the users.</del></li> <li>• Having a stationary camera in the gym that records your climbing route and then you can compare it later</li> <li>• <del>Put in other use: use the camera to track professor rock climbers's gesture and upload it to a database for comparison.</del></li> </ul>	<ul style="list-style-type: none"> <li>• Have a ubiquitous wearable that tracks user gestures while climbing rocks</li> <li>• Have visual height indicators of when to bend your knees/barrel roll depending on wall height</li> <li>• Have a system in the gyms that automatically chalks your hand properly when you place your hands underneath</li> <li>• Have a score-based system so that touching rocks of higher difficulties results in more points added to an overall score.</li> <li>• <del>Put in to other use: Have a score-based system where you receive points based on how many routes you have completed in a week</del></li> <li>• Using the gym speakers to announce new route changes when a visitor walks in</li> <li>• <del>Put in other use: Using the gym speakers to announce the available routes.</del></li> <li>• Having a system that notifies you if you've beat your personal best on a certain route</li> <li>• <del>Modify: have a platform so that you can see if you've beat your friend's personal best on a certain route or the entire gym's best record.</del></li> <li>• Implement a numbering system for individual rocks within a route in order to encourage route tracking</li> <li>• <del>Multiply: creating a database of history of routes with the community of rock climbers.</del></li> <li>• Instead of LED, implement special gloves with tracking capability when interact with individual rock</li> <li>• Combine: Implement a tactile feedback system with these gloves in order to help</li> </ul>

- If you climb on a LED board where you touch a rock not in your path, it lights up a red color to notify you climbed wrong rock
- Gamify climbing process by having personal time limits on each LED rock hold set by blinking color timers
- Have rotating rocks on a board that you have to time yourself to climb it like an obstacle course
- Put in other use: Have a score-based system for rewarding based on climbing the wall in a specific period of time, using the rotating rocks
- Modify: Create rocks with weird shapes for challenging courses
- Have a community leaderboard of the top public created routes on the LED board
- Put to other use: Have a community leaderboard of the fastest/most climbed routes on the LED board
- Have a physical screen in gym that can show the current LED personalized routes
- A mobile application that is connected to the LED rock board that lets you personalize routes based on saved personal profiles

- Use machine learning to implement automatic mapping of your climb video recording to the gym's route maps

climbers navigate towards their recommended routes

- Put to other uses: A grip system can also be implemented for these gloves in order to substitute for the chalk system
- Combine: These gloves can be combined with an audio feedback system in order to assisting climbers in navigating through the correct route
- Having a conveyor belt wall system that changes itself to generate new routes every week



## Mobile Technologies for Ubiquitous Tracking/Learning

- ~~Doing a mobile app to keep track of history of routes you've climbed~~
- ~~Building a mobile app to get notified of new routes when available at gyms and preview their descriptions~~
- ~~Building mobile application to have video tutorials on demand per route~~
- ~~Doing a mobile application for showing how you climb with proper form and grips~~
- ~~Combine: Pair the mobile application with bluetooth sensors that strap onto the body and will assess if your form is proper.~~
- **Combine: Have a mobile app that has a database of current/past routes & their descriptions and tutorials, future routes notifications, and allows the user to add routes to a list**
- ~~Combine: Download routes you've climbed from a physical screen to a personal mobile application.~~
- ~~Have a mobile app that uses previous climbing history to recommend new climbing routes.~~
- ~~Put in other use: Using the previous climbing history from the community of rock climbers to make better changes on the courses.~~

## Smartwatch/Bluetooth Sensor Connectivity

- ~~Have bluetooth sensors that sense which rock you touched and can audio alert when you touch a wrong rock~~
- ~~Put in other use: Have bluetooth sensors that sense which rock you touched and can audio alert when you touch a correct rock~~
- ~~Combine: Have bluetooth pressure sensors on each rock that can detect the grip you are doing and send it to a physical screen to see afterwards~~
- ~~Doing a smartwatch app for new route notifications on the go~~
- ~~Building a smartwatch app for convenient personal tracking history after a climb~~
- ~~Combine smartwatch app with bluetooth sensors so you can indicate your start of a climbing route on the watch, and end by touching the top rock sensor~~
- ~~Substitute: Have a Smartwatch app that shows a visual of what holds are next on the route.~~
- ~~Have bluetooth sensors that can track the time when you reach the top rock and send it back to your mobile phone~~
- ~~Combine: Link the bluetooth sensors with a physical screen in the gym to track what routes you've climbed~~
- ~~Have an audio wearable for a live coach to guide you through routes when they are too far away during a training session.~~
- ~~Have an audio wearable similar to an audio book of a coach guiding you on predefined routes~~
- ~~Adapt: Have an audio wearable that instructs you how to climb a route that only triggers when your hands or feet touch a specific rock~~
- **Combine: Use a wearable visual interface that displays your time while you climb and gives visual indicators for if you beat your record or if too much time has elapsed.**
- ~~Smartwatch apps that show the LED board map on your wrist while you climb.~~
- ~~Put in other use: Smartwatch apps that allow you to edit the LED board map~~



## Top 10 Ideas

- ~~Use a wearable AR system that provides moment-to-moment tutorial as you proceed through the climb~~
- Combine: Have a mobile app that has a database of current/past routes & their descriptions and tutorials, future routes notifications, and allows the user to add routes to a list
- ~~Combine: Have a web application that has a history of routes built at the gym, and notify new members of upcoming routes for preparation via email/text subscription~~
- ~~Implement audio cues that activate automatically depending on when you touch the appropriate rocks.~~
- Combine: Have a physical touch screen on each wall section that shows people how to climb every route in that section with video tutorials done by professional climbers. Could also preview upcoming routes too
- ~~Use machine learning to implement automatic mapping of your climb video recording to the gym's route maps~~
- ~~Have a score based system so that touching rocks of higher difficulties results in more points added to an overall score.~~
- ~~Combine: Implement a tactile feedback system with these gloves in order to help~~
- LED rock board that lets you personalize routes and training sessions based on saved personal profiles on a mobile application
- ~~Combine: Use a wearable visual interface that displays your time while you climb and gives visual indicators for if you beat your record or if too much time has elapsed.~~

