# Meeting
# 07/09/2020

Shuo Zhang

# In past week

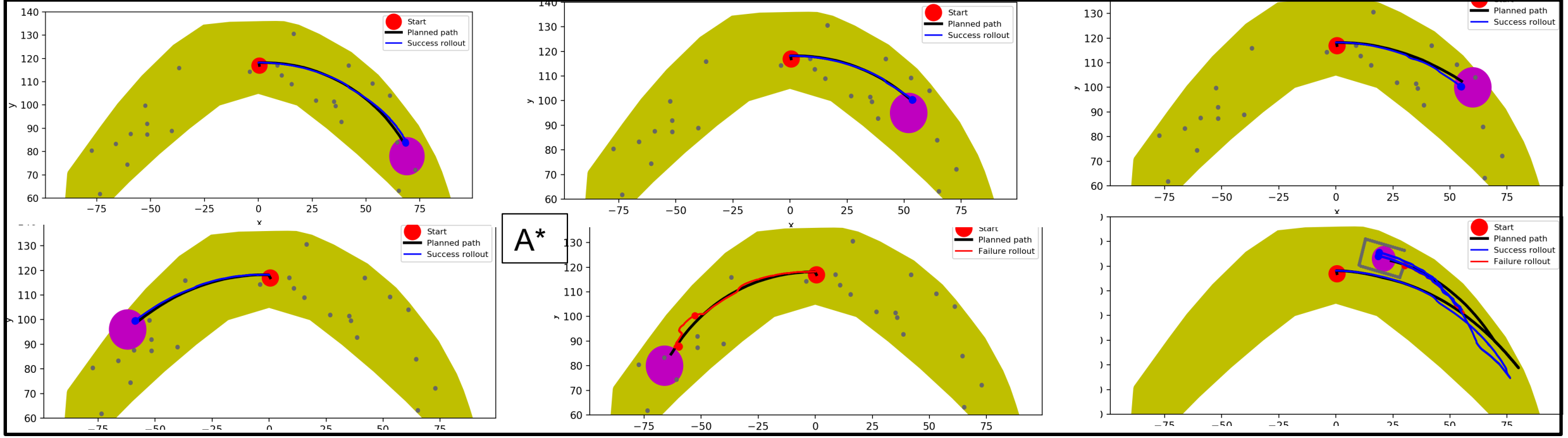
1) PPO for real hand: Done
2) Clean and wrapped codes so far + managed experiment's logistic: Done
3) 10 rollouts for A* and PPO on reacher and acrobot: Done
4) 10 rollouts for gazebo: Done (on my own machine, 14 hours)
5) Got all statistics: Done
6) Write rollout ros package codes for real hand: Just to start

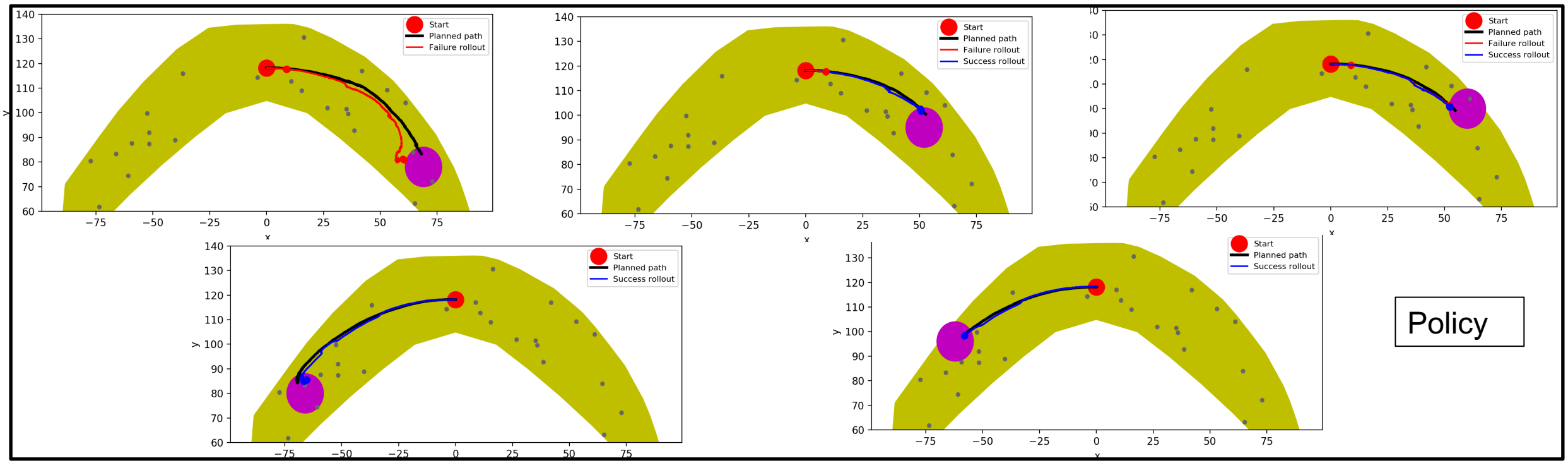
# Progress

| | A* Plan + Rollout + Statistic | PPO Plan + Rollout + Statistic | Online Method |
|---|---|---|---|
| Acrobot | Done | Done | **Need to discuss in more details** |
| Reacher | Done | Done | **Need to discuss in more details** |
| Gazebo Hand (normal obstacles + horseshoe ) | Done | Done | **Need to discuss in more details** |
| Real Had (no obstacles) | Plan is done. **(Wait for Mridul until the marker issues fixed)** | Plan is done. **(Wait for Mridul until the marker issues fixed)** | **Need to discuss in more details** |

# Gazebo Hand Statistics

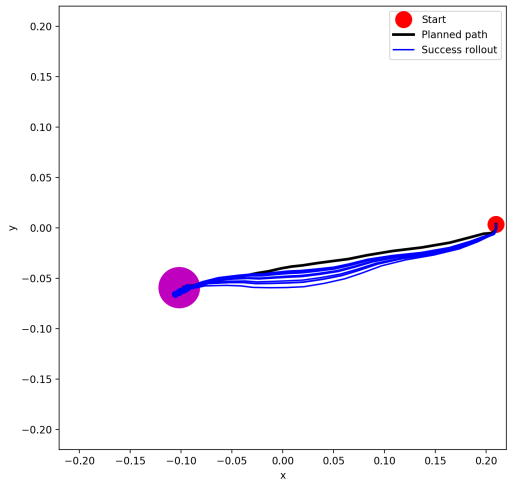
| goal location (method) | success rollout rate | goal reach rate | success rollout path RMSE relative to plan path [mm] | path length [mm] | | | number of path steps | | last distance to goal [mm] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | plan | success rollout | failure | plan | failure | plan | success rollout | failure |
| 0 (A*) | 0% | 0% | - | 75.88 | - | 75.35±5.94 | 390 | 375.8±31.3 | 5.50 | - | 11.43±4.29 |
| 0 (policy) | 100% | 100% | 1.80±0.02 | 150.18 | 98.68±0.76 | - | 947 | - | 5.49 | 5.13±0.22 | - |
| 2 (A*) | 100% | 100% | 1.26±0.06 | 63.10 | 62.79±0.11 | - | 295 | - | 5.38 | 4.89±0.10 | - |
| 2 (policy) | 100% | 100% | 1.08±0.06 | 77.14 | 62.90±0.04 | - | 385 | - | 5.49 | 4.70±0.11 | - |
| 7 (A*) | 100% | 100% | 0.79±0.03 | 59.08 | 58.73±0.11 | - | 197 | - | 5.49 | 5.20±0.09 | - |
| 7 (policy) | 60% | 50% | 1.45±0.05 | 110.43 | 59.82±0.38 | 9.06±0.06 | 695 | 109.25±0.43 | 5.36 | 7.84±0.12 | 54.14±0.05 |
| 8 (A*) | 100% | 100% | 0.94±0.01 | 58.04 | 57.68±0.07 | - | 289 | - | 5.50 | 5.63±0.06 | - |
| 8 (policy) | 40% | 40% | 1.39±0.04 | 109.89 | 59.82±0.19 | 8.90±0.12 | 752 | 94±0.57 | 5.47 | 7.22±0.37 | 48.74±0.09 |
| 15 (A*) | 100% | 100% | 1.01±0.01 | 80.85 | 80.71±0.14 | - | 436 | - | 5.46 | 6.08±0.16 | - |
| 15 (policy) | 20% | 0% | 3.66±0.04 | 191.42 | 104.59±0.06 | 8.96±0.11 | 1299 | 90±1.87 | 5.41 | 9.35±0.32 | 72.10±0.08 |
| horseshoe (A*) | 90% | 90% | 3.87±0.04 | 165.17 | 173.71±0.47 | 162.05±0 | 731 | 680±0 | 3.37 | 3.00±0.30 | 9.53±0 |
| horseshoe (policy) | - | - | - | - | - | - | - | - | - | - | - |

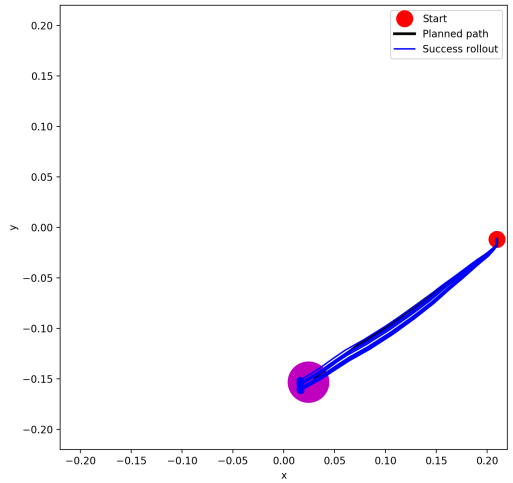

A*
Start
Planned path
Success rollout
Failure rollout

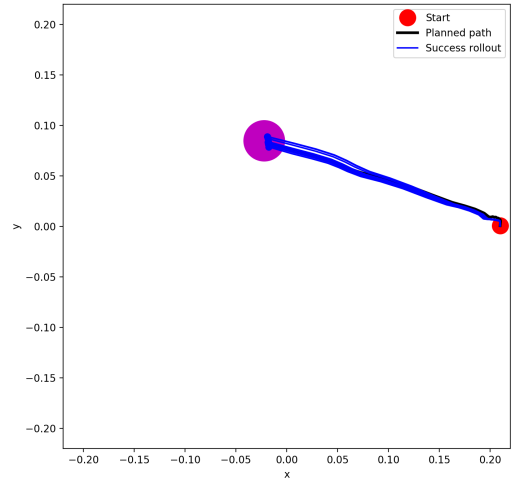

Policy
Start
Planned path
Failure rollout
Success rollout

# Reacher-v2 Statistics

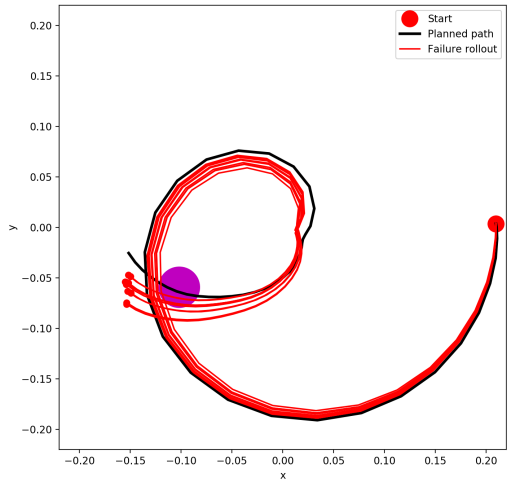
| goal location (method) | goal reach rate | rollout path RMSE relative to plan path [mm] | path length [mm] | | number of path steps | last distance to goal [mm] | |
|---|---|---|---|---|---|---|---|
| | | | plan | rollout | | plan | rollout |
| 1 (A*) | 100% | 0.01025±0.00091 | 0.22799 | 0.24568±0.00221 | 16 | 0.00778 | 0.00993±0.00112 |
| 1 (policy) | 60% | 0.00599±0.00203 | 0.87181 | 0.86061±0.00931 | 51 | 0.03055 | 0.02295±0.00937 |
| 2 (A*) | 100% | 0.0034±0.00065 | 0.24392 | 0.24707±0.00159 | 26 | 0.00859 | 0.00509±0.00105 |
| 2 (policy) | 0% | 0.01801±.00191 | 0.72881 | 0.78558±0.01989 | 51 | 0.06385 | 0.04545±0.00596 |
| 5 (A*) | 100% | 0.00871±0.00373 | 0.31887 | 0.32344±0.00551 | 23 | 0.00449 | 0.00598±0.00154 |
| 5 (policy) | 0% | 0.01307±0.00383 | 1.05959 | 1.00686±0.01665 | 51 | 0.06024 | 0.05161±0.00201 |

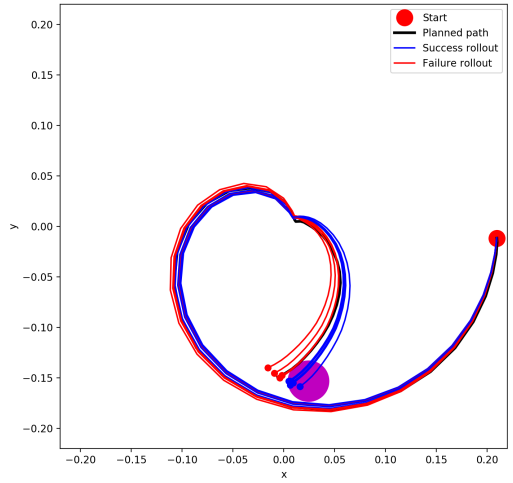

Start
Planned path
Success rollout
x
y

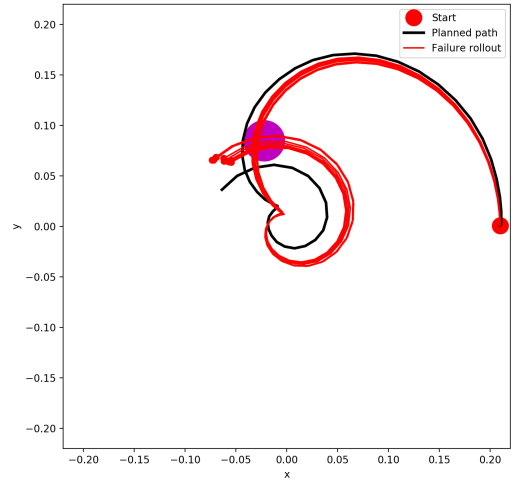

Start
Planned path
Success rollout
x
y


Start
Planned path
Success rollout
x
y

A*


Start
Planned path
Failure rollout
x
y

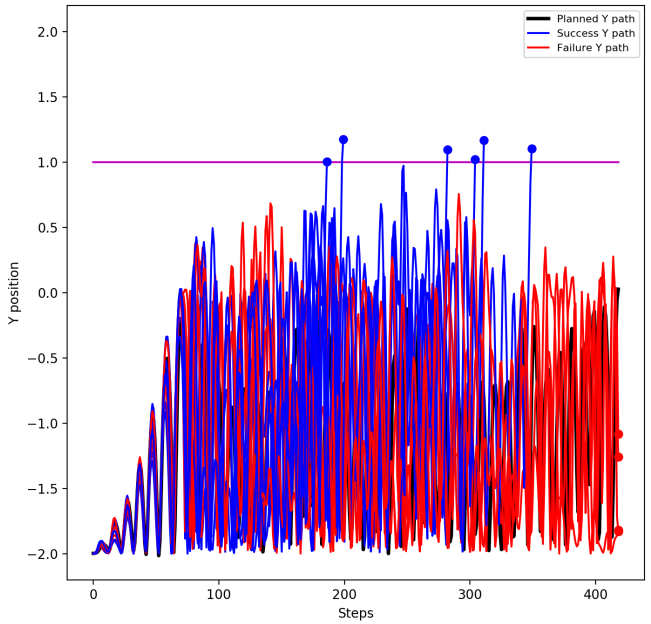

Start
Planned path
Success rollout
Failure rollout
x
y


Start
Planned path
Failure rollout
x
y

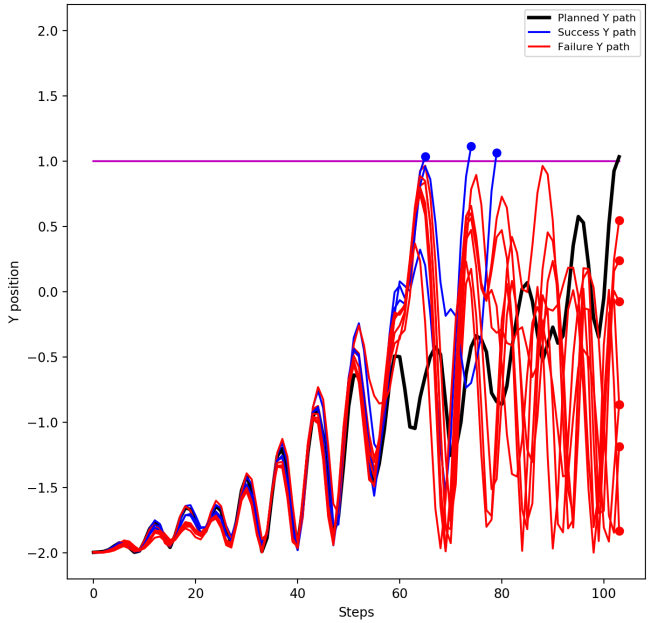
Policy

# Acrobot-v1 Statistics

| goal location (method) | goal reach rate | rollout path RMSE relative to plan path [mm] | path length [mm] | | number of path steps | | last distance to goal [mm] | |
|---|---|---|---|---|---|---|---|---|
| | | | plan | rollout | plan | rollout | plan | rollout |
| 1 (A*) | 60% | 0.77±0.09 | 104.91 | 94.52±28.19 | 419 | 331.3±85.19 | 0.97 | 1.00±1.24 |
| 1 (policy) | 30% | 0.61±0.11 | 17.83 | 23.13±6.92 | 104 | 94.9±14.26 | 0 | 1.10±0.98 |

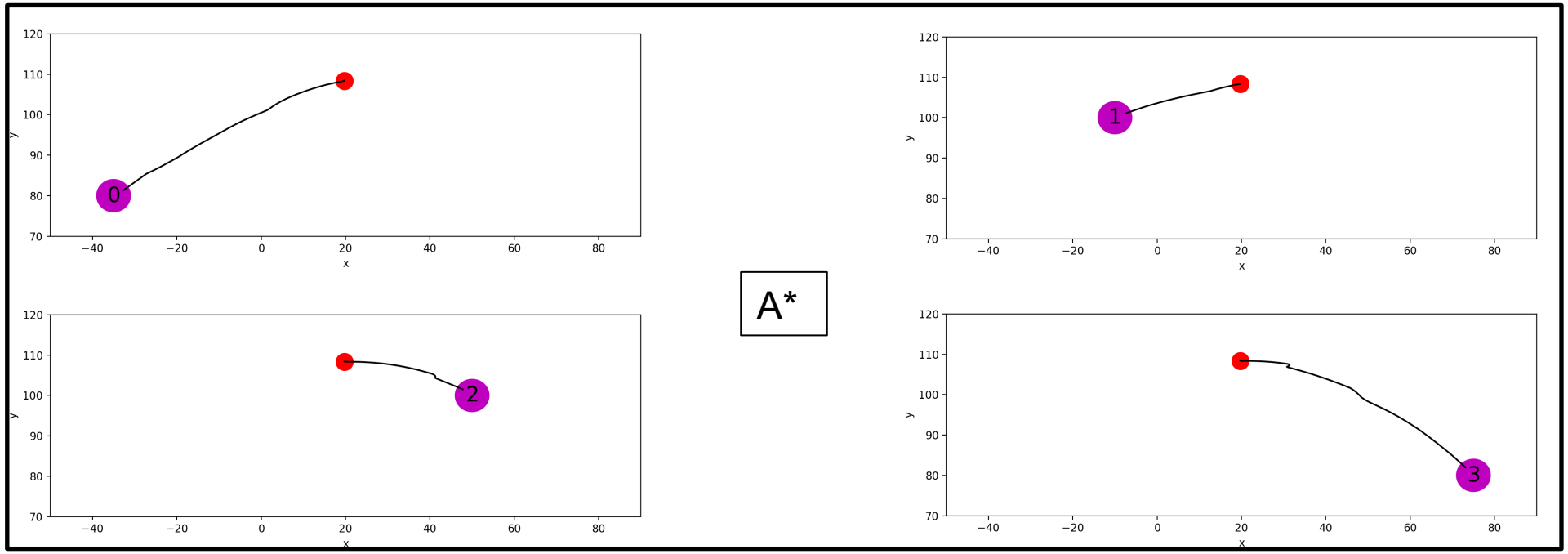


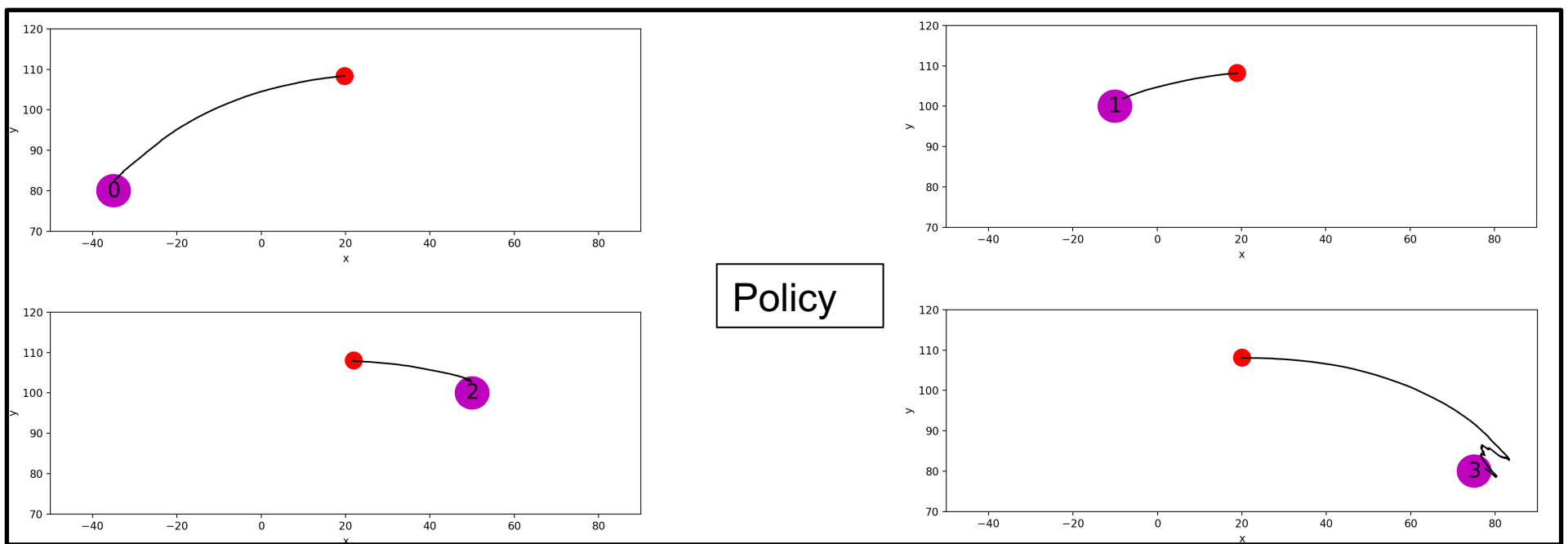

A*




Policy

# Real Hand Plan



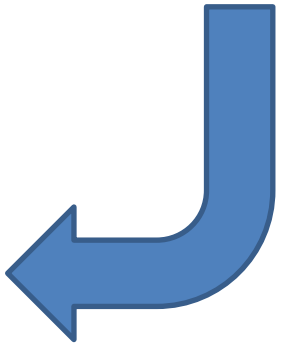



# To Do List

- **Writing a ros-package for rollouts of the Real Hand.**
  (Avishai's previous rollout ros-package only works on the Motoman setup)

- **Work on our new online method**

Mridul:
- Fix the issues of marker tracking
- Collect several episodes of data for testing my trained dynamics model



## *Real Hand*

- Test whether the trained real hand dynamics model also works with Mridul's new data or not

- Do rollouts for A* and PPO policy on real hand