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## Anytime exploration planning algorithm for UAVs

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Data gathering in the physical world is tedious and often risky. Robots are ideally suited for such applications. The objective of a data gathering robot is to travel between two points maximizing the information it gains while not exceeding energy or cost constraints. This problem can be formalized as that of finding budgeted routes in a graph such that the reward collected by the route is maximized, where the reward at nodes can be related. This problem is known as correlated orienteering. Unfortunately, state of the art solutions are too slow to even present an approximate solution while running online. We describe, RRO, a sampling based anytime orienteering algorithm that provides approximate solutions to the orienteering problem with computational costs that enable it to run online. This enables the UAV's to reason about intelligently planning non-myopic paths to explore an environment at large scale. We prove the algorithm is asymptotically optimal, and converges in polynomial time, whilst analyzing the effects of various heuristics on run times. We demonstrate that the state of the art methods take 10-12 minutes to solve a 400 node problem, whereas the method presented here takes 7-8 seconds.

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## Investigate into future of prosthetics with sensation

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Advanced artificial limbs proven that there is possibility to give patients the feeling that prosthesis is no longer separated from the rest of the body. But absence of touch and sensation in prosthesis delays this advantage. For this reason, much effort has been put to spend to bring sensation to prosthesis. In recent years, there has been remarkable progress in this field and new improvement has been presented in artificial limbs, such as surgically implanted cuff electrons or implants directly through brain. Both these methods will give the patient sensory feedback, but it can be very expensive and high-risk procedure. In this work, we try to open up new possibility for prosthesis to have sensory feedback by using brain illusion. Using recorded brain activities; we can form direct communication between brain and artificial limbs. The objective of work carried out in this project was to investigate how the brain resolves conflicting multisensory evidence during perceptual interference. The rubber hand illusion, mirror hand illusion and invisible hand illusion are the three most famous examples of experiments in which illusionary body ownership is convinced by tactile stimulation of participant's hand. To identify the functional anatomy of these experiments, we used multichannel (14 channel) EEG. Brain response was investigated in 9 healthy (no amputated) candidates, (6 men and 3 women aged 20-32). First experiment on rubber hand illusion (RHI) was carried out under two conditions; hand of volunteer stroke on artificial hand while real hand was hidden from the participant's vision, also, stroking hand and artificial hand without hiding real hand. Second experiment, mirror hand illusion (MHI), also carried out in two conditions, no mirror, looking at physical hand and, mirror, the illusion that hands were stimulated. Third experiment, invisible hand illusion (IHI), is same experiment as RHI without presents of artificial hand. EEG results suggest that gender difference exist in perception of body transfer illusion. Visual input can be induced to trick the brain as 100% of participant had confirmed the statement of "the fake hand feel like my hand"

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