Project Proposal

"Construction of ego model"

Introduction

Given a 2-d planar robot arm with camera at tip and touch sensors on the skin. The aim of my project is to recognize its degree of freedom and path to avoid obstacles using synthetic data. For the same I have used the dataset with some thousands images of robot arm with camera at the end of tip with different thetas (both theta1 and theta2).The camera at the tip gives the robot a clear view of things around it.

Motivation

As we all know human beings are lazy they want someone to replace their work. To minimize the work of humans robot were created by humans. As we can see in today's life robots have made our life very easy in all sense. They almost do all the works which humans can and also some of the works that humans can't. For example carrying heavy loads require large man power and also waste lot of time. This have been made easy by making robotic arm(crane).This is controlled by human and take less time to carry the loads. Robotic arms made up of metals(commonly used in industries) are very costly. By making robotic arm with cheap rate using low cost materials we can make our life easy. In this project we will assign a start and goal point and robot has to plan its path accordingly. It has to avoid obstacle for which it has tactile sensors on its skin. It will be nice to discover that the 2D manifold of these images will be similar to the manifold that we got when we didn't considered camera at the tip.

History

Some of the few robotic arms in past were :

- Joseph F. Engleberger and George Devol developed the **first industrial arm robot**, **the Unimate,** in 1954. It was first installed in General Motors in 1962 for the completion of assembly line tasks that were repetitive or dangerous.

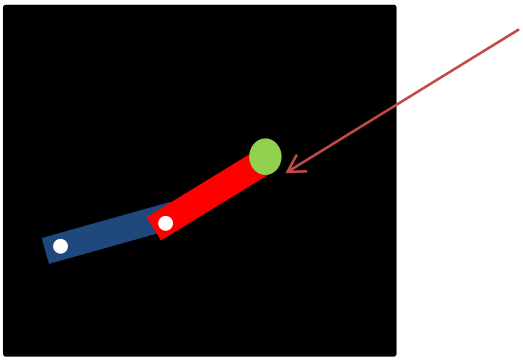
- **The Rancho Arm,** developed at Rancho Los Amigos Hospital in Downey, California, was designed to be used as a tool for the handicapped.
- **Orm,** the Norwegian word for "snake," was an unusual air-powered robot arm developed by Victor Scheinman and Larry Leifer in 1965.
- **The Stanford Arm,** developed by Victor Scheinman in 1969, was the first successful electrically-powered, computer- controlled robot arm. It was used to develop industrial assembly techniques for commercial robot arms.
- **Tentacle arm** was developed by Marvin Minsky at MIT in 1968. Since it moved like an octopus, it was called as the Tentacle Arm.
- The **Mars Surveyor Program** (in 2001) its primary objective was to further their understanding of the biological potential and possible biological history of Mars, and to search for indicators of past and/or present life. For this purpose robot arm was one of the instrument used. The main purpose of the robot arm was to take images of the Lander foot pads providing useful data in determining surface properties at touchdown site .

- The **Shuttle Remote Manipulator System** (**SRMS**), also known as the **Canadarm** (**Canadarm 1**), is amechanical arm that was used on the Space Shuttle orbiters to maneuver a payload from the payload bay of the orbiter to its deployment position and then release it.

Method & data

Data : It consists of some thousands of images of the robot arm with camera at its tip. Both theta1 and theta2 are given to us for all the images.

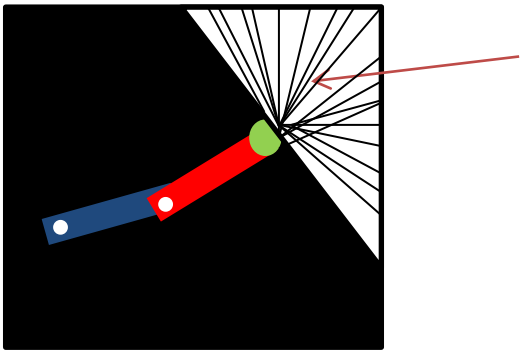
The following is the image of 2d planar robot arm having camera at tip of the arm



- **Vision :**

Vision :

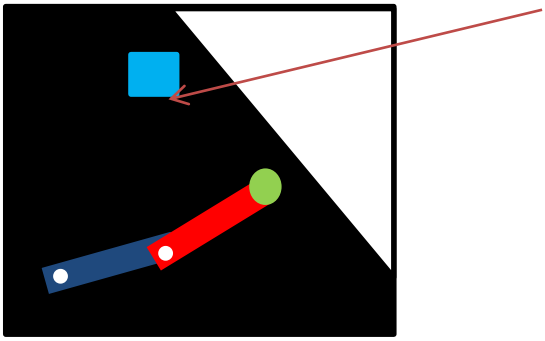
The image without obstacle



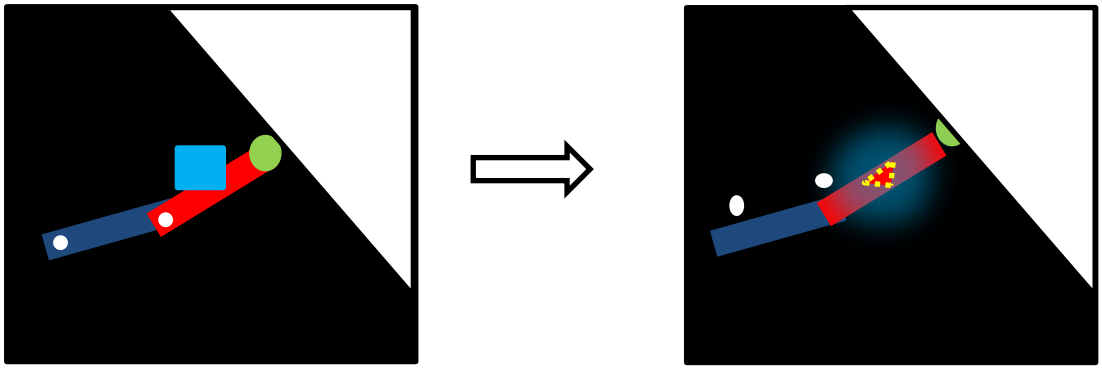
We have taken the world to be a planar world. The view that camera sees is a thin strip of world. The image seen basically consists of vertical stripes with colour. Example of such image is the following :-

Now if we colour the walls then again we will get a similar type of image just the colour changes and we can colour the corner with different colours to distinguish between walls and colour in the image seen by camera. In this project we generate different images of such kind using different images of robots.

Tactile sensor:



When the obstacle hits the robot arm the part touched by obstacle glows up.



If ((obstacle with image of robot)-obstacle) == image of robot) then
Obstacle not hitting the object
Else
Obstacle hitting the object
Display all images where the some part of obstacle hits the robot
In this manner we can separate out the obstacle and can do path planning between start and goal images.

Usefulness .

- In an effort to reduce worker injuries and trim labour costs, many companies are moving away from manual bag filling, palletizing, and depalletizing. Some companies are automating these functions. Others are using a newer option — the robotic arm
- People with paralysis control robotic arms using brain-computer interface
- To Perform Remote Abdominal Telesonography