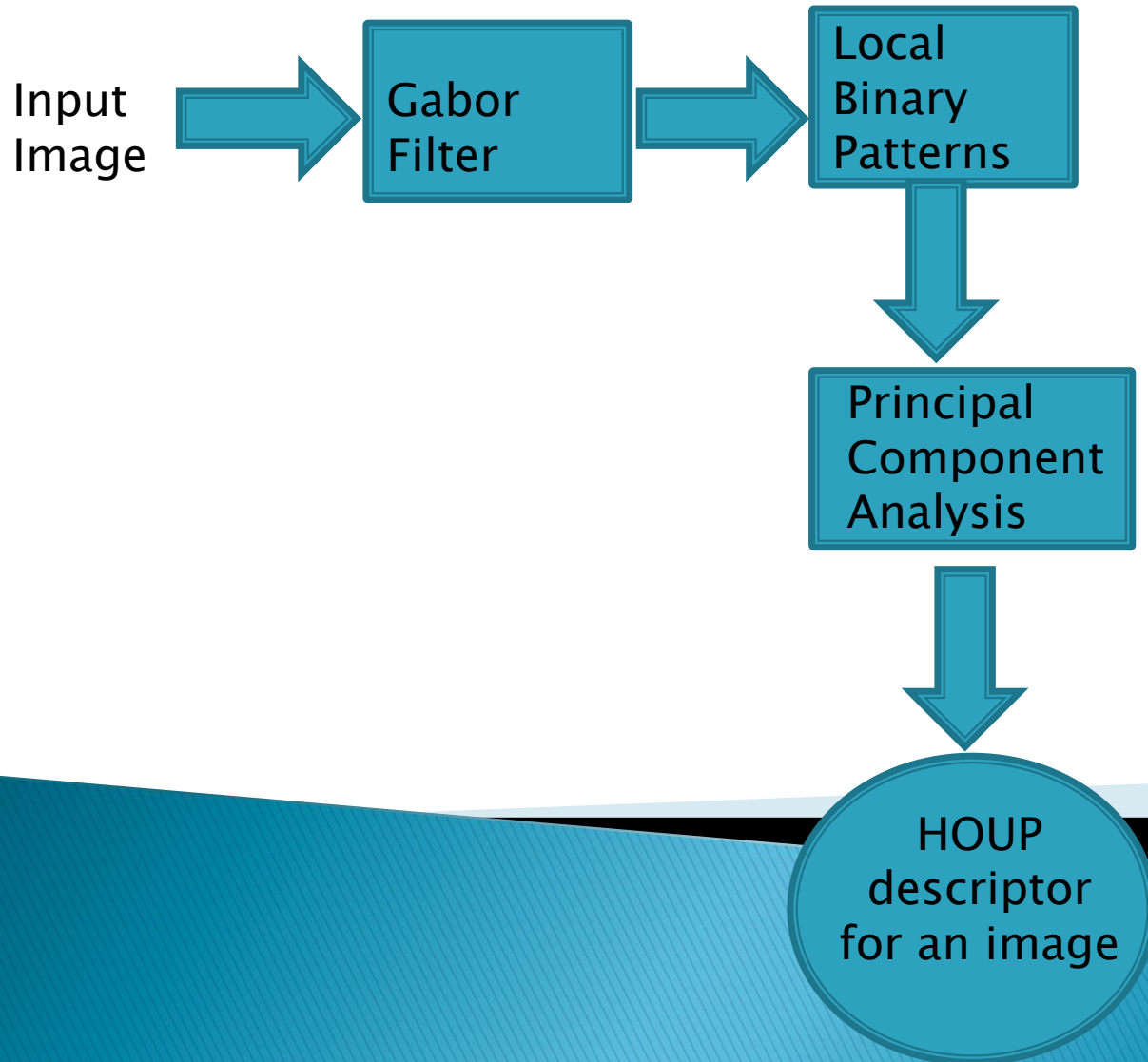


# Place Recognition for Localization of Mobile Robot

Raghavender Sahdev, Asheer Bachoo and John Tsotsos at  
Centre for Vision Research (CVR), York University, Canada  
In Spring 2015 for my Bachelors Thesis

# THE HOUP – Histogram of Oriented Uniform Patterns Descriptor



# Subdivision

- ▶ Every frame divided into 3x3 blocks
- ▶ Each block is passed through a gabor filter, then the Local binary patterns are computed for that block
- ▶ PCA to reduce the dimensions.
- ▶ Classifiers used are
  - 1 Nearest Neighbour for place recognition
  - Support Vector Machines for place categorization

# Results on the KTH Idol and the UIUC dataset

Experiment	Train	Test	Lighting	Performance			
			Wu & Rehg	Wu & Rehg, 2011	Pronobis, 2006	Fazl-Ersi, Tsotsos, 2012	Sahdev, Tsotsos, 2015
1	Minnie	Minnie	Same	95.35	95.51	96.61	95.38
	Dumbo	Dumbo	Same	97.62	97.26	98.24	97.22
2	Minnie	Minnie	Different	90.17	71.90	92.01	85
	Dumbo	Dumbo	Different	94.98	80.55	95.76	88*
3	Dumbo	Minnie	Same	77.78	66.63	80.05	72.46
	Minnie	Dumbo	Same	72.44	62.20	75.43	75.48

We achieved a performance of 75% accuracy on the UIUC dataset consisting of 15 different places

# Robots we used ..!!



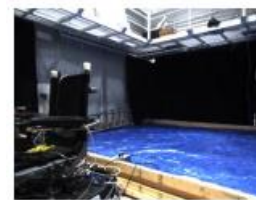
Virtual Me



Pioneer

# Our Dataset

- ▶ Dataset generated at the Centre for Vision Research, York University
- ▶ 11 placesThe dataset was built in 2 different lighting conditions day and night using 2 robots (*Virtual Me* and *Pioneer*). Robots were manually driven.
- ▶ The Camera (Point Grey Bumblebee 2 stereo vision camera). is mounted at heights of 117cms and 88cms for *Virtual Me* and *Pioneer* respectively.
- ▶ Each image has a resolution 640 x 480 at a frame rate of approximately 3 frames per second.
- ▶ Each place has 60 - 200 images and in total we have 1800 - 2000 images which are used for training and a similar image sequence for testing.



Arena



Ash Room



Corridor



Lab2



Living Room



Lounge



Plant Room



Work Place



Professor Room



Wash Room



Seminar Room

# Performance on our dataset

Experiment	Training Set	Testing Set	Lighting Conditions	Accuracy
1	Pioneer	Pioneer	Same	98
	Virtual ME	Virtual ME	Same	98
2	Pioneer	Pioneer	Different	93
	Virtual ME	Virtual ME	Different	93
3	Pioneer	Virtual ME	Same	92
	Virtual ME	Pioneer	Same	92
4	Pioneer	Virtual ME	Different	82
	Virtual ME	Pioneer	Different	85

**Thank you!!**

**Questions?**