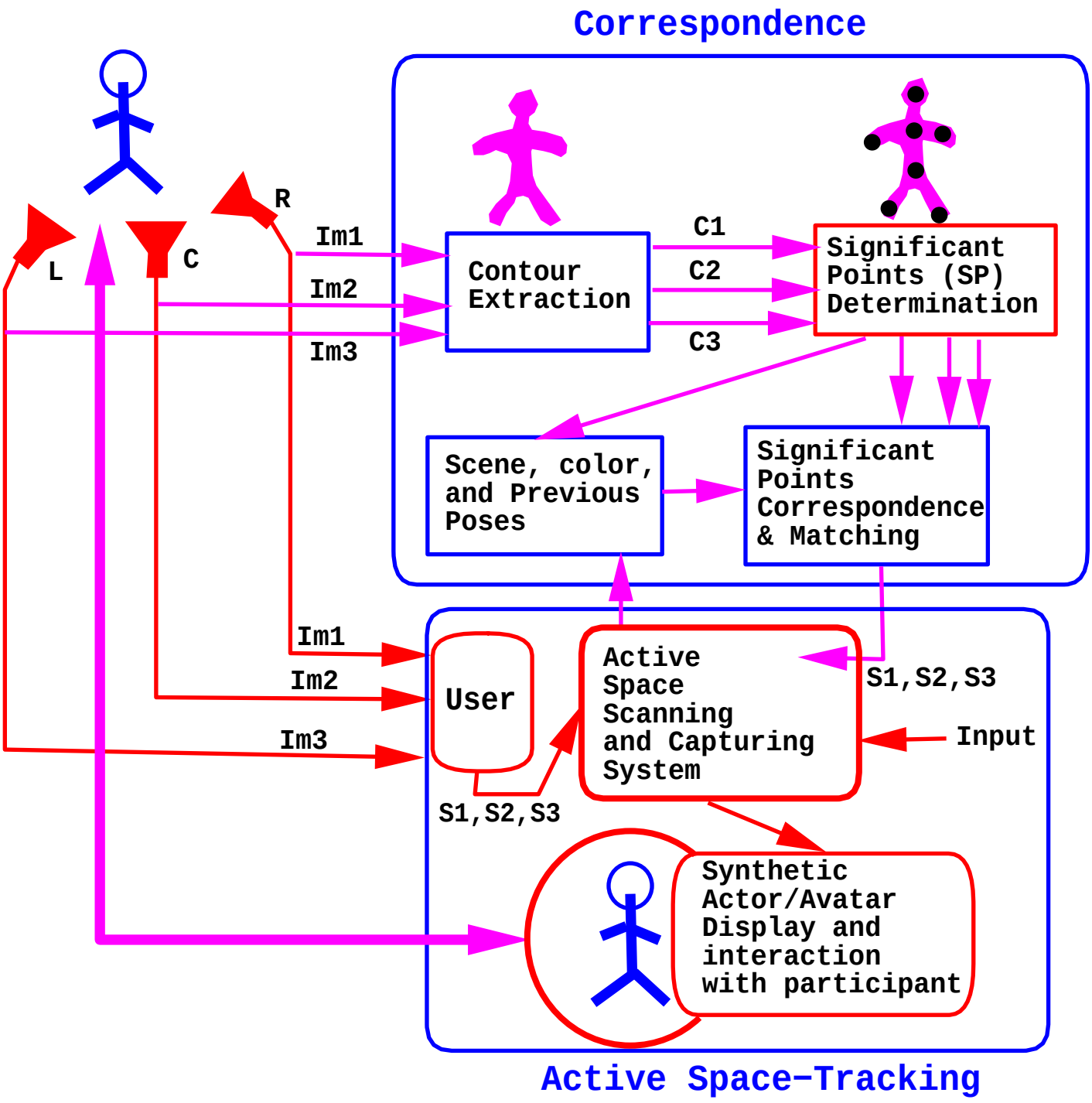
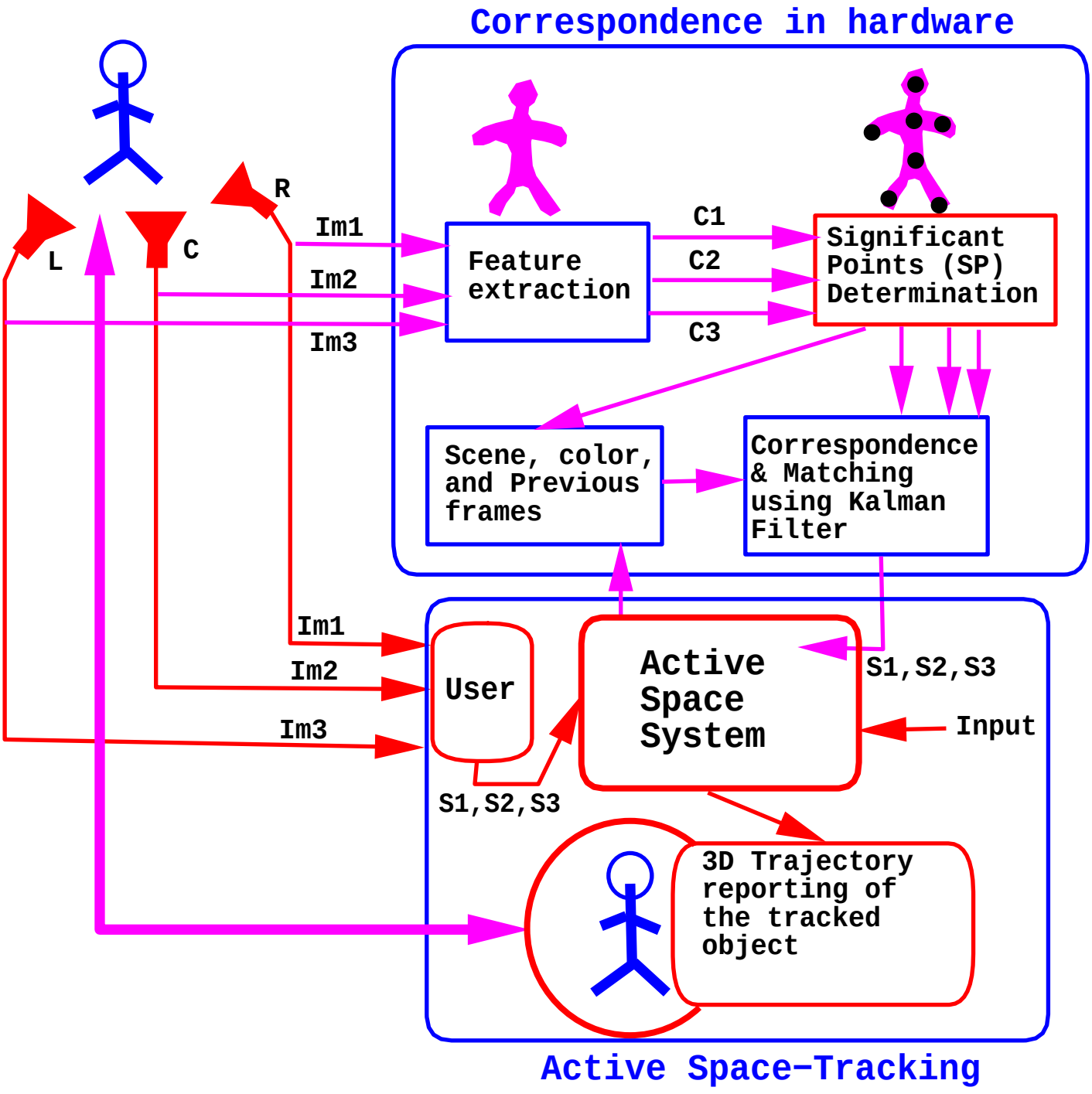
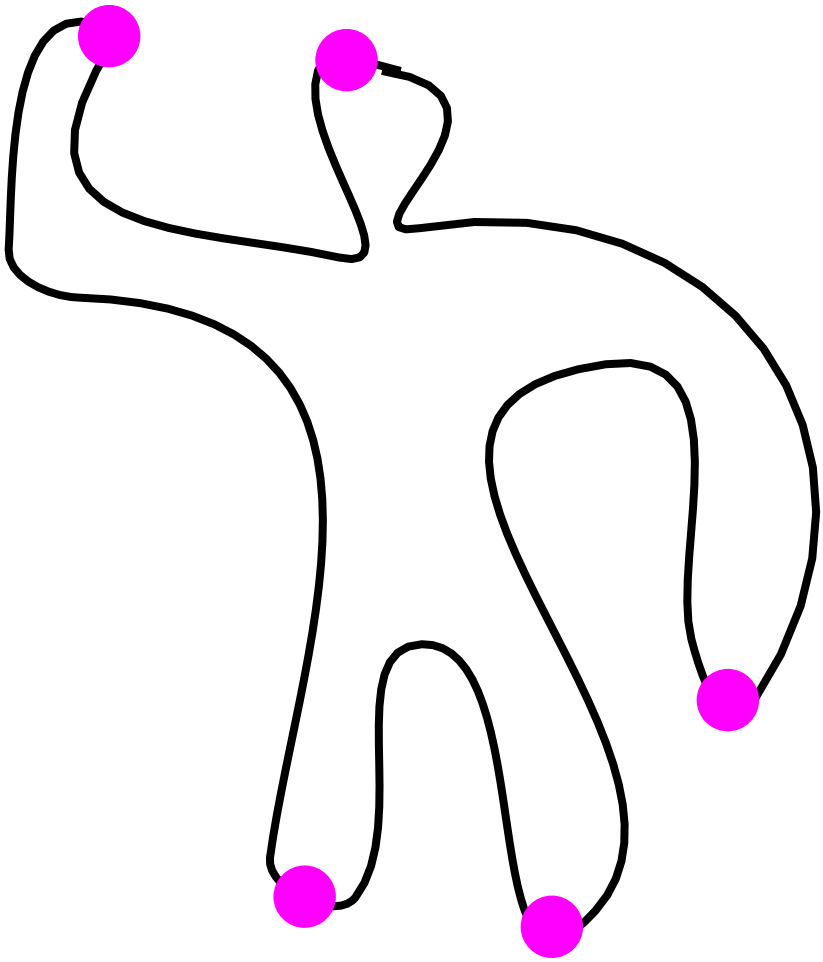
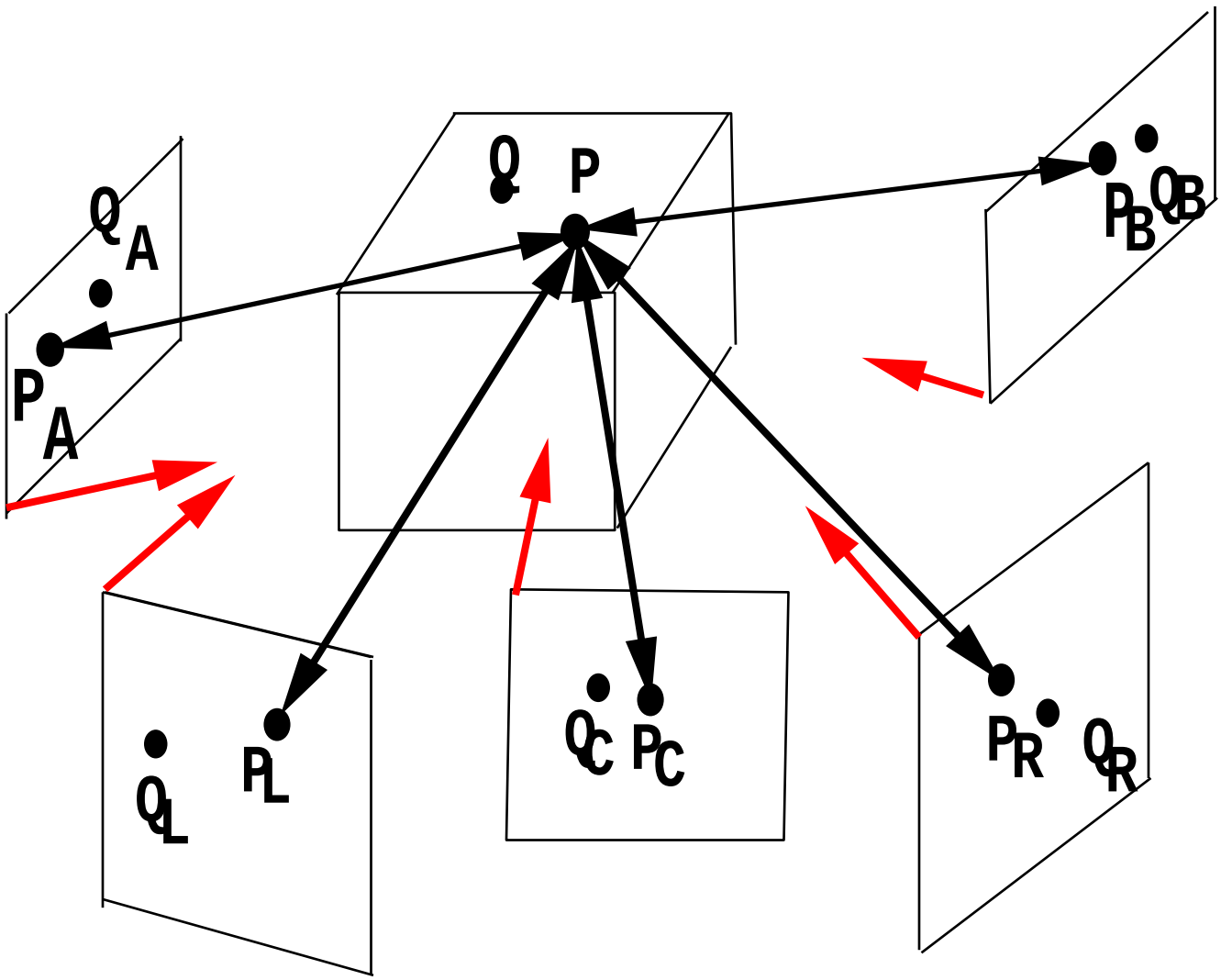



The Scan&Track Virtual Environment

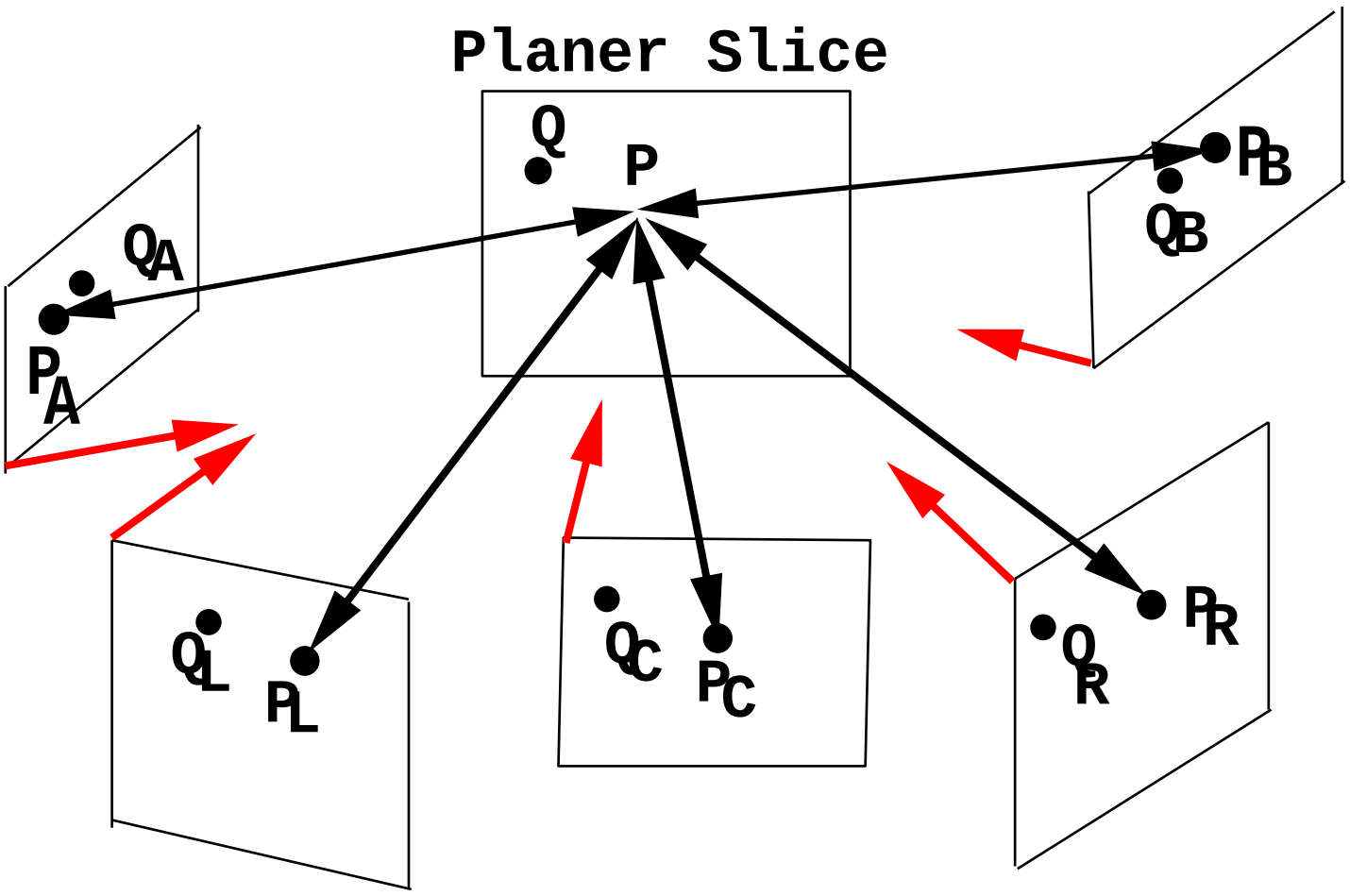



# CamerasInConcert Virtual Environment

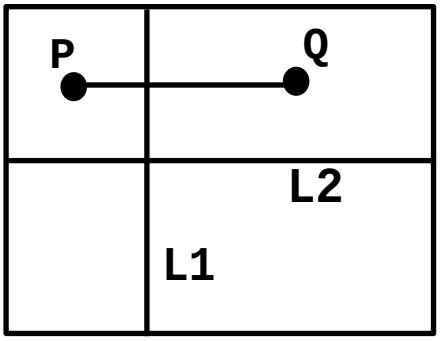


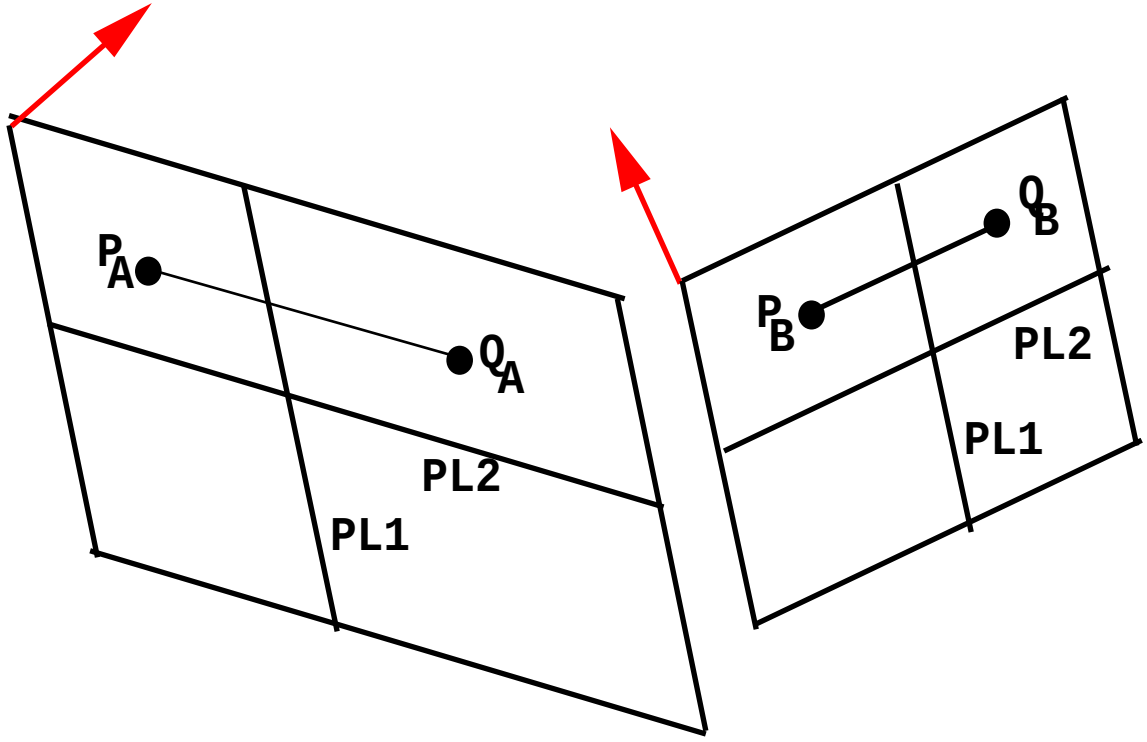



**Relationship of points P and Q changes as cameras move around it.**

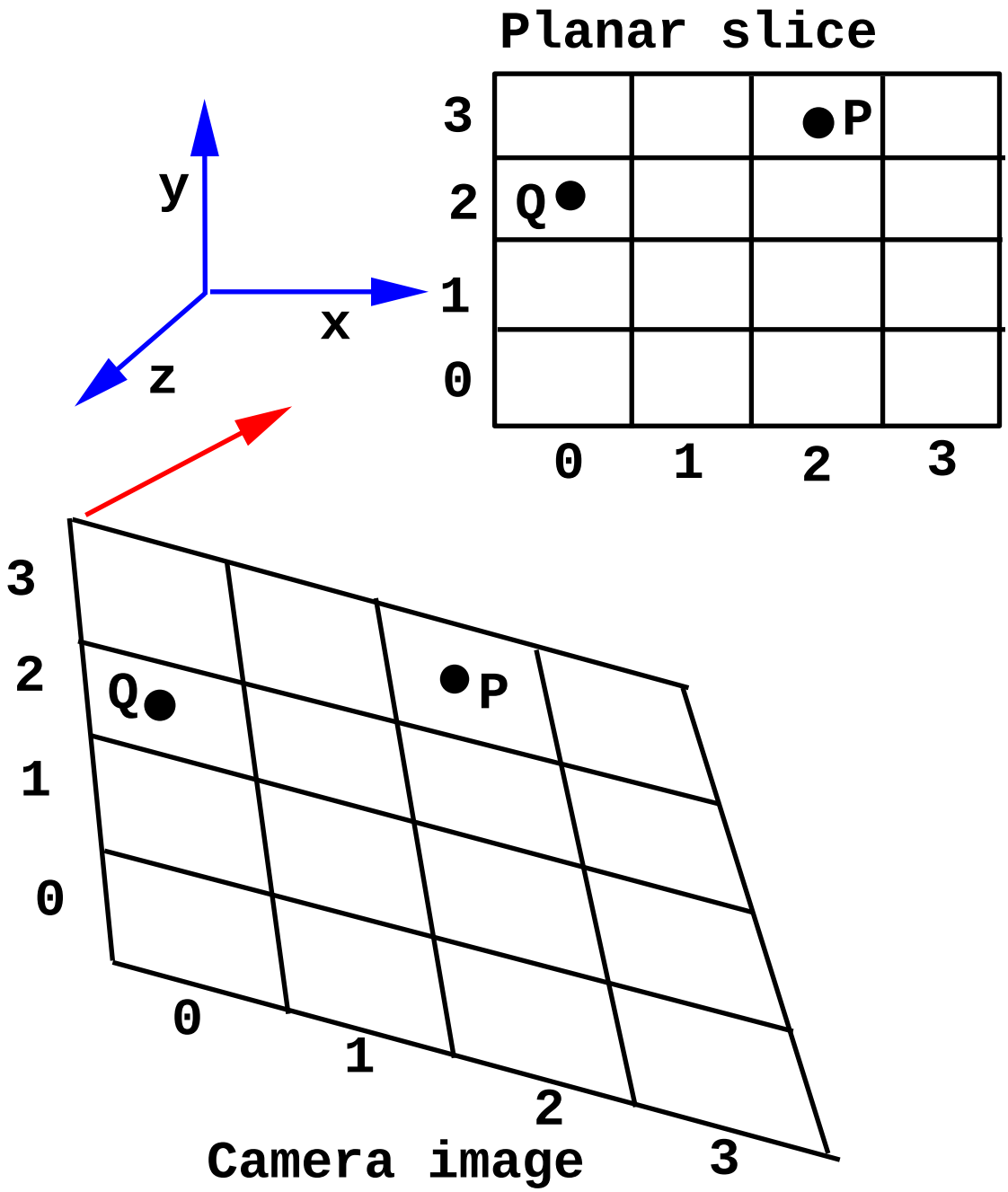



The relationship of the point on a slice remains same for a variety of planar views in the same hemisphere related to the slice.

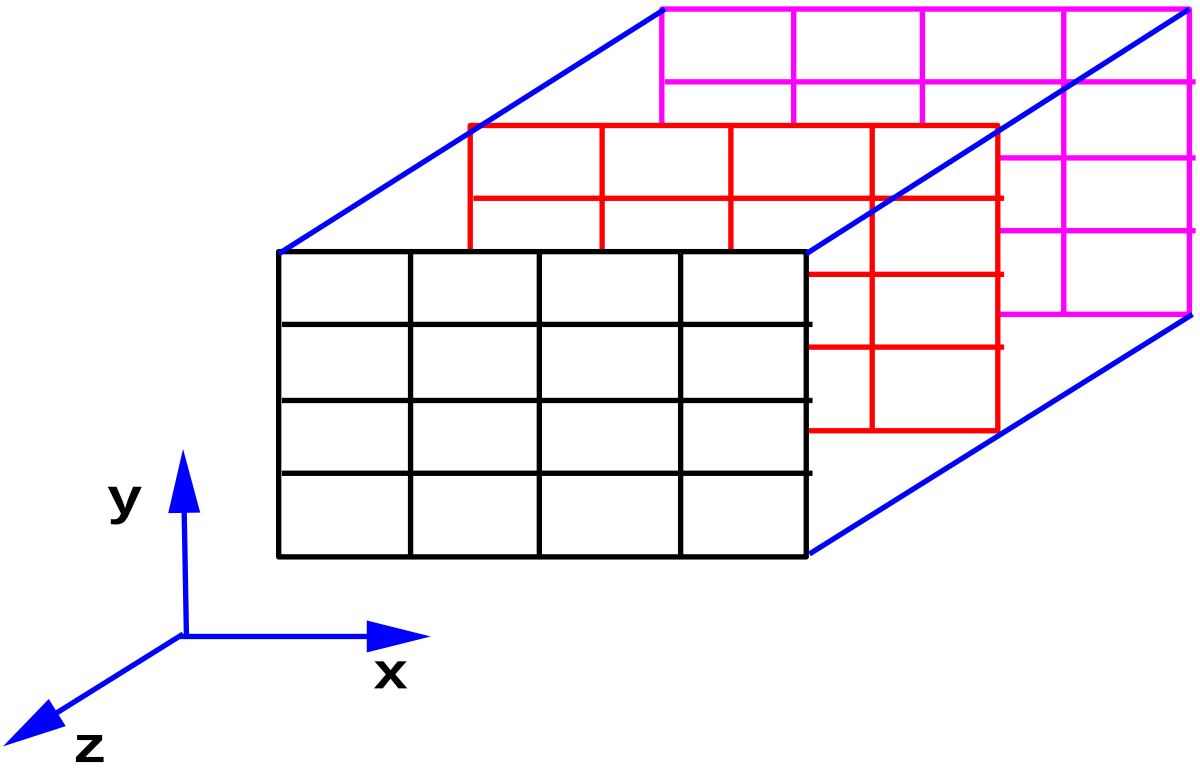


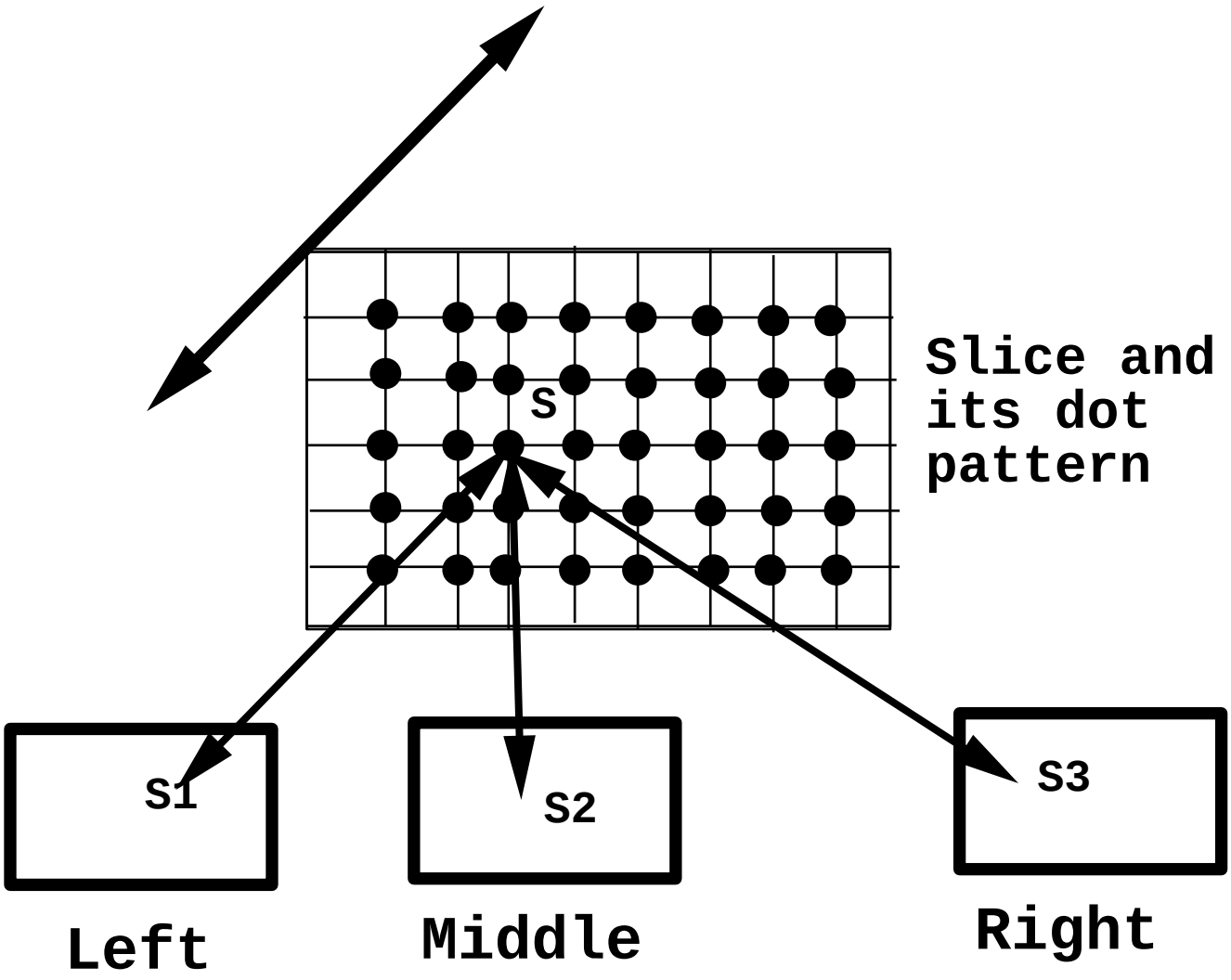

**Projection of two planar points on two planes.**




Camera images of two points P and Q.

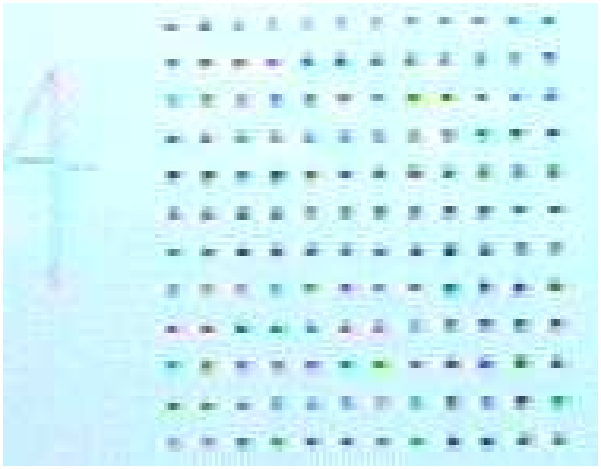



A set of 3 planer slices.

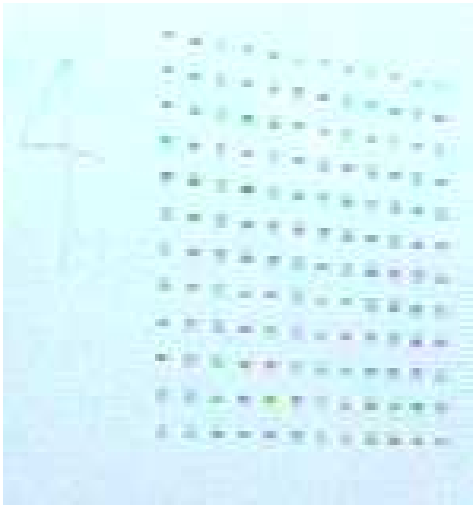



Active space creation

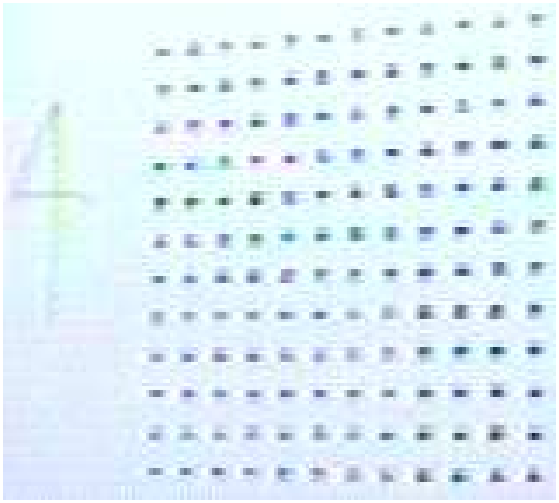
Imprint–set (S1,S2,S3) for point S.



Center

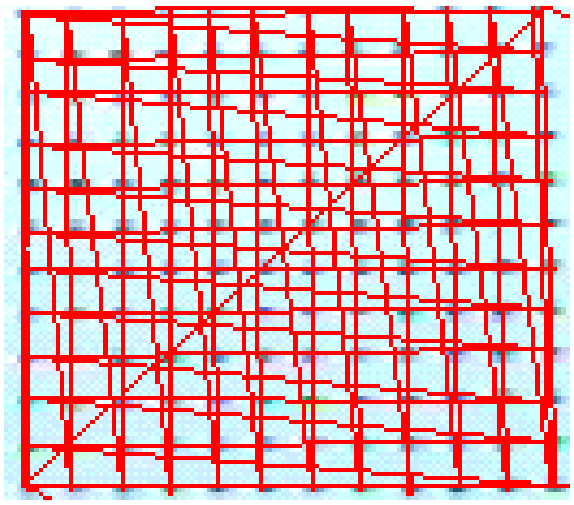


Left

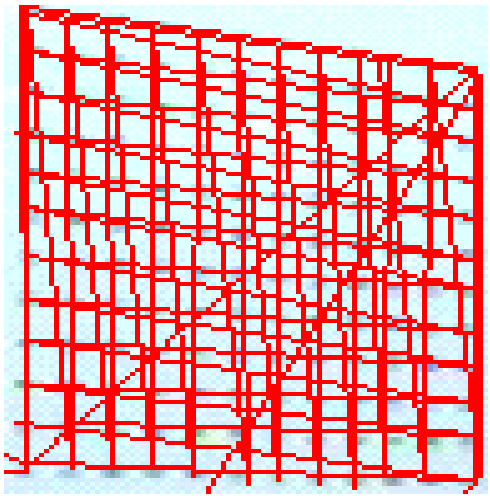


Right

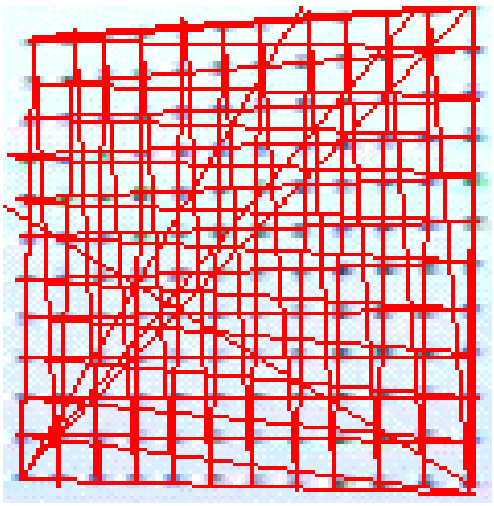
# Camera-images from Slice 4



Center camera

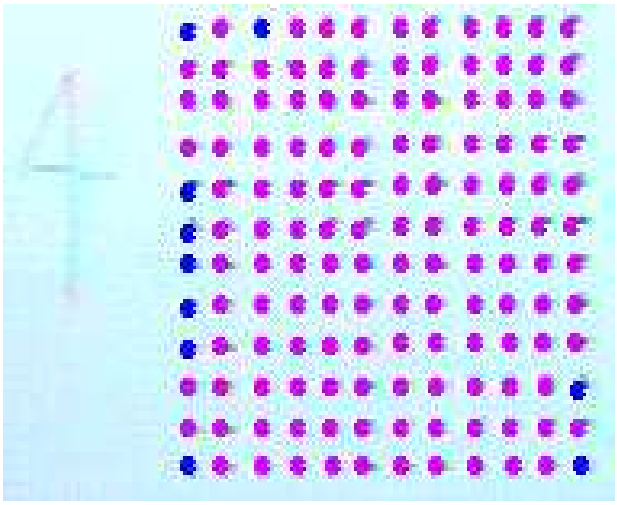


Left camera

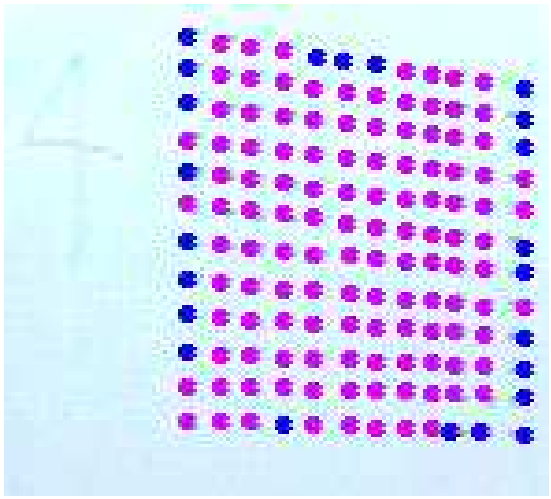


Right camera

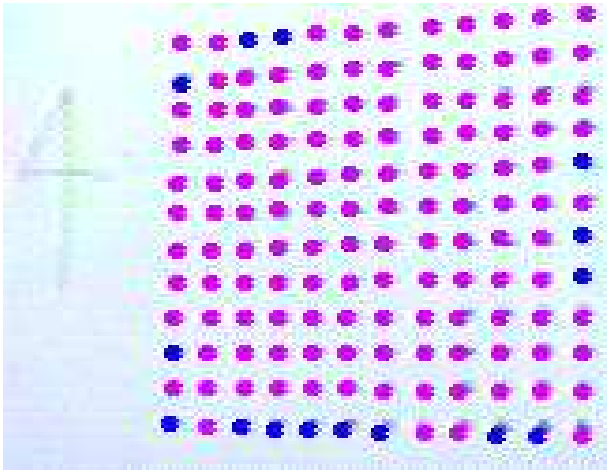
**<u>Preprocessing</u>: Red lines are the patterns created as the lines covering the grid-pattern are specified.**



Center camera

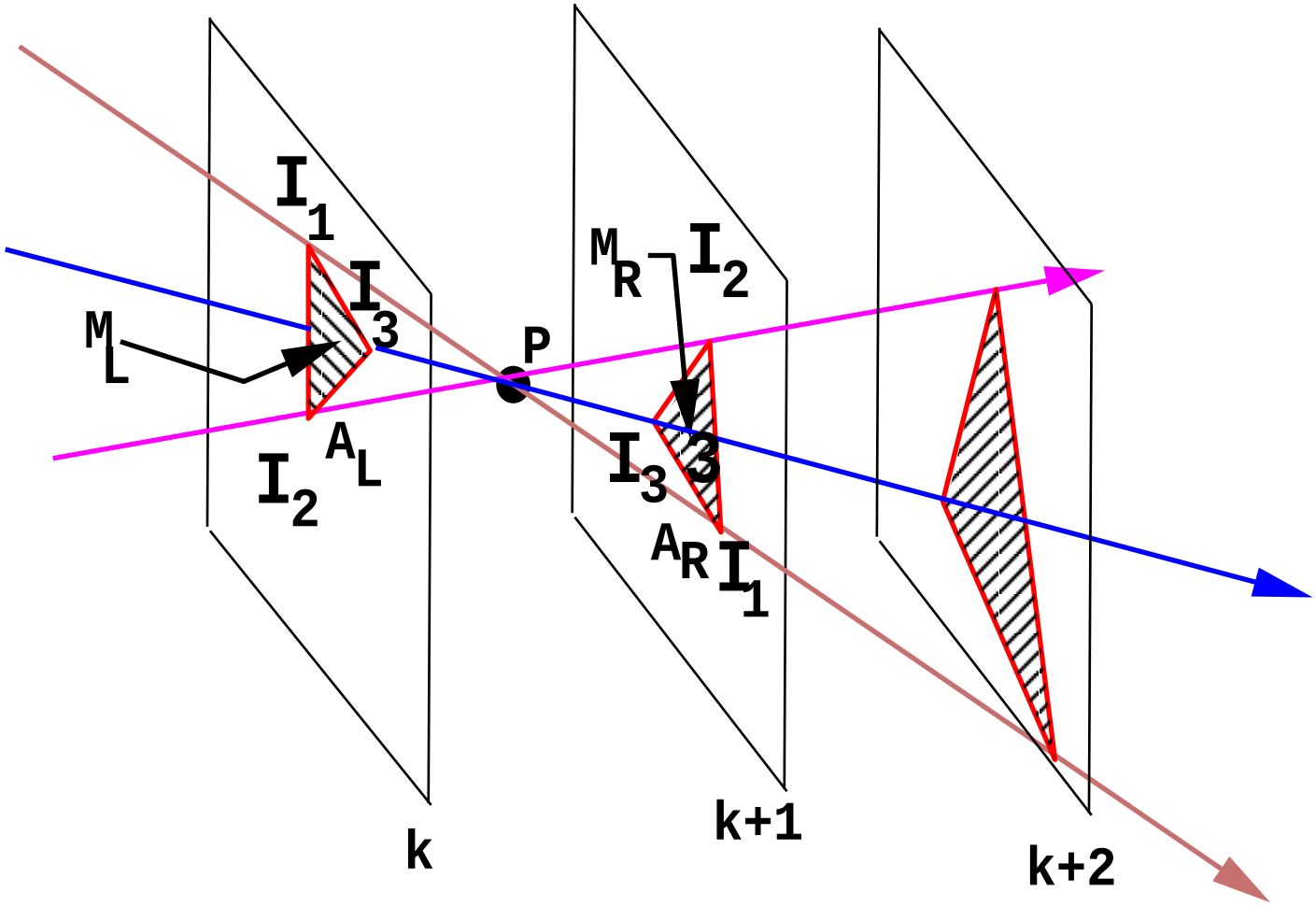


Left camera

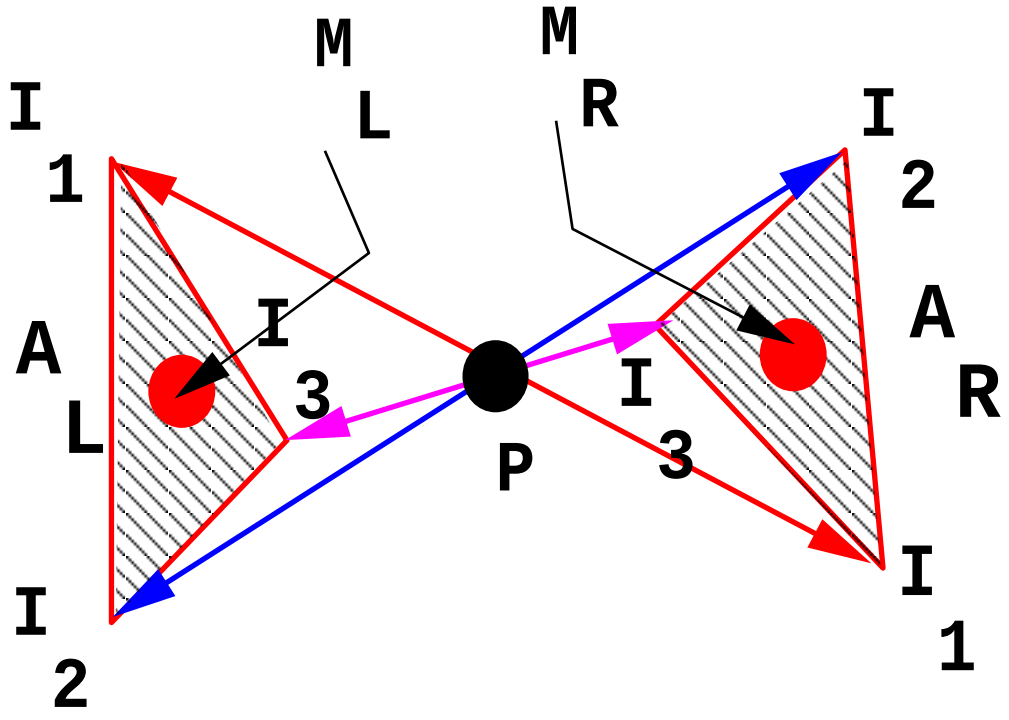


Right camera

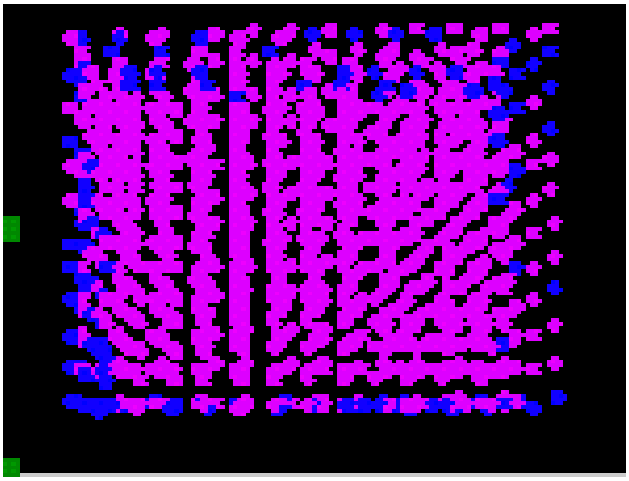
Line intersections cover the grid-patterns well.



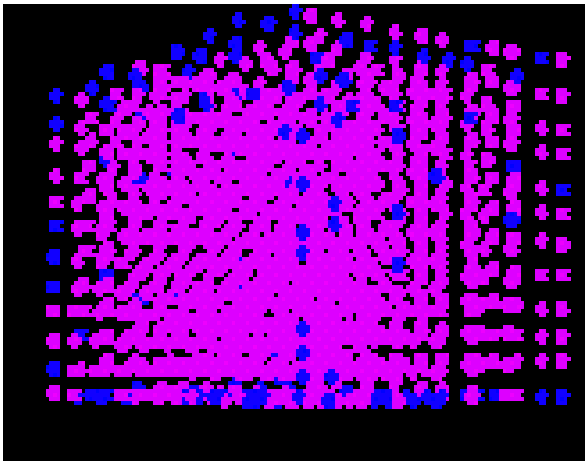

**Estimating the active index of P.**



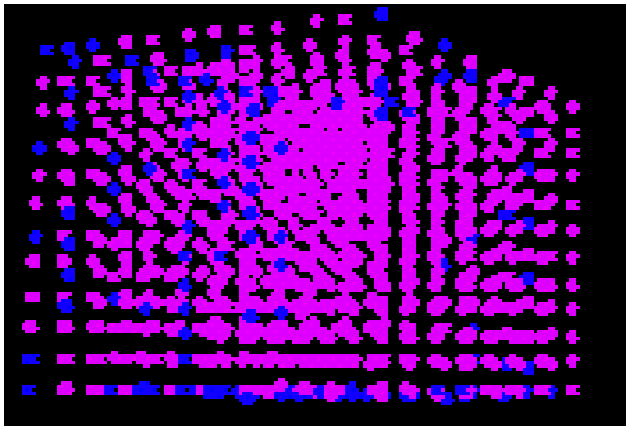

Linear Interpolation.



Center camera

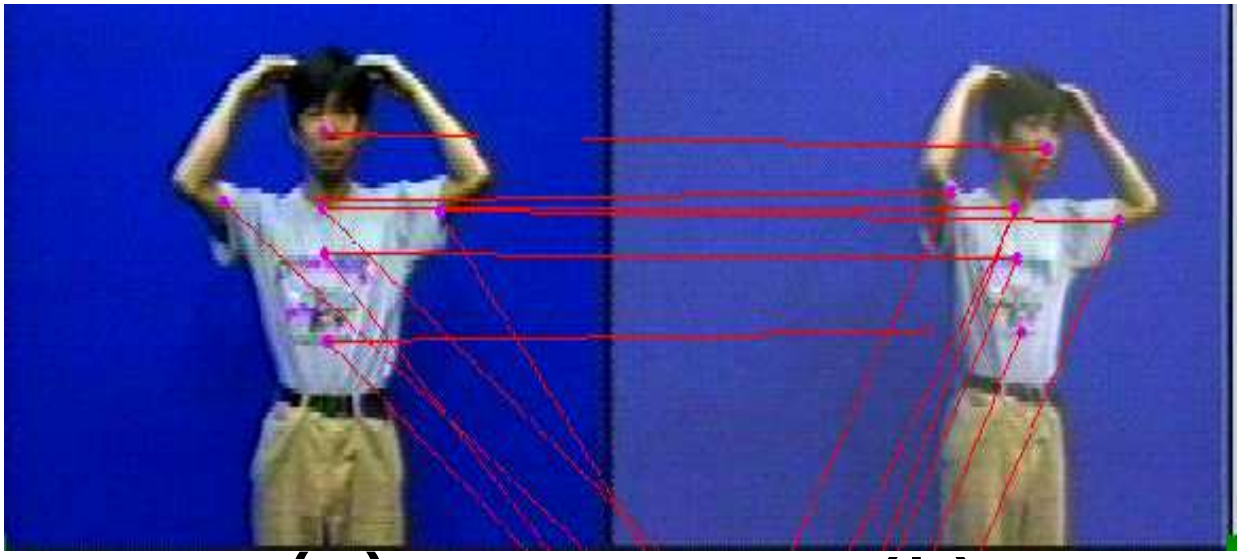


Left camera

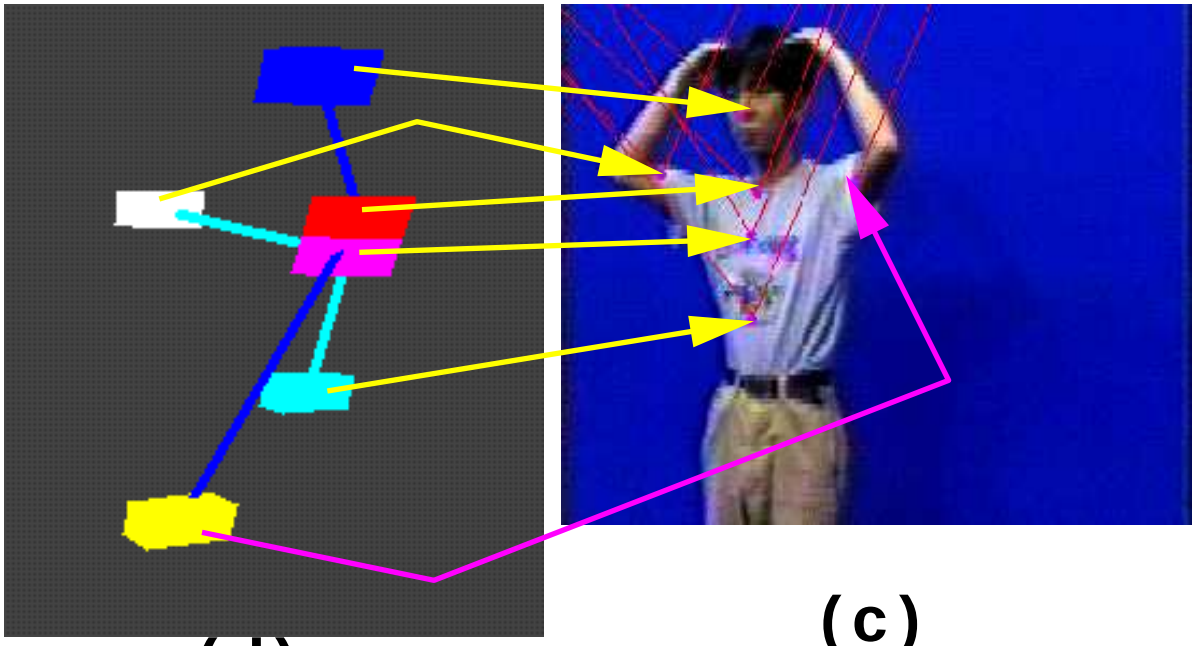


Right camera

**Active-space points for all Eight Slices.**

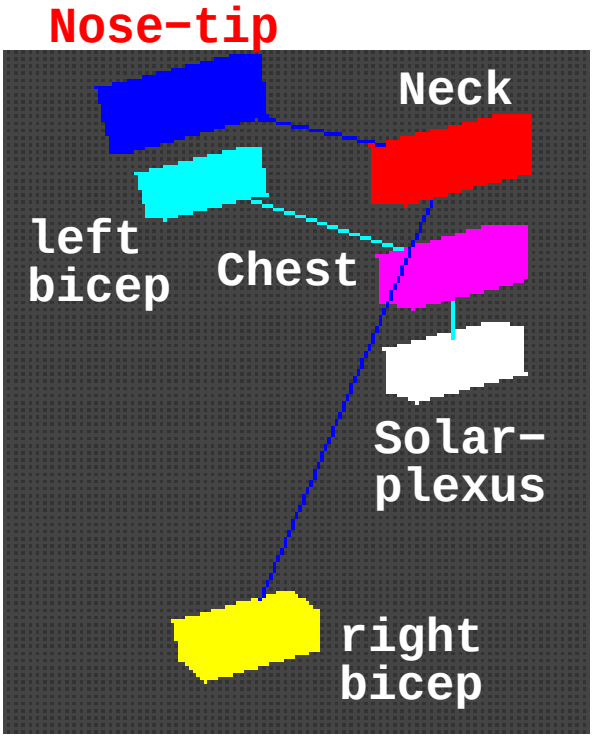


(a) (b)

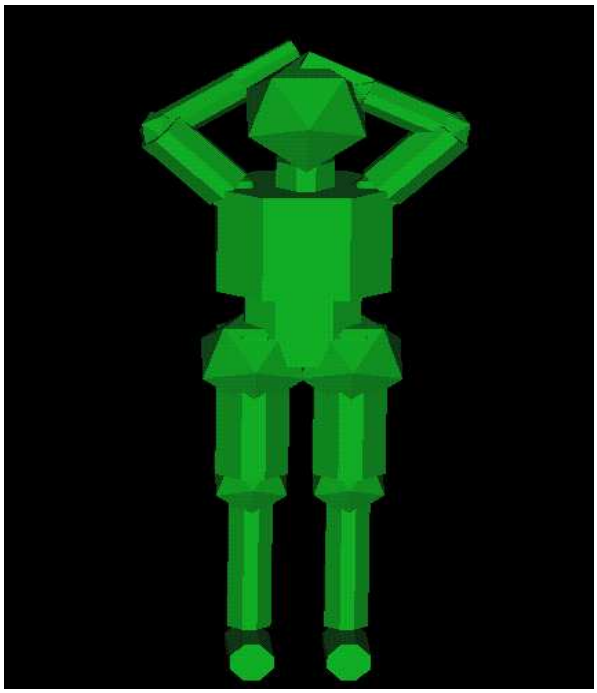


(d) (c)

a–c: Selecting six image imprints on the middle, left and right camera images. (d) associated 3D–cells connected by a simple skeleton.

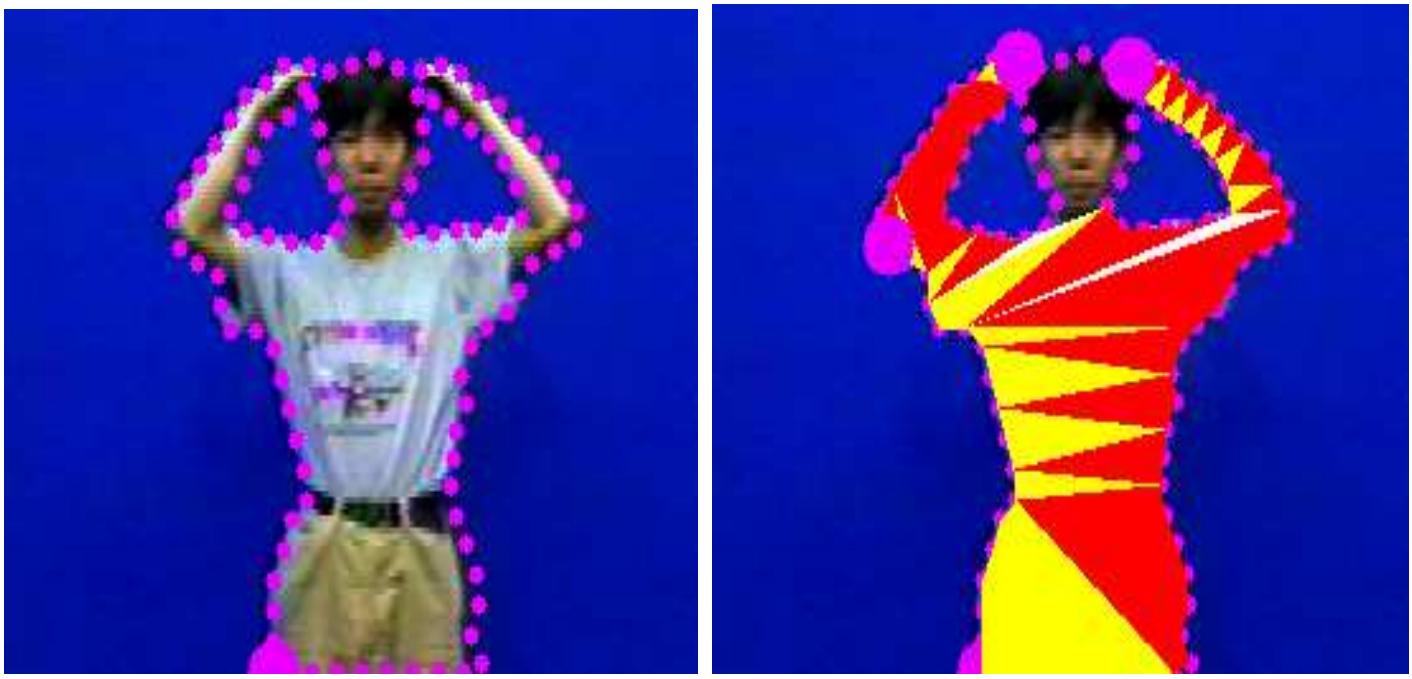



(e)



(f)

(e) Another skeleton for a different set of six points. (f) A synthetic actor mimics the participant.



Left: Scan-line algorithm for automatic extraction of the contour.
Right: Geometric-imprint

# The Scan&Track Virtual Environment

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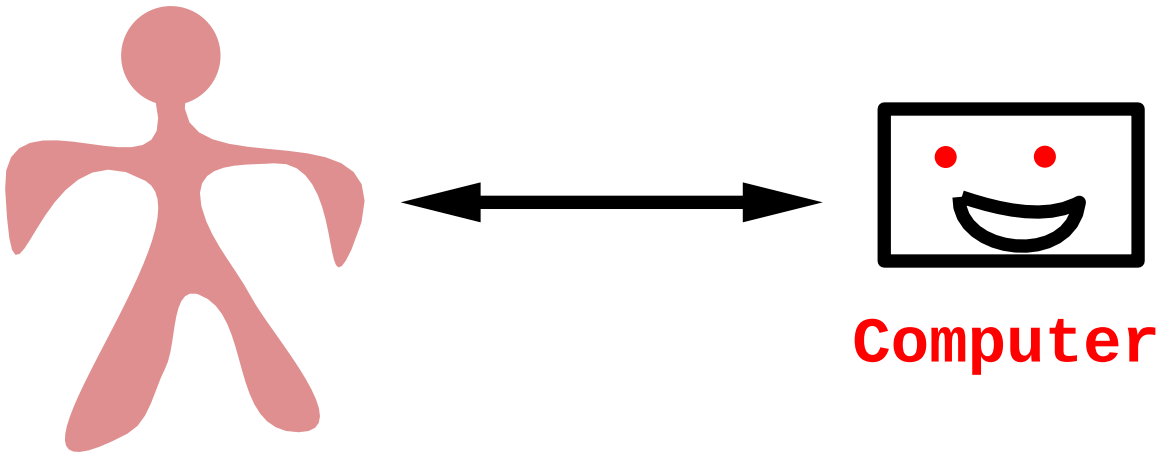
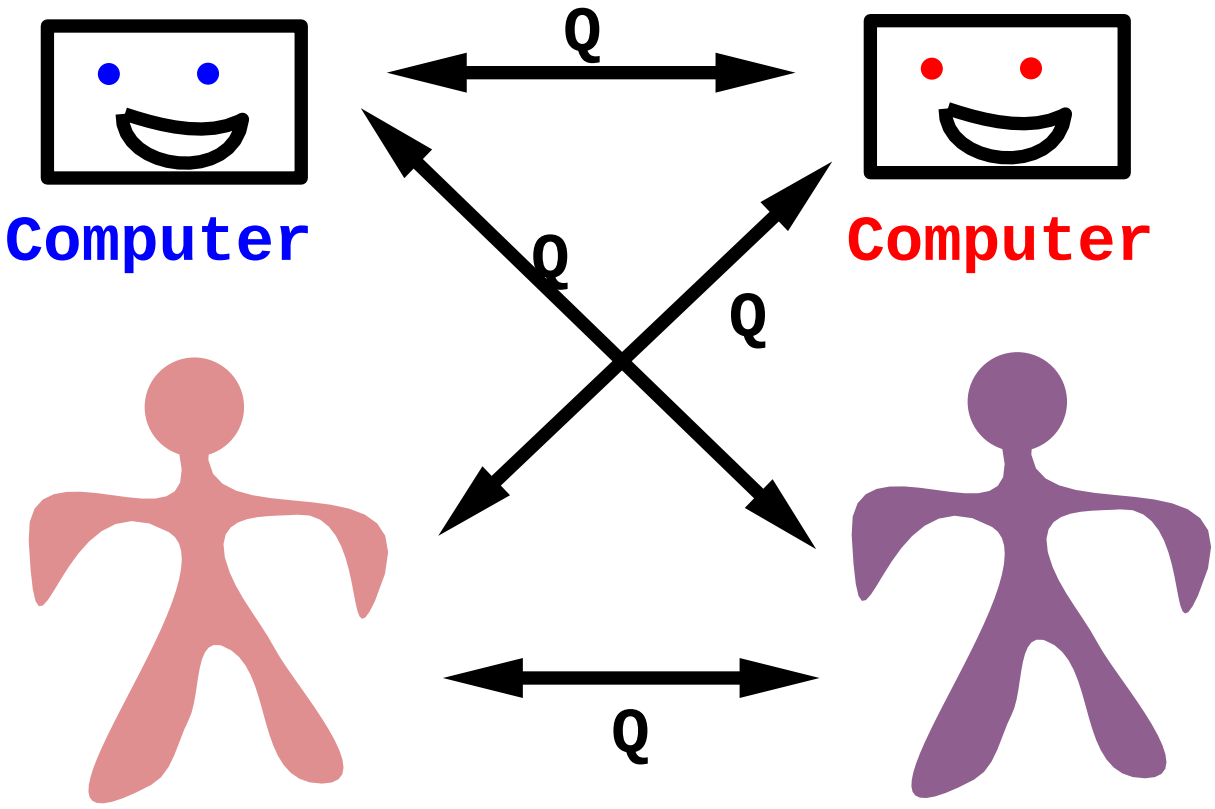



**Human–computer interaction**




**Q: Quality (degree) of interaction is Same.**

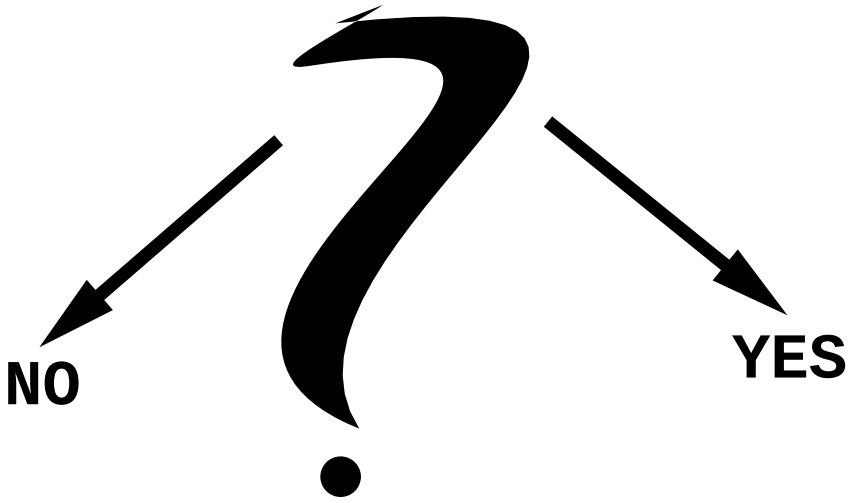
# Old Questions remain:

- Can we understand Humans?
- Can we understand and control Humans?
- Can we understand what humans are thinking?
- Can we create machines which acts like humans?
- Are computers of today sufficient for understanding humans?
- Is it necessary for a computer to act like humans, or it could still be useful?
- Do humans want a machine to learn about them?

**Big Question:**

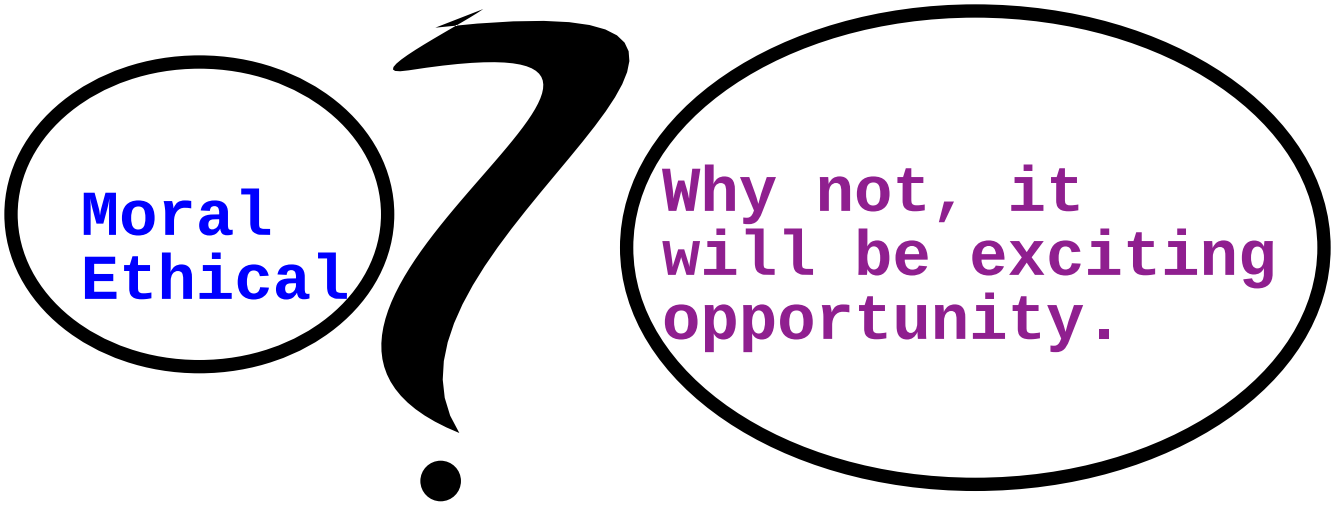
**Assuming that the brain guides all the human actions,**

**Can we understand the brain itself and create a machine which replicates the brain independently?**




- Brain’s amazing abstraction power (do the little thing, brain will think bigger)
- Even if you clone they are not identical
- Actually the player tried to fool the machine and lost
- Todays computer are not the answer.

- Cloning
- Chess
- Army of ants
- Can not underestimate the human brain


Moral
Ethical
?
Why not, it will be exciting opportunity.

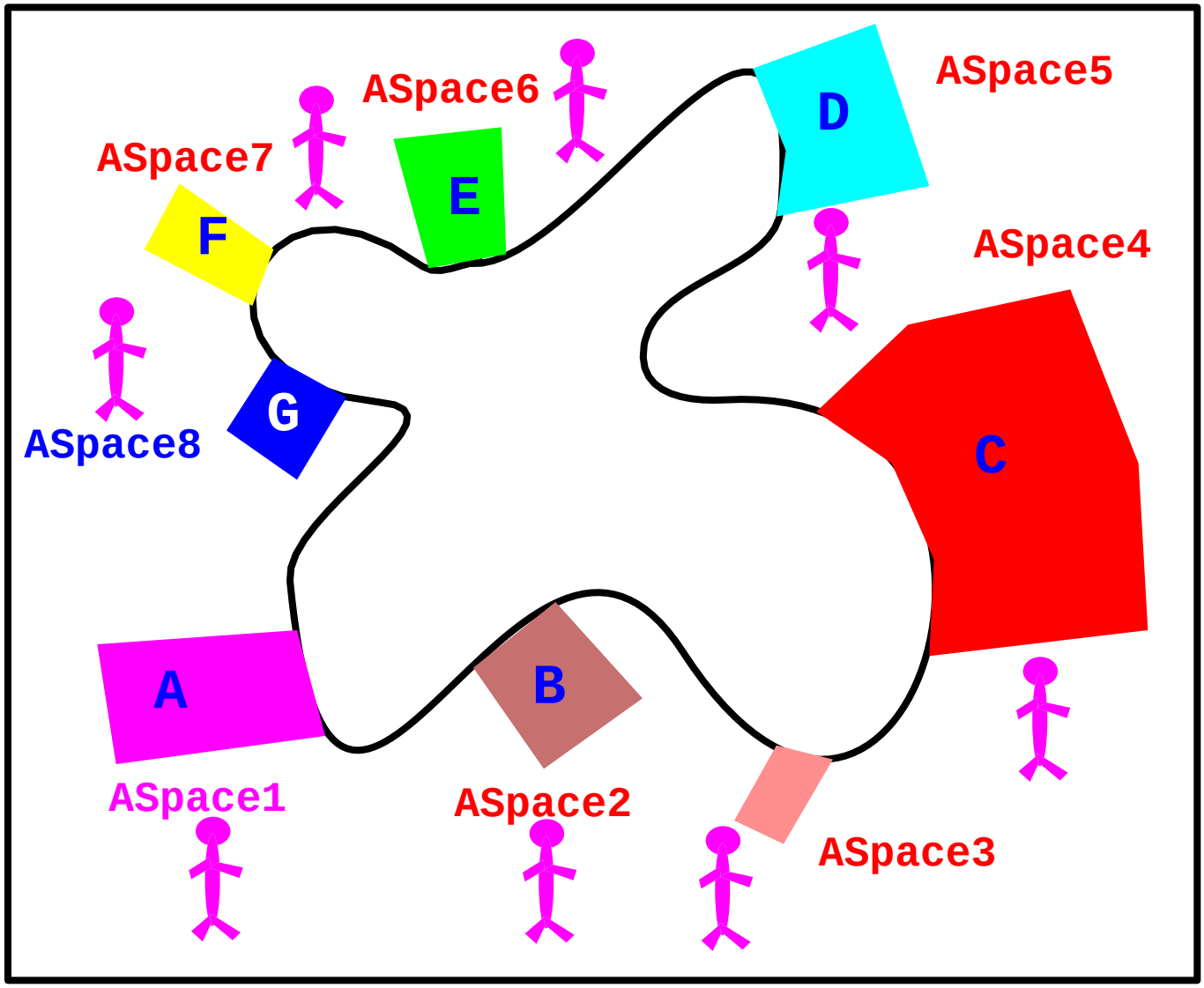
**SMALLER QUESTION:**

**How about INTERACTION??**

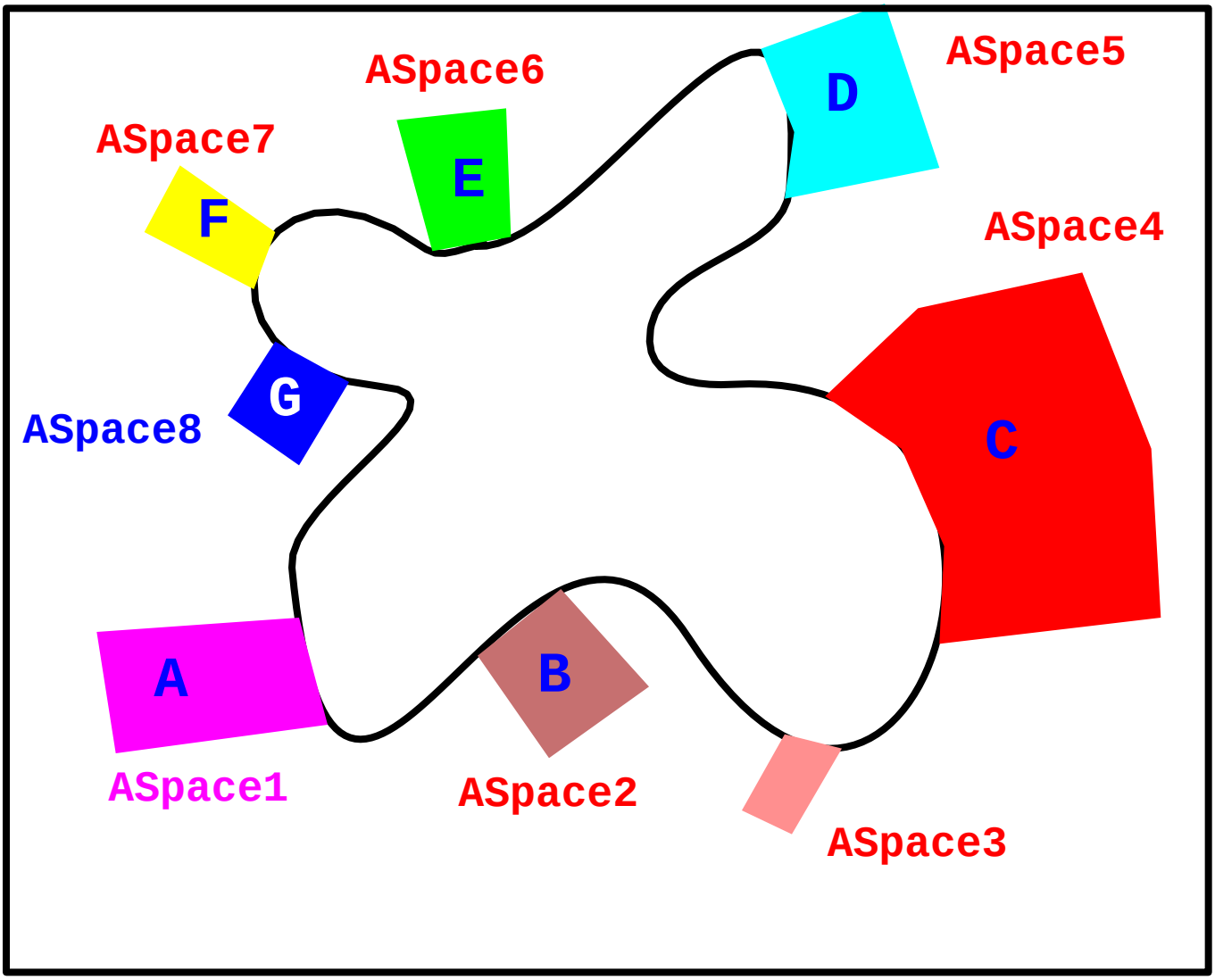
- **Sight + Sound has been tremendously successful**
- **Movies, TV, Internet ...**

**Can we include other senses also??**

- **Sense of touch (force feedback tactile sensors)**
- **Sense of smell (Airlines)**
- **Speech (understanding)**




# World of Active-spaces




# World of Active-spaces

- **Complex and Non Linear Systems**

  1900: Movies as a medium

  1990s: Excellence can be achieved

  More than a lifetime

- **Can VE "Something" really understand us**

  Have we really changed the computational power at all

  Can we solve Halting problem for a VE

  How many active-spaces do we need

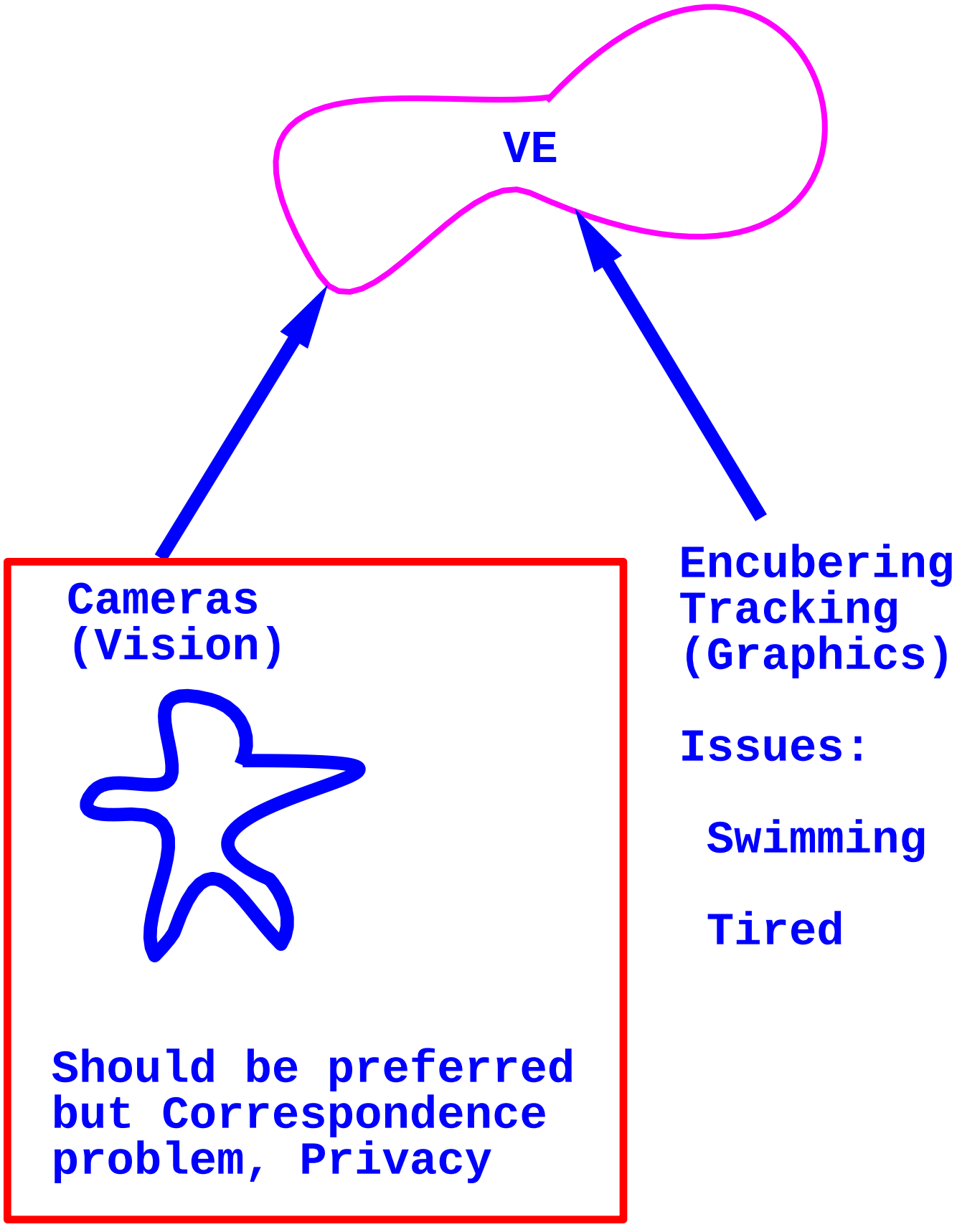
- **Human Centered Applications**

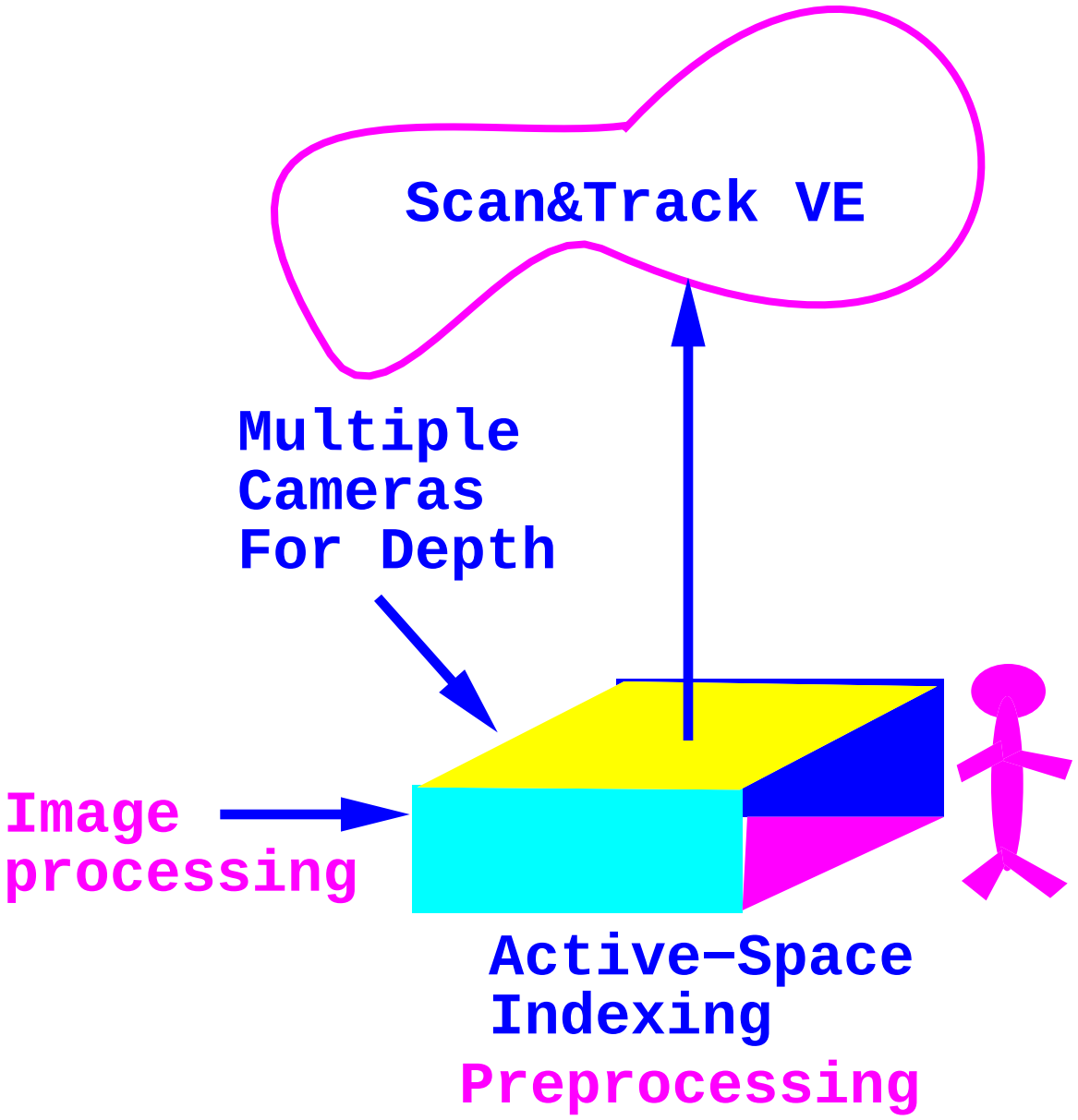
**Encumbering**

magnetic trackers
optical tracking

**Non-encumbering**

vision-based

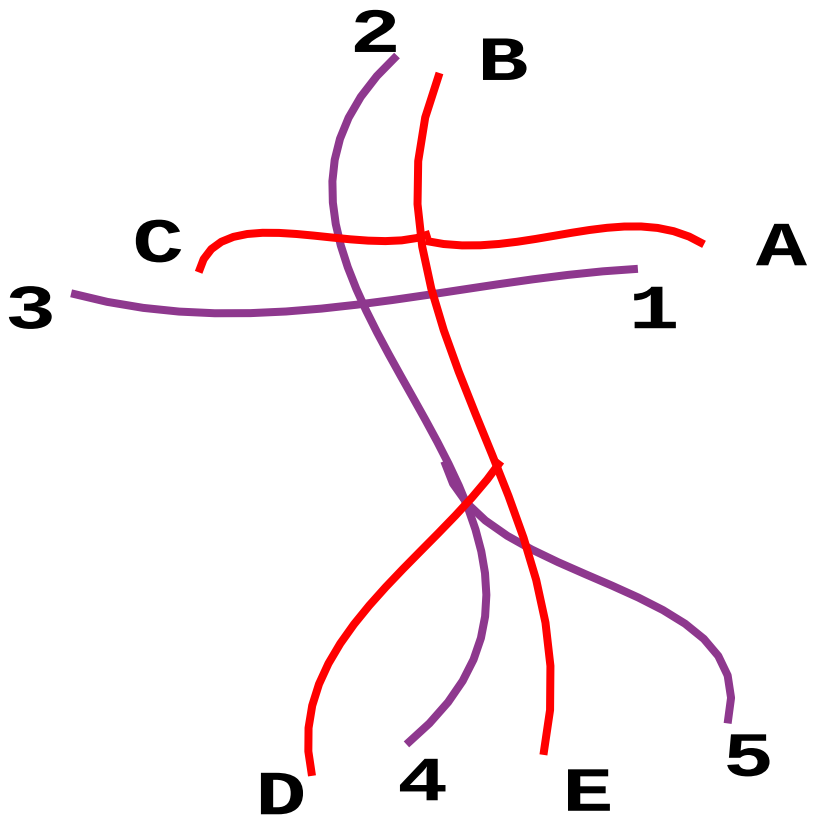

VE
Cameras
(Vision)
Encubering
Tracking
(Graphics)
Issues:
Swimming
Tired
Should be preferred
but Correspondence
problem, Privacy



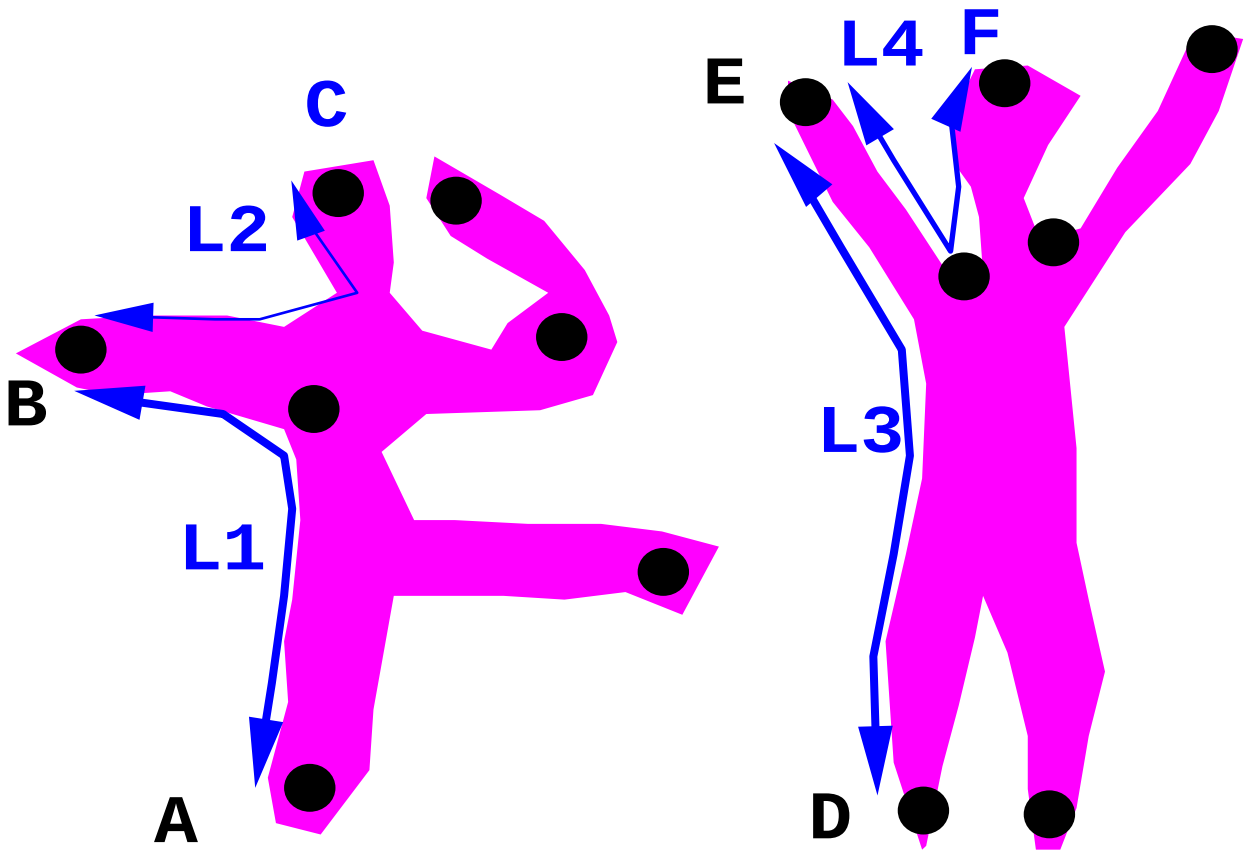

**Geometric-Spatial Information is gathered for later usage**

## Scan&Track

- Scalable
- Accurate
- Hardware Implementable
- Fast tracking when significant points are known
- Unencumbering
- 3D Tracking Multiple Cameras
- Allows Privacy, if needed
- Works with others, if desired
- Swimming effect

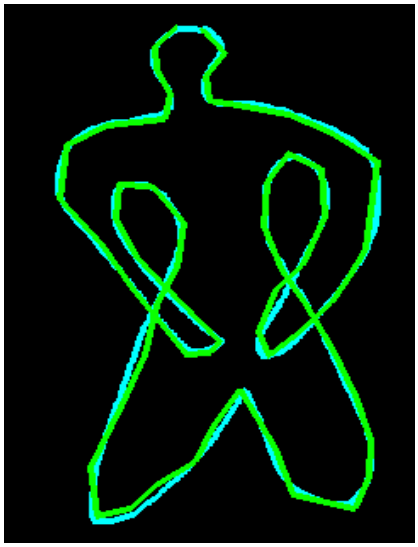



# Correspondence Problem



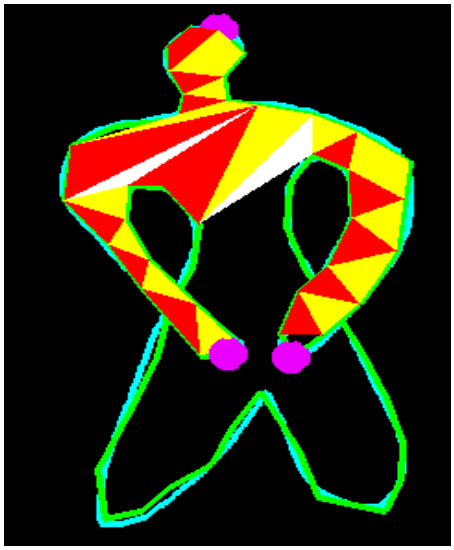

(a) Dancing (b) Elation

**Postures express emotions**



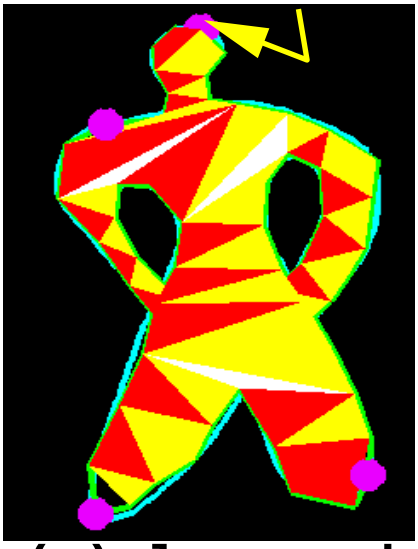
(a) 61 points

Starting point



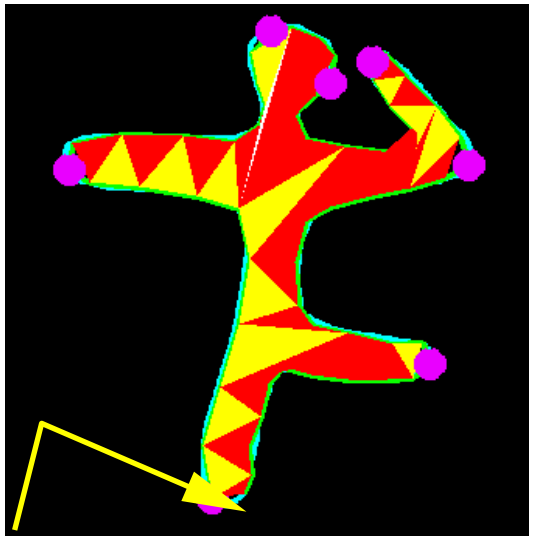
(b) Finger tips

starting point

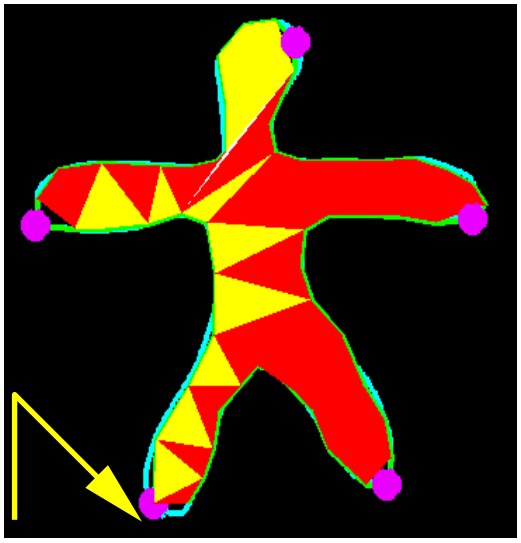


(c) legs and shoulder

(a) Overlapping contours.
(b) Partial geometric imprint (3 points).
(c) Remaining 4 geometric imprint points

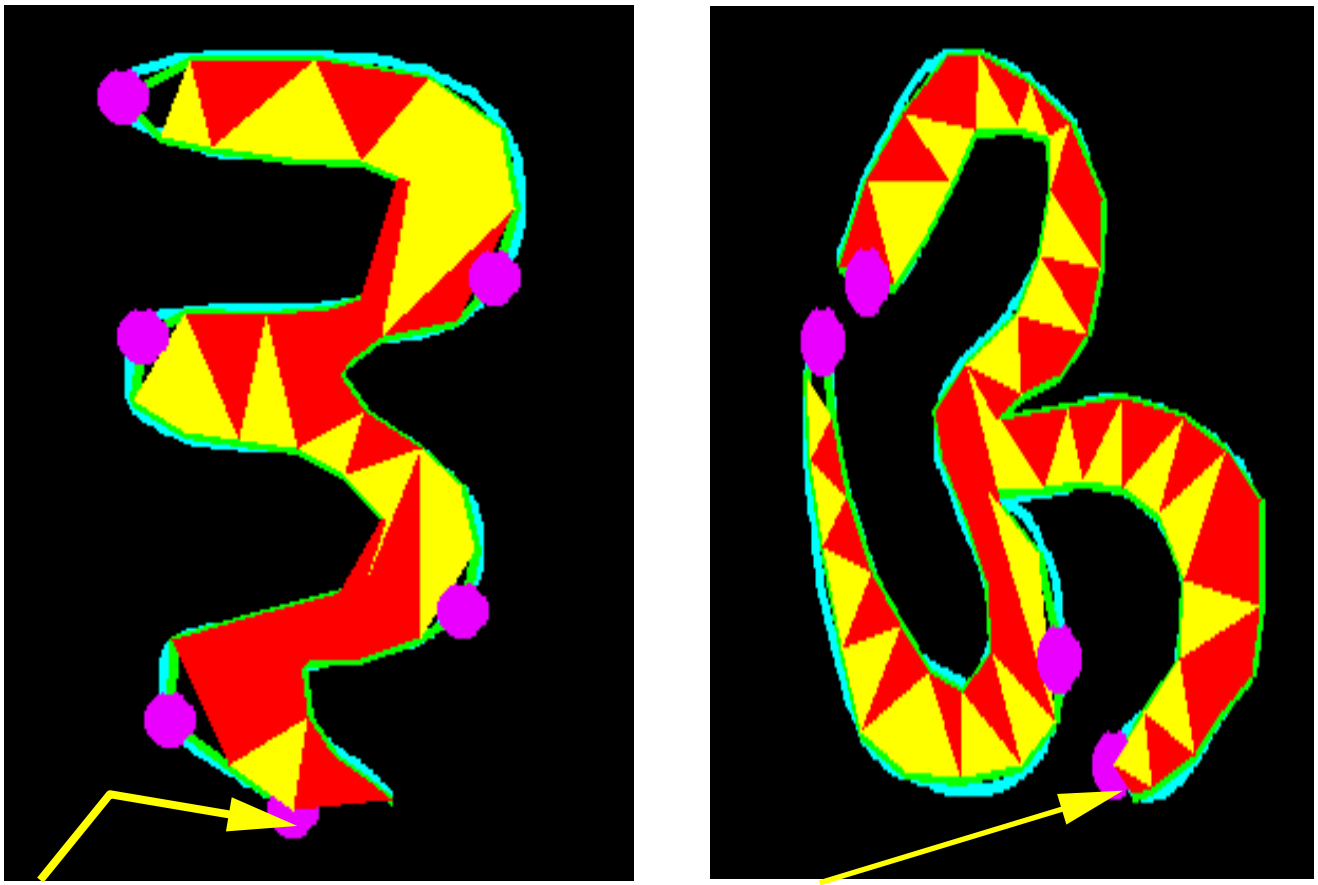


(a) starting point



(b) starting point

(a) Spread out pose. 57 points 7 geometric imprints.
(b) Dancing pose. 60 points, 5 geometric imprints.

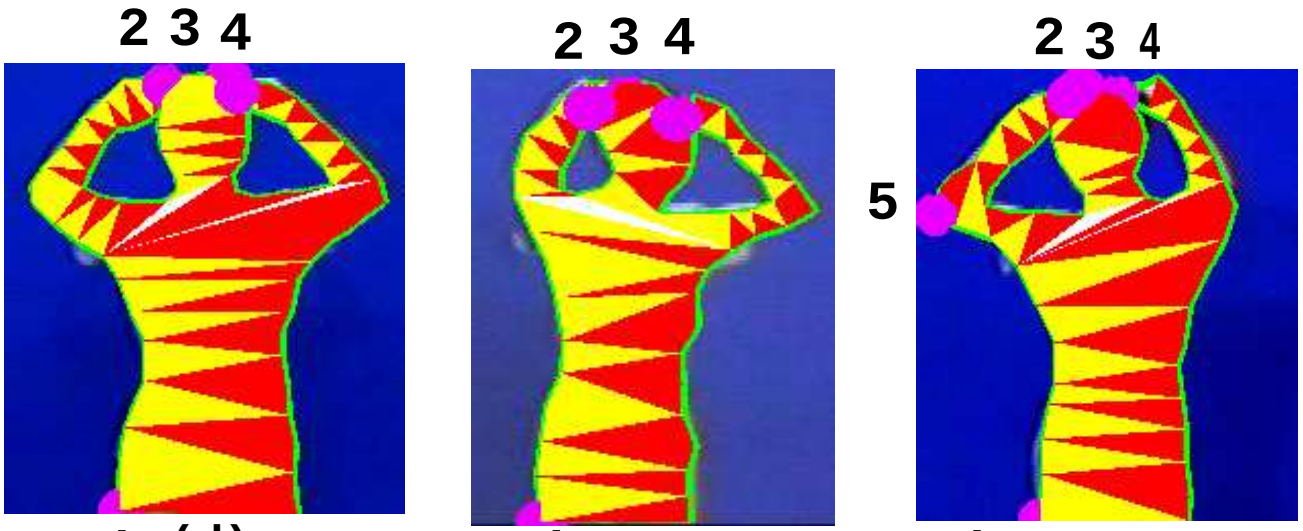


(a) starting point (b) starting point

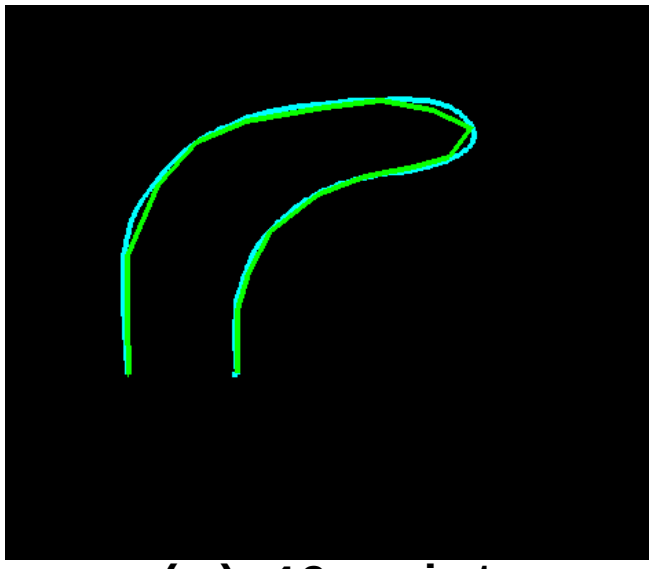
**Interesting Figures:**

(a) Winding river, 45 points,
6 geometric imprints

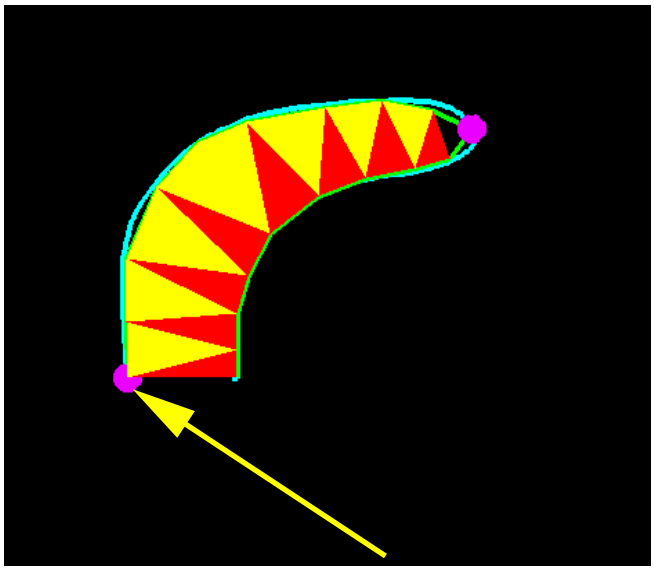
(b) Oohm sign, 67 points,
4 geometric-imprints.

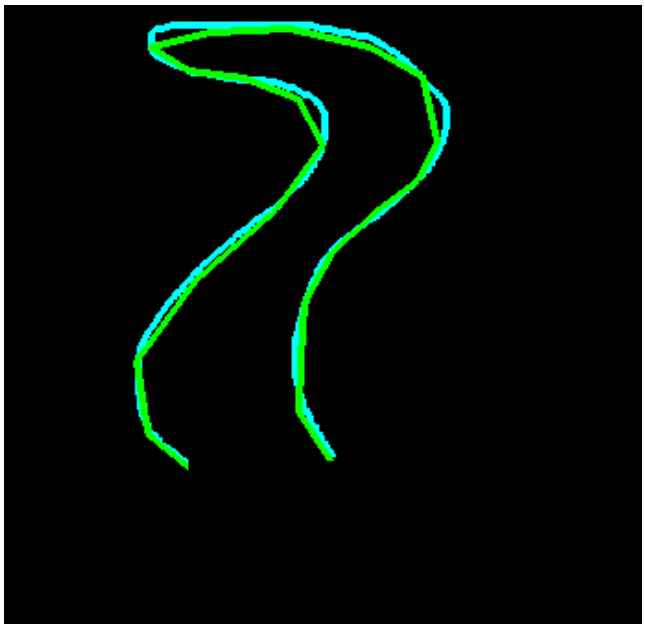

**Geometric-imprint points for three camera image for the same pose. (a) 77 Points (b) 63 points (c) 68 points (d) 4 (e) 4 (f) 5 geometric imprints.**



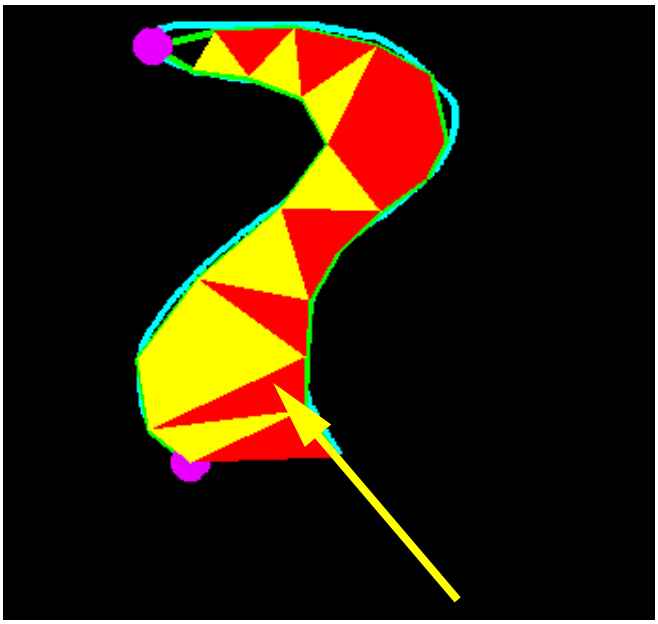
(a) 19 points



(b) starting point

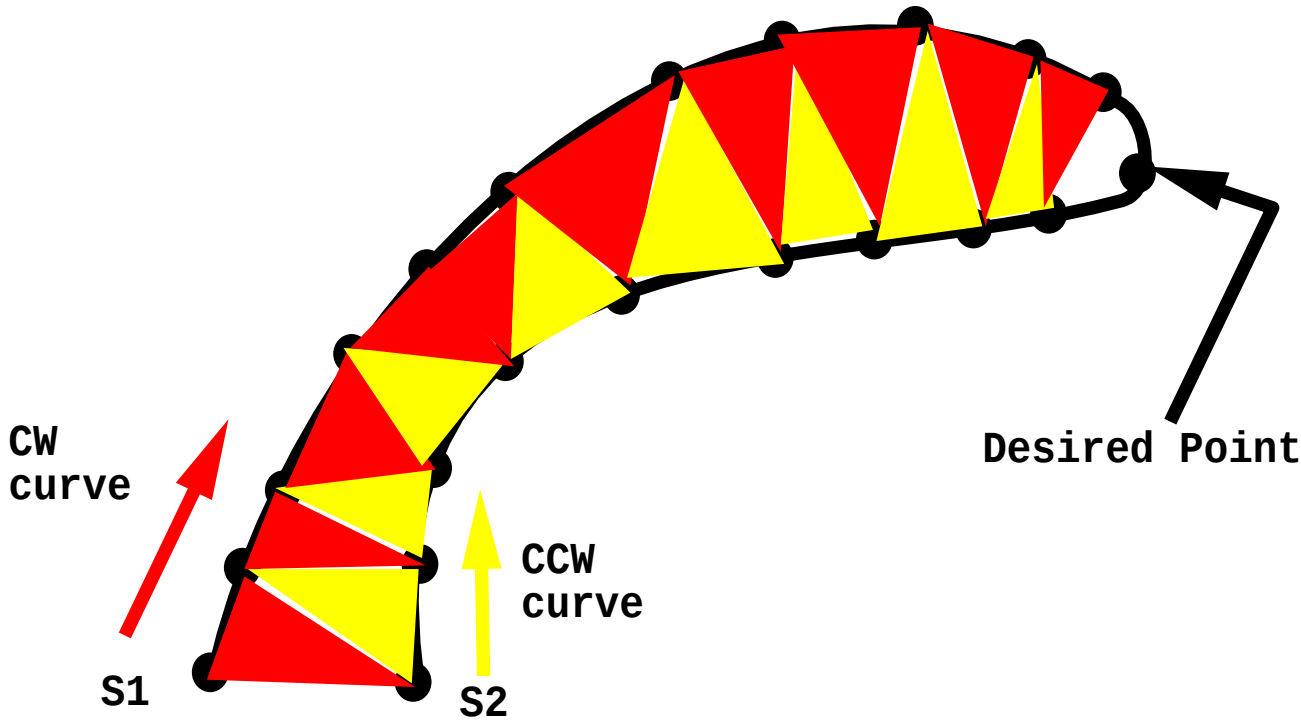


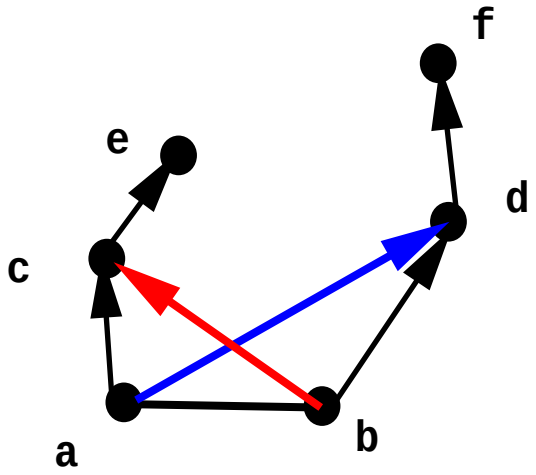
(c) 21 points

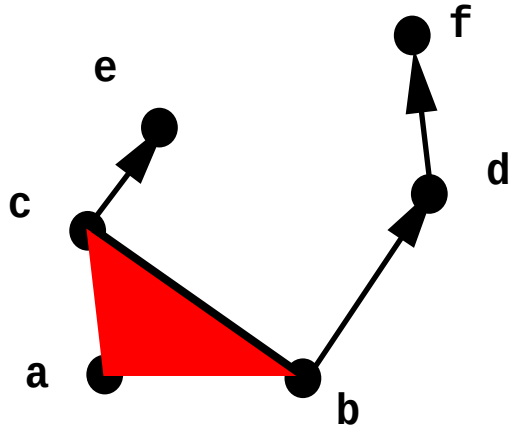


(d) starting point

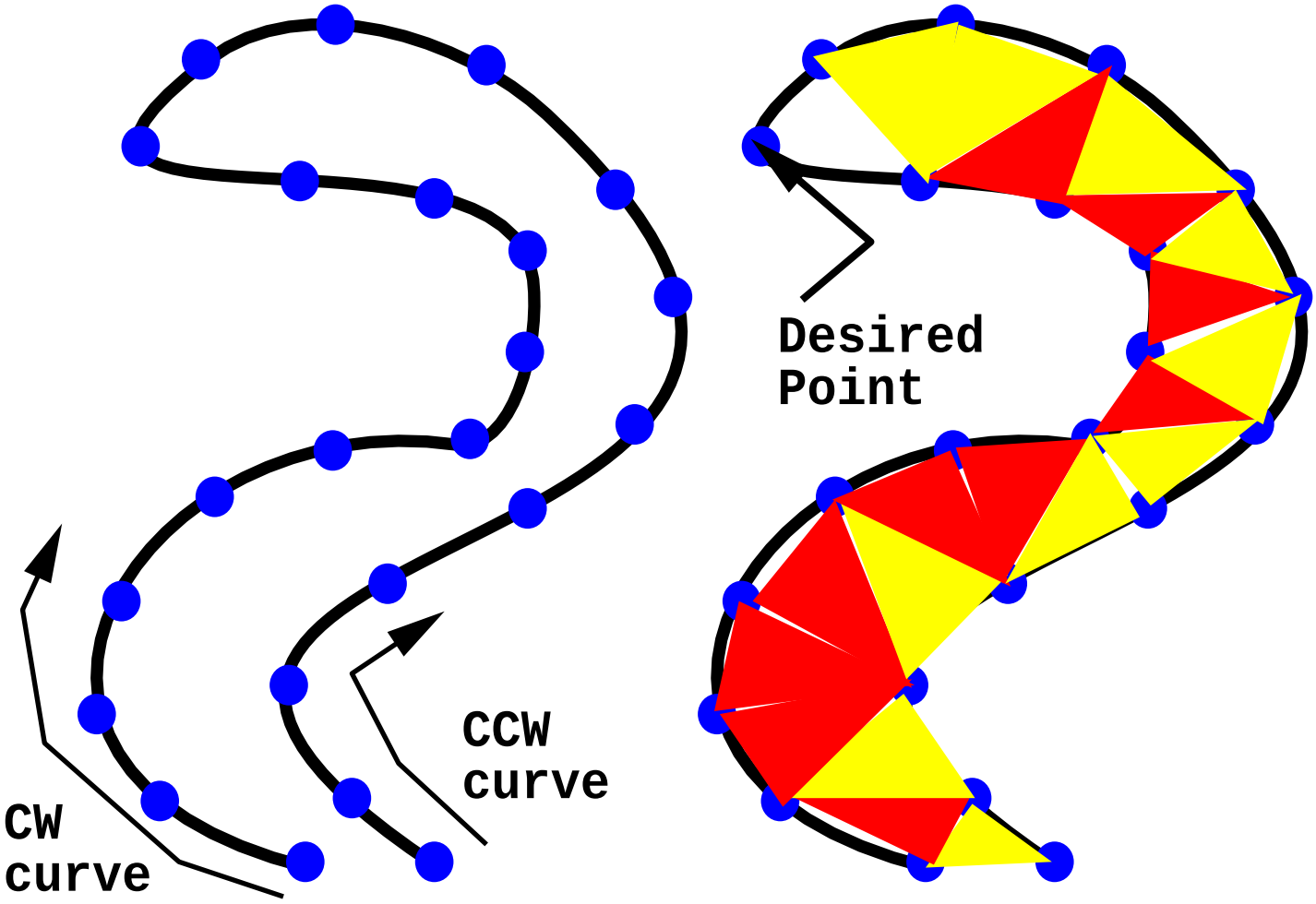
**Left (a,c): starting curves**
**Right(b,d): Geometric Imprint**



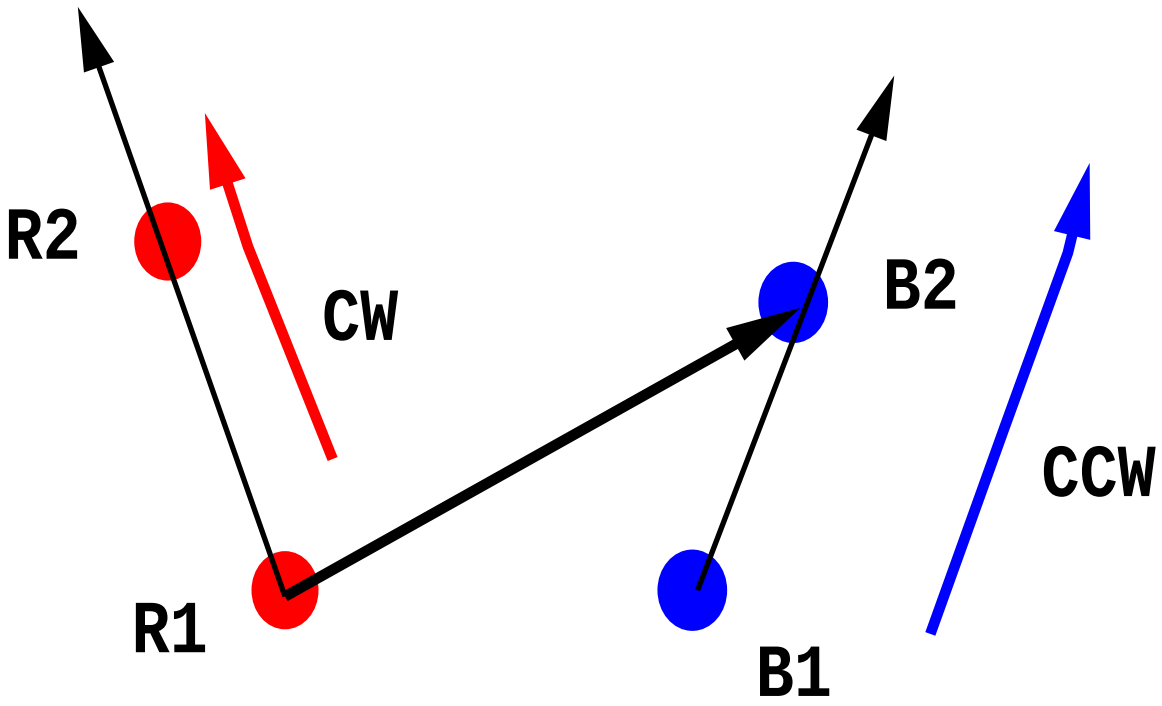




**Triangulation based upon smaller area available**

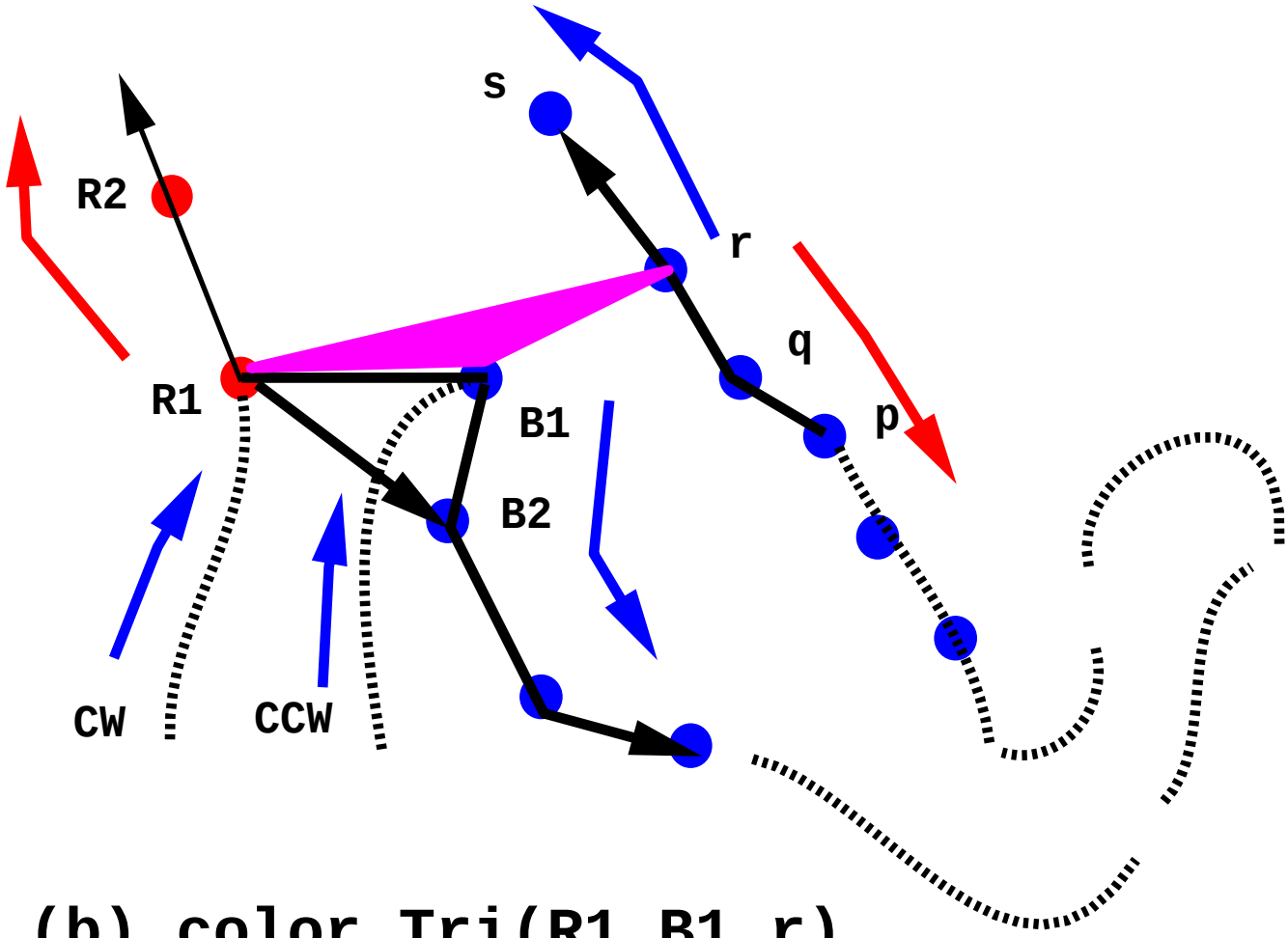



A modulating cylindrical shape




(a)

(a)color Tri(R1,B1,B2)
New-base line(r1,b2)




(b) color Tri(R1,B1,r)
Split into 2 Curves
(i) base line(R1,r)
CW–1: R1–>R2–>...
CCW–1: r–>s–> ...
(ii) base line(r,B1)
CW–2: r–>q–>p–> ...
CCW–2: B1–>B2–> ..

**Shows Curve–Splitting**

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