



Common robot platform  
with communication and  
power modules onboard

# The MiCRoN Project

## Microsystem & Machine Vision Laboratory

19th Jan 2005



Integrated  
tools or  
cameras

→ 1  $\mu$ m?

Towards a  
Nanogripper

MMVL

<http://www.shu.ac.uk/research/meri/mmvl/>

MRC

[http://www.shu.ac.uk/research/meri/modelling\\_rc.html](http://www.shu.ac.uk/research/meri/modelling_rc.html)

MERI

<http://www.shu.ac.uk/research/meri/>

SHU

<http://www.shu.ac.uk/>

SPM methods

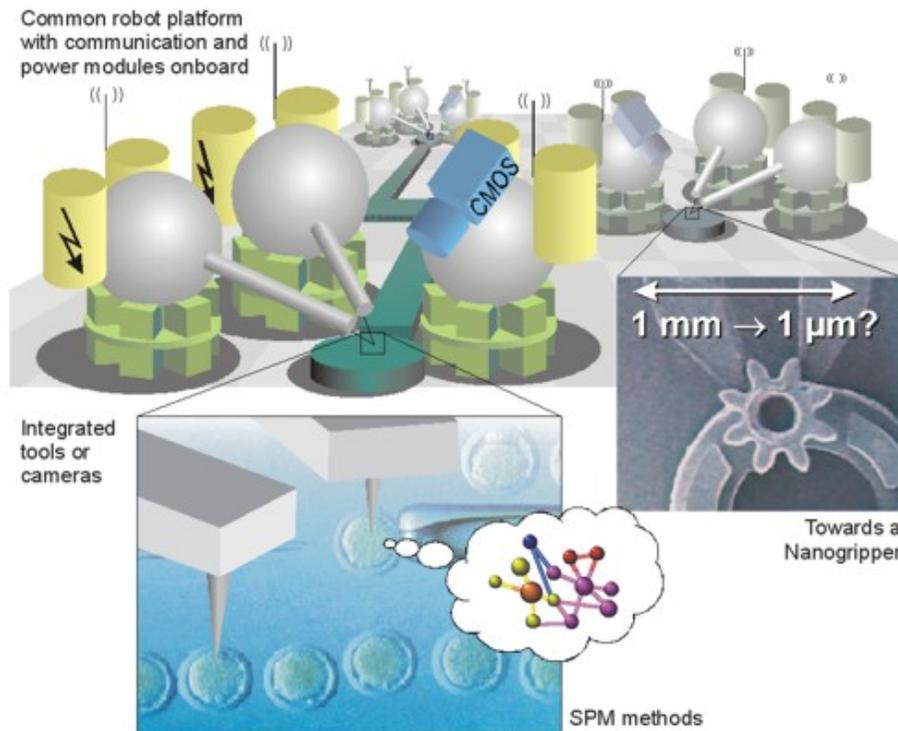




## MiCRoN

European Union IST project

Uppsala, Lausanne, St. Ingbert, Athens, Pisa, Barcelona, Karlsruhe



### project goals

- Manipulate  $\mu\text{m}$ -sized objects
- Closed-loop control of robots
- 3D object recognition and tracking

### image acquisition

- micro-camera
- microscope

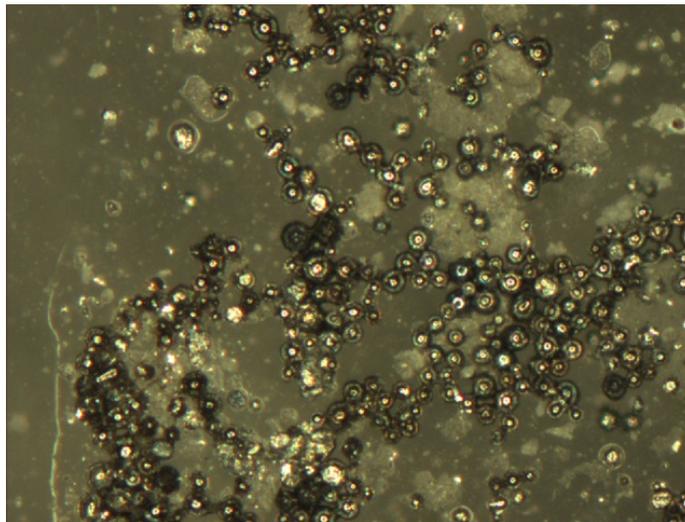
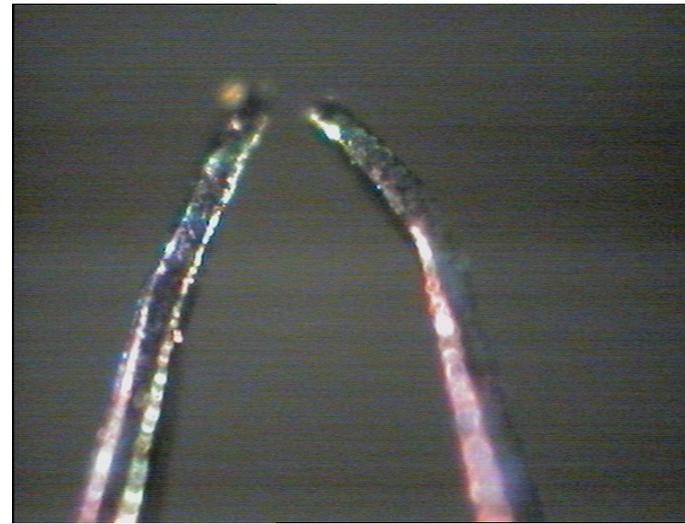
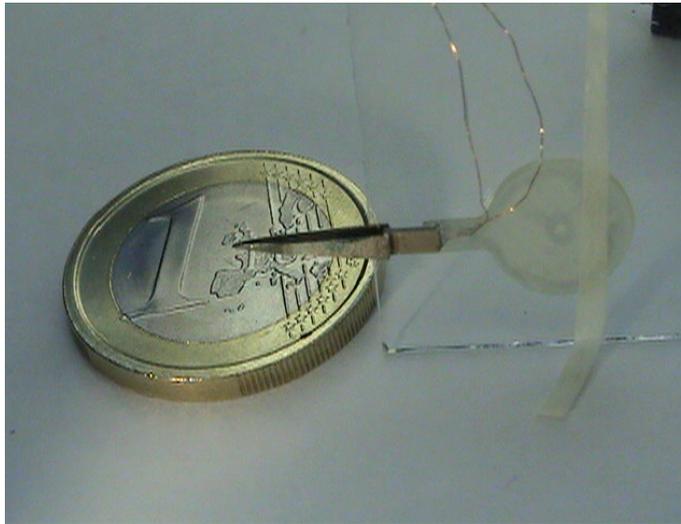
<http://wwwipr.ira.uka.de/~micron/>

<http://www.cordis.lu/ist/>





Scuola Superiore Sant'Anna (Italy)

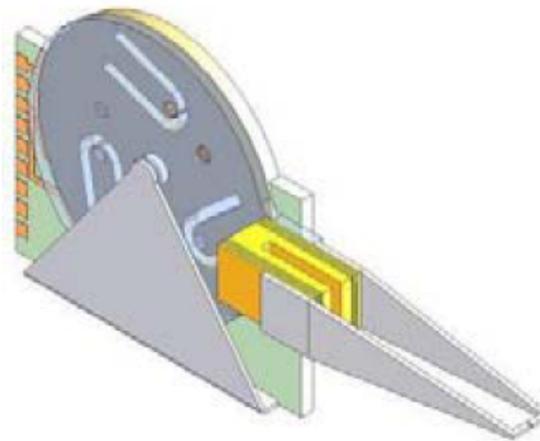
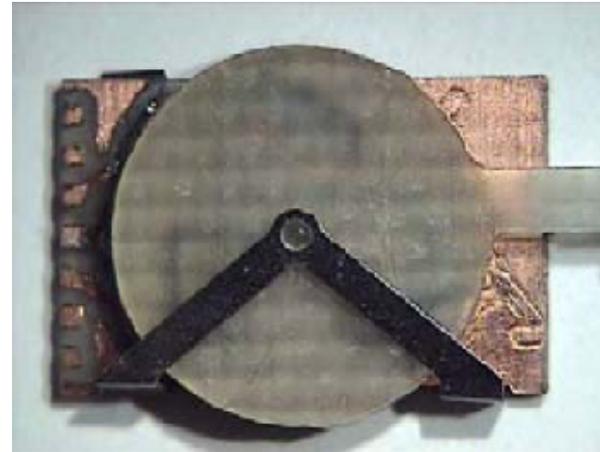


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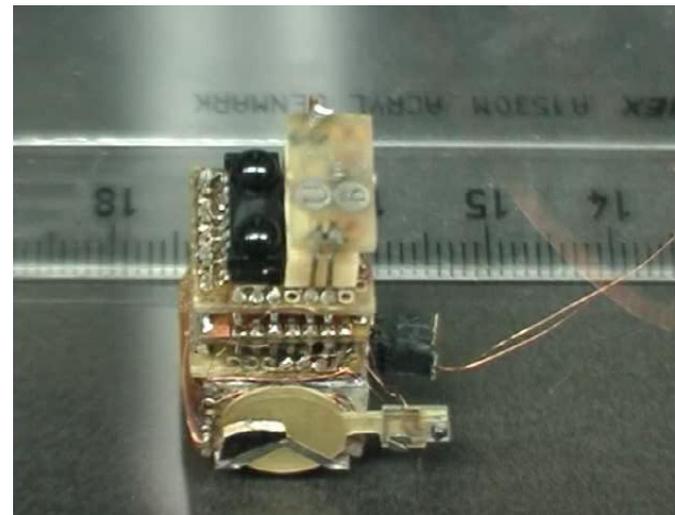
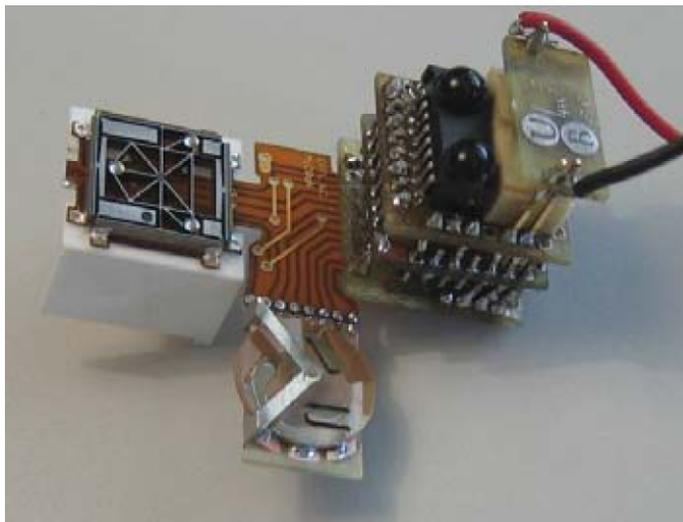
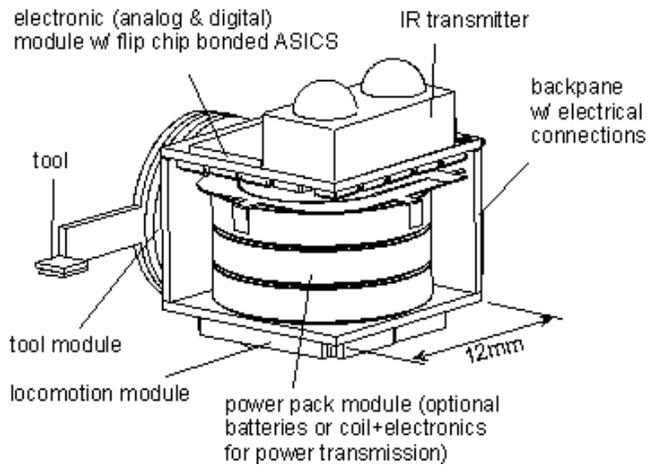


## Uppsala University (Sweden)



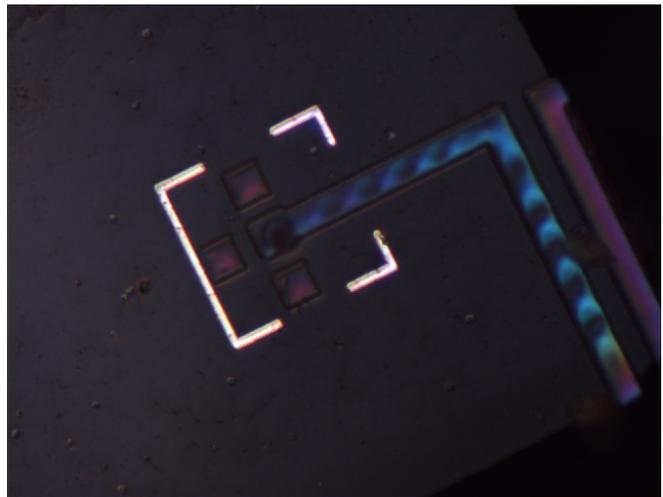
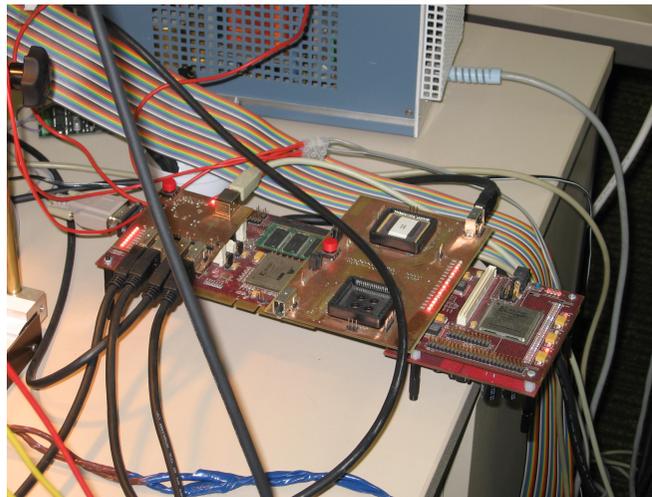
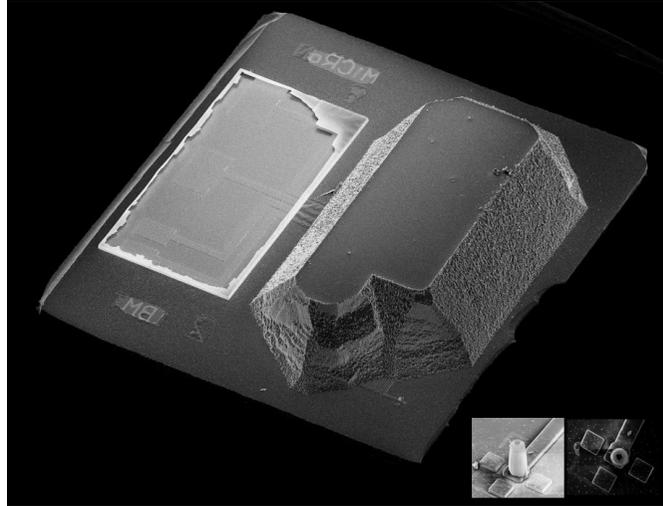


## Ecole Polytechnique Fédérale de Lausanne (Swiss)



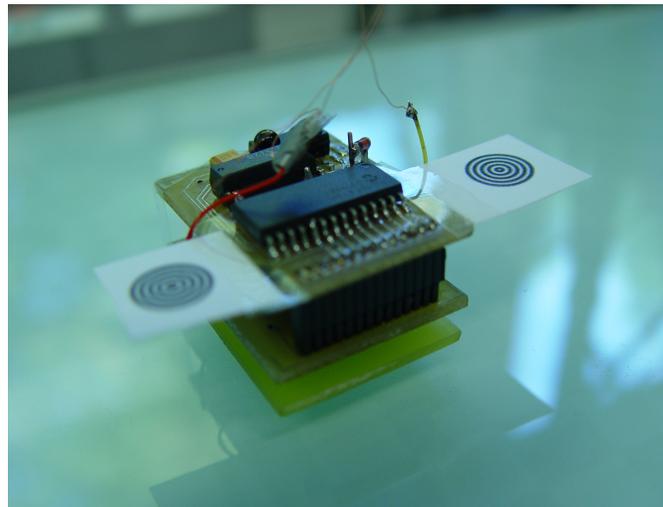
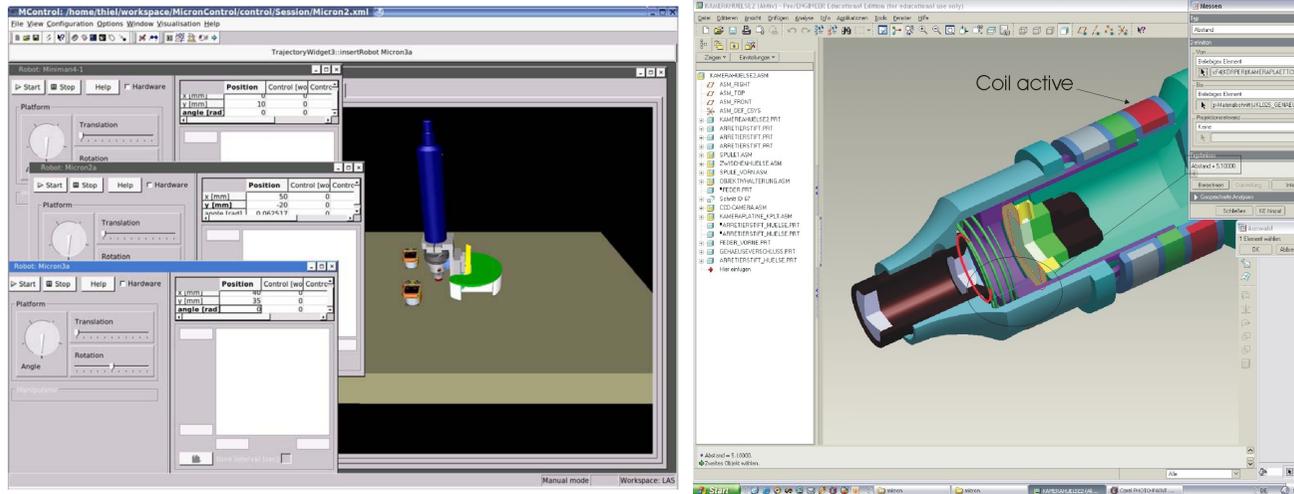


Fraunhofer Institute, St. Ingbert (Germany)



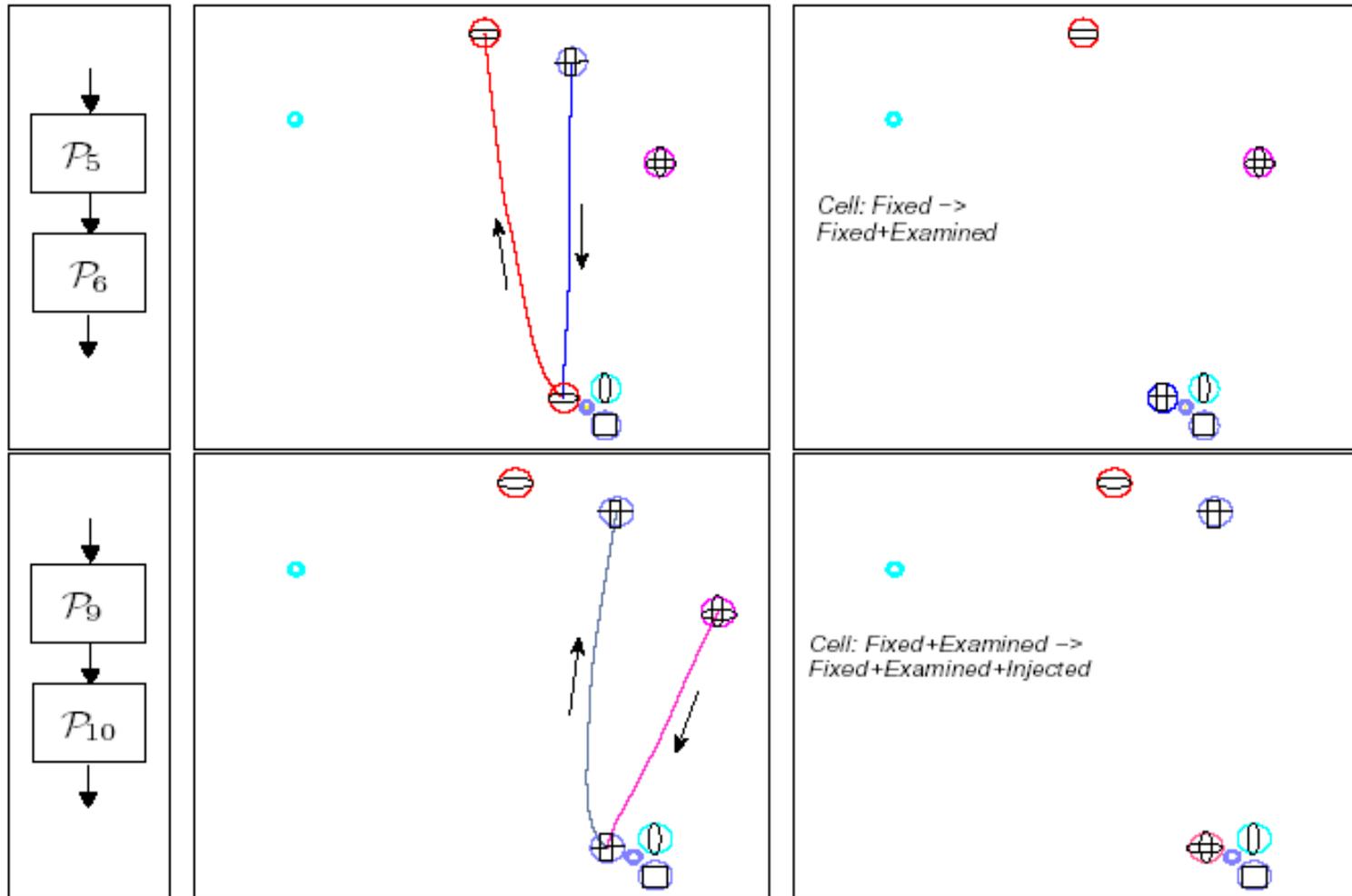


## Karlsruhe University (Germany)



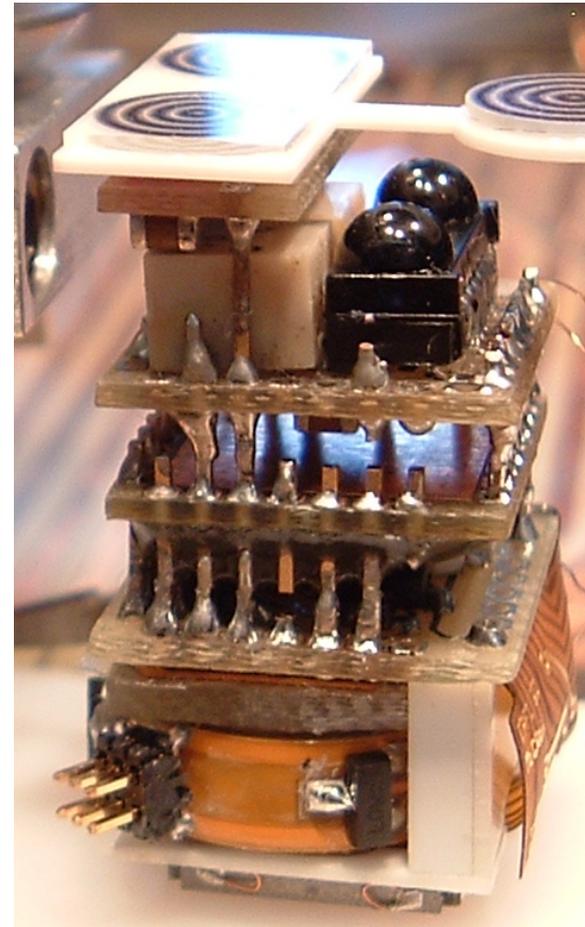
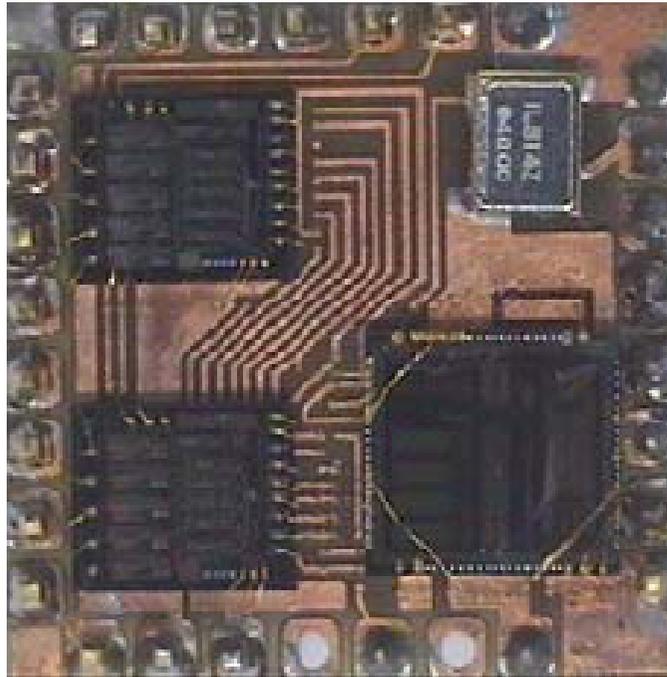


## National Technical University of Athens (Greece)



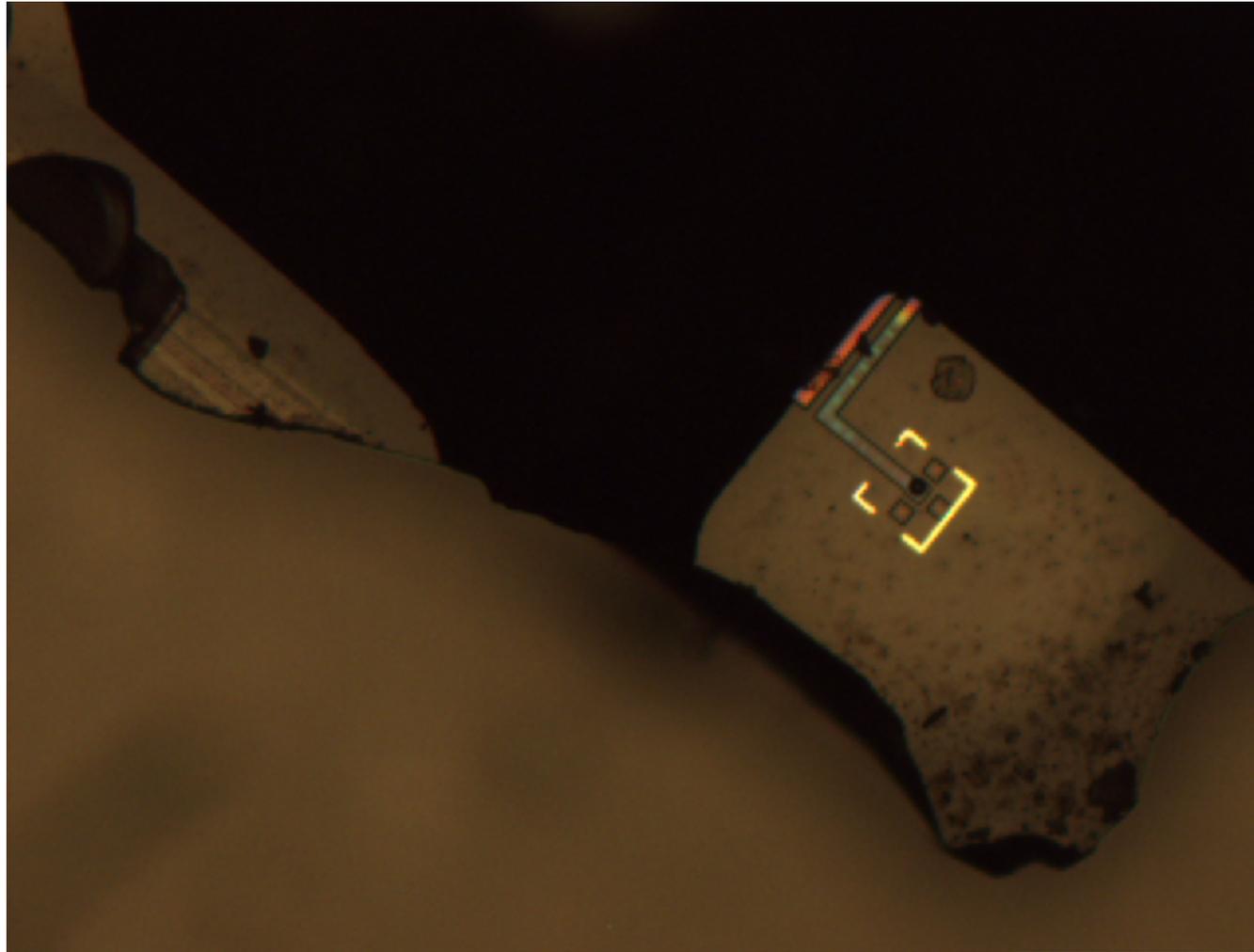


University of Barcelona (Spain)





geometric hashing (i)





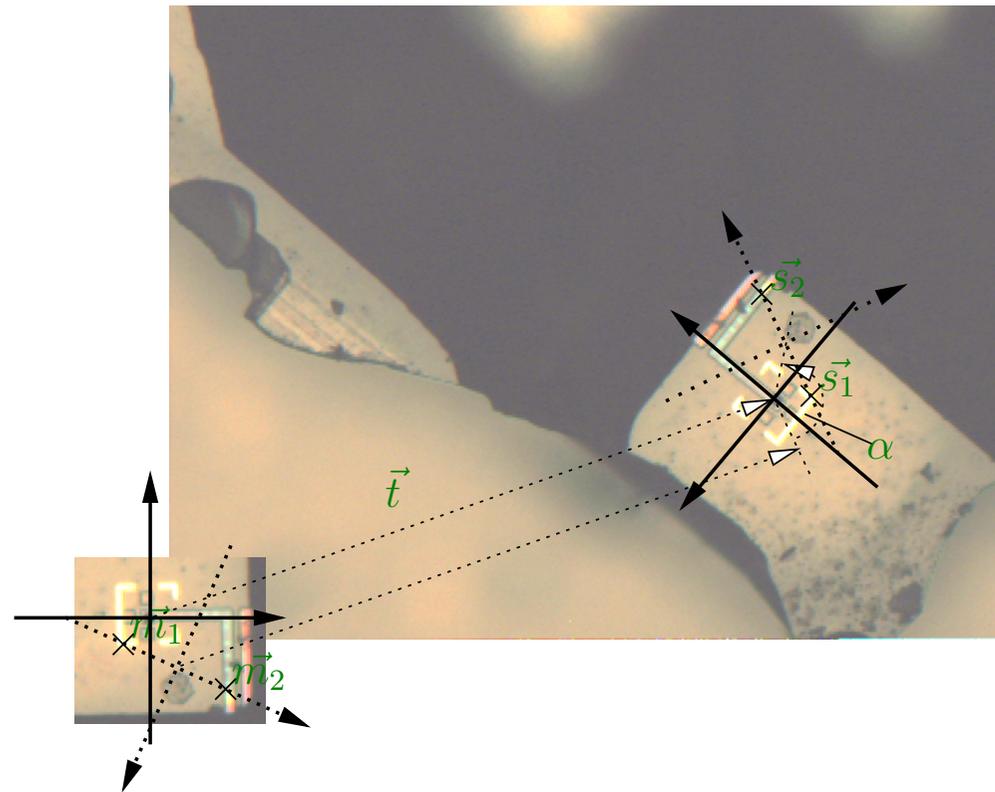
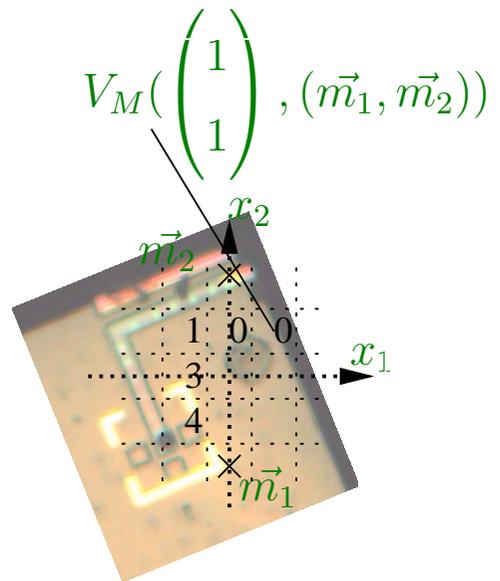
geometric hashing (ii)





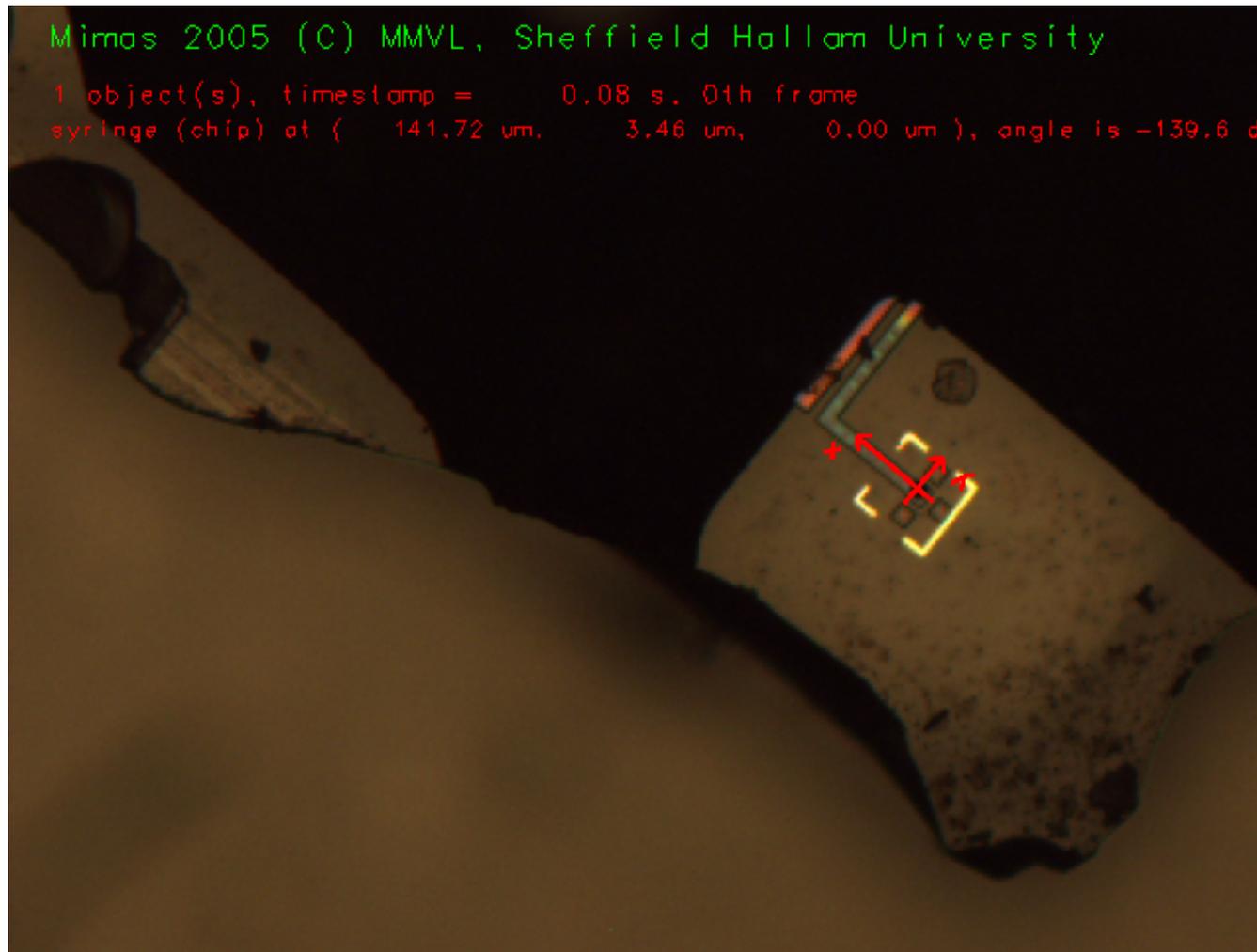
geometric hashing (iii)

3-D / 3 DOF





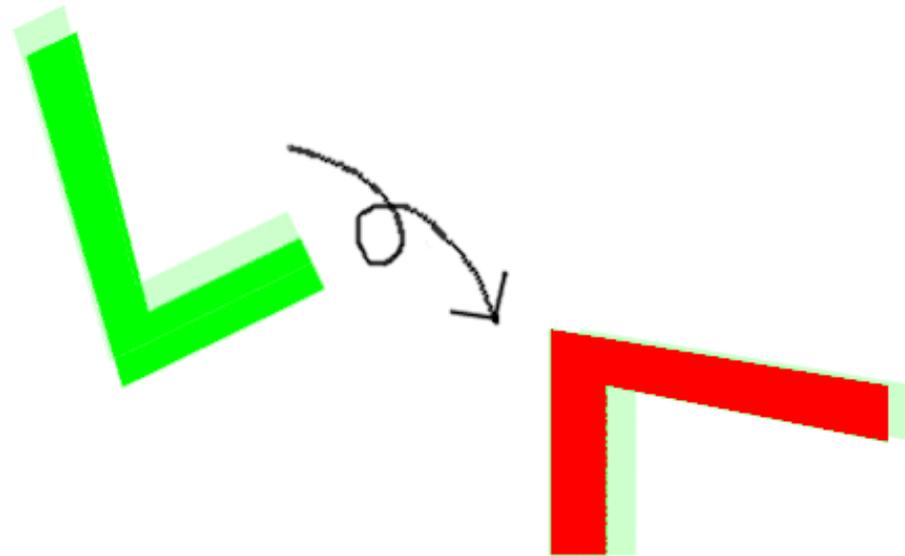
### geometric hashing (iv)





bounded hough transform (i)

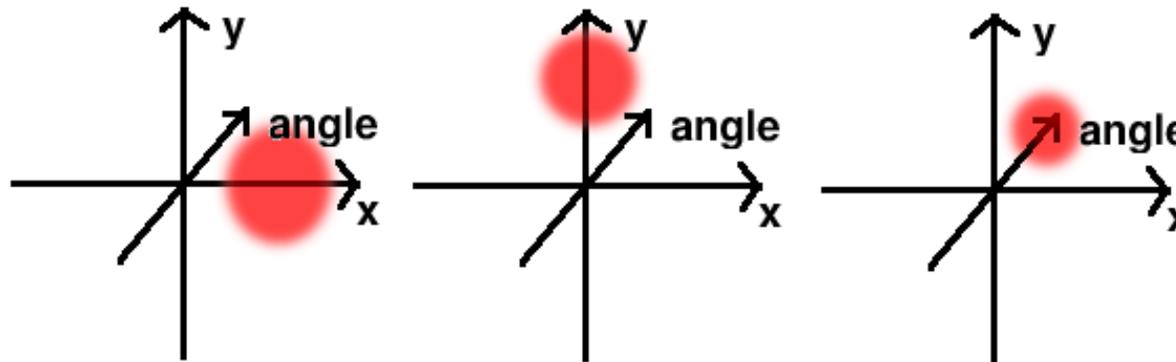
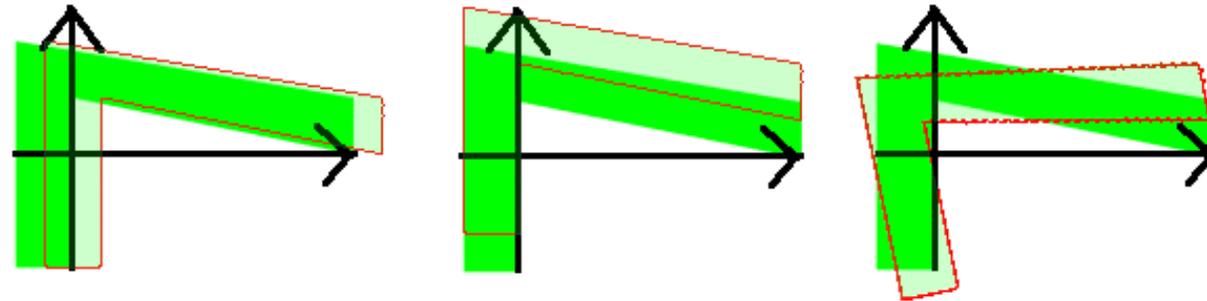
inverse transformation





**bounded hough transform (ii)**

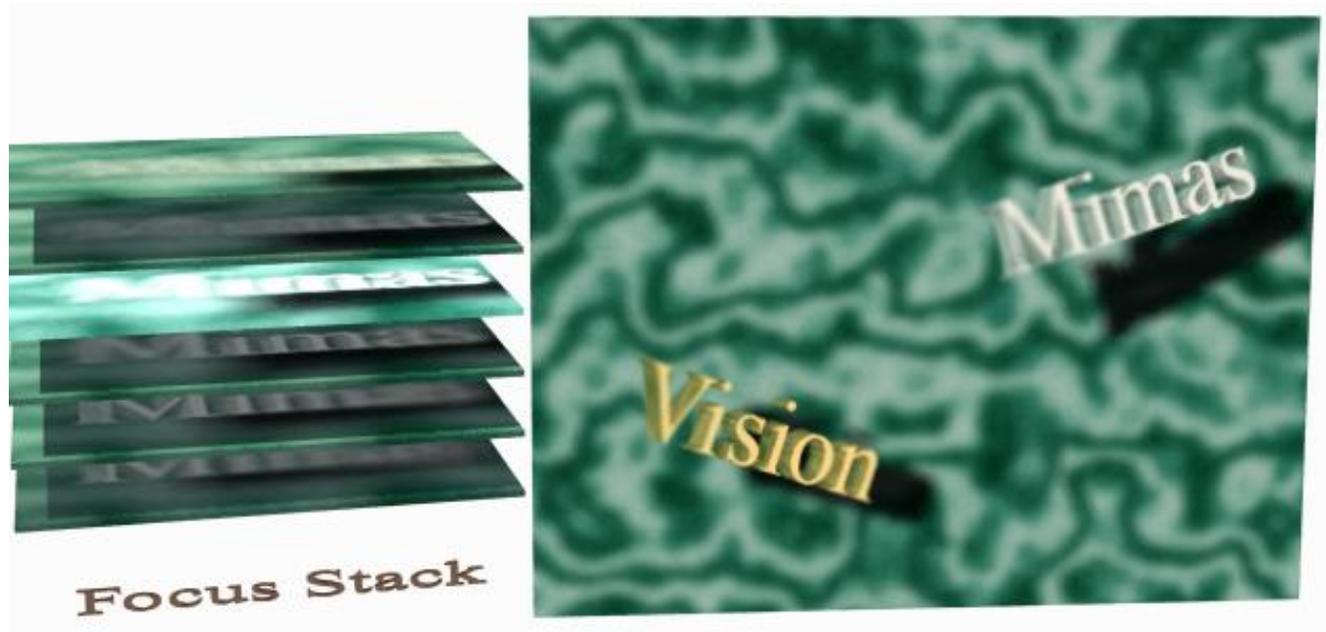
houghspace for relative shifts





depth perception)

focus stacks for 4 DOF





tests

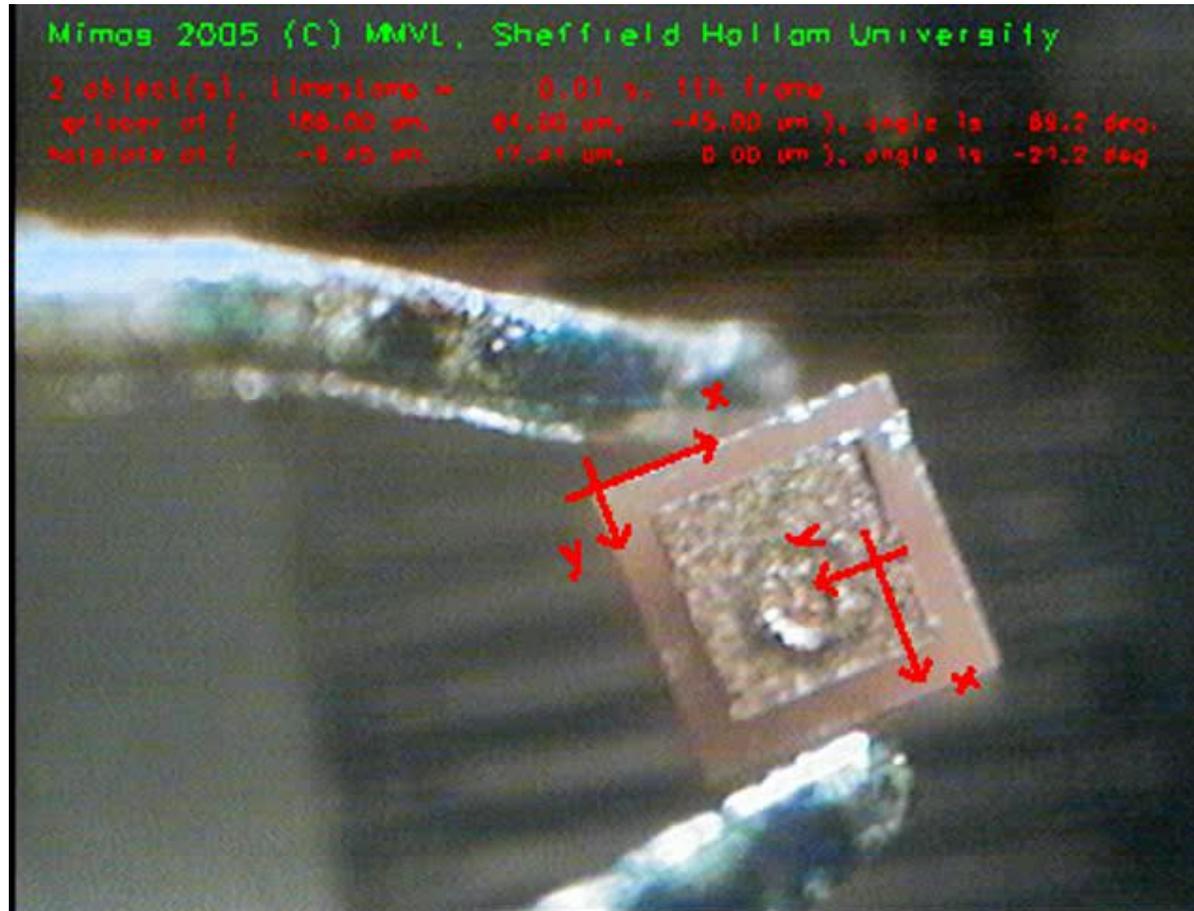
gripper





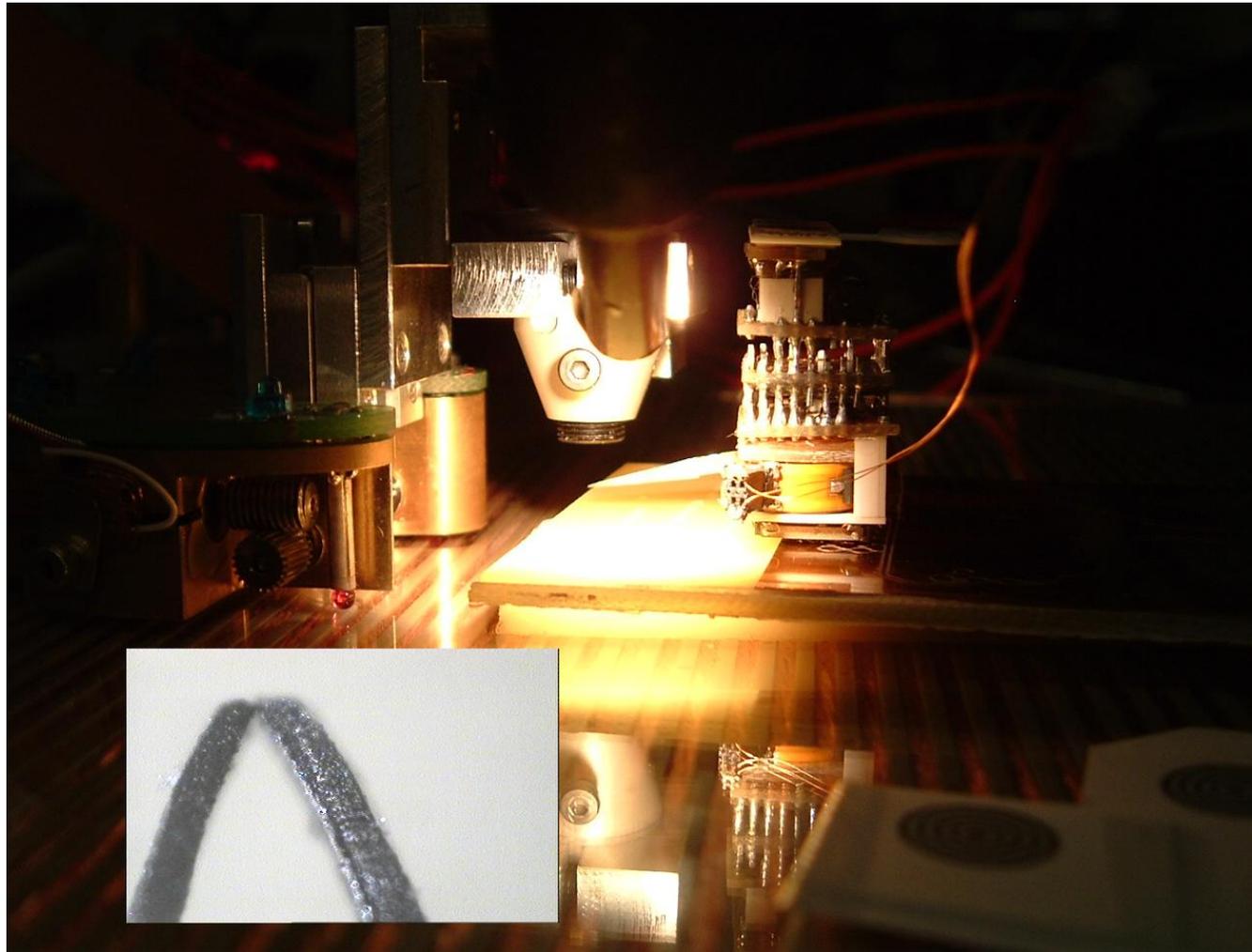
tests

gripper2



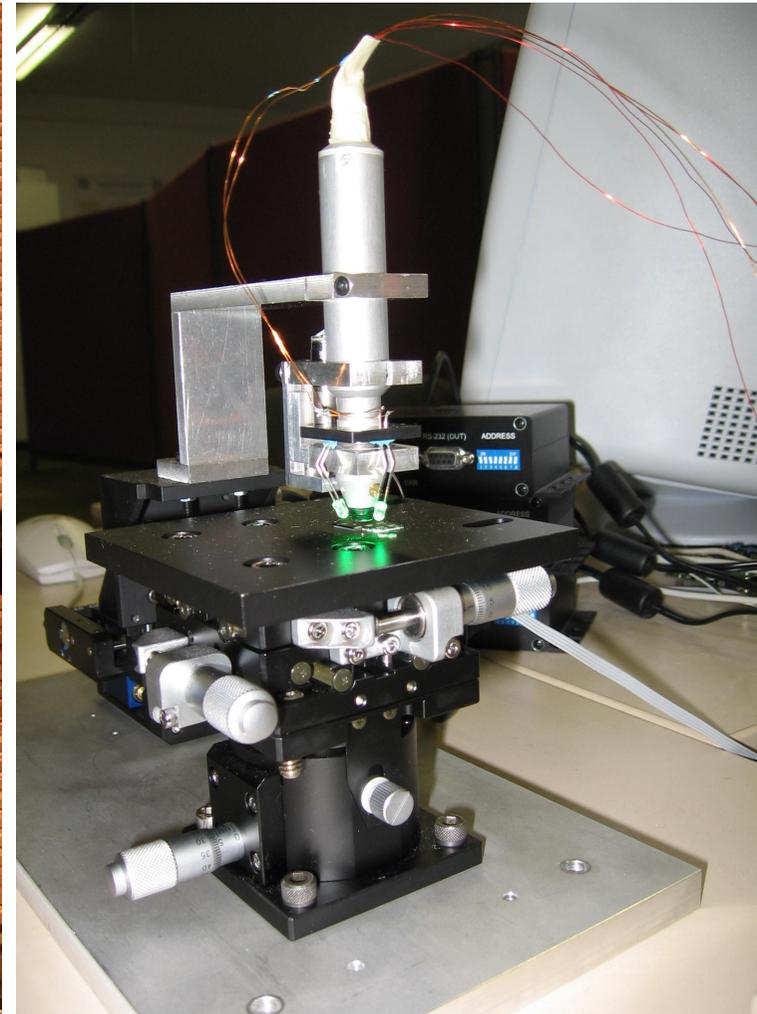
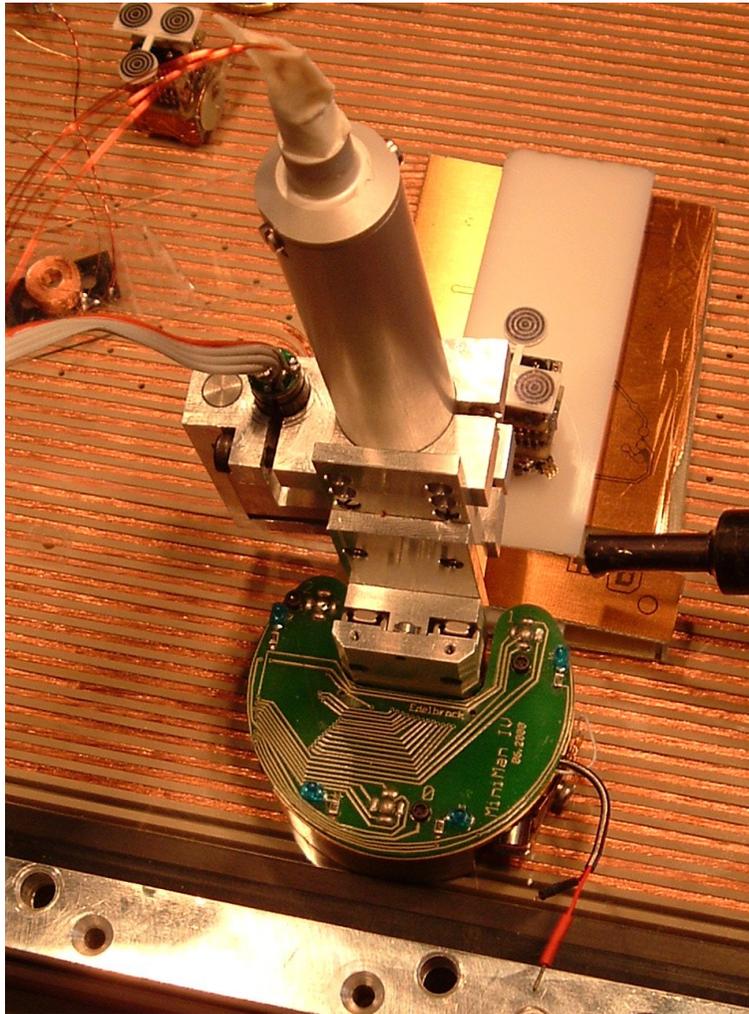


## MiCRoN setup





## Sheffield Hallam University





## Graphical User Interface

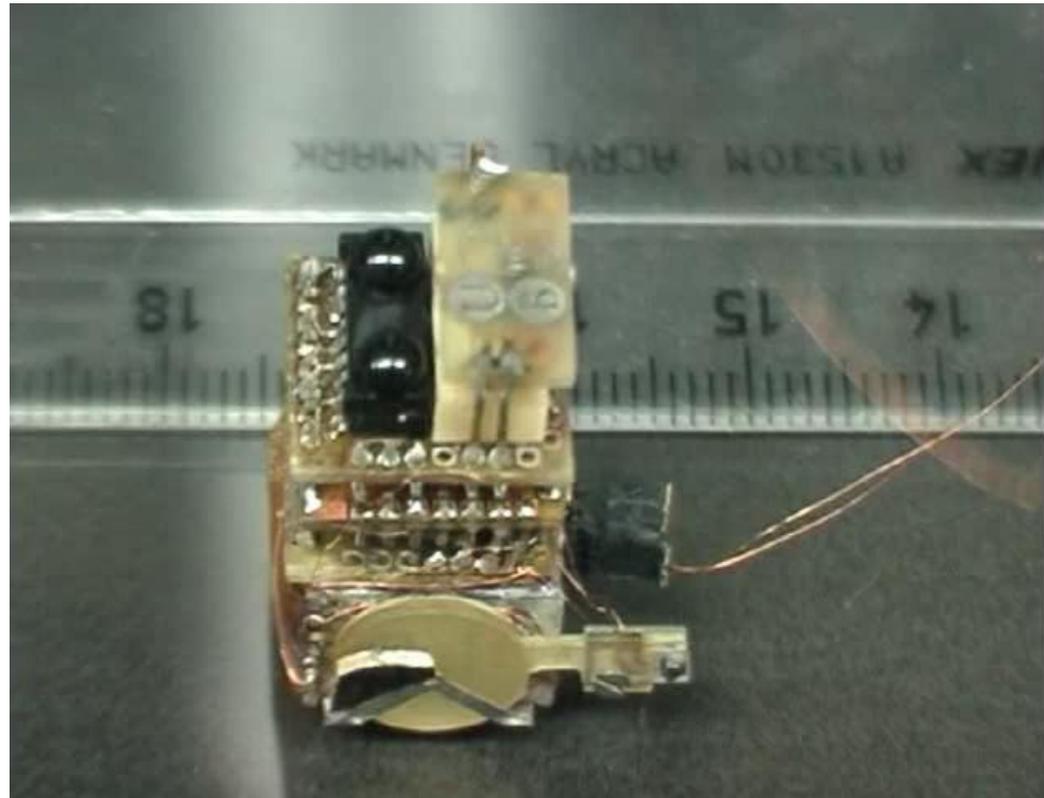
The screenshot displays the 'Micron Demonstration' software interface. The main window shows a live video feed of a syringe chip. The text overlay in the top left of the video area reads: 'Mimas 2005 (C) MMVL, Sheffield Hallam University', '1 object(s), timestamp = 148.22 s, 379th frame', and 'syringe-chip at ( -15.75 um, -22.50 um, 20.00 um ), angle is 0.'. A coordinate system with x, y, and z axes is overlaid on the chip. The interface includes several control panels on the right: 'Camera' with sliders for Brightness (20000), Hue (32768), Colour (32768), and Contrast (30000); 'PI-stage' with directional buttons (Backward, Up, Left, Right, Forward, Down) and position fields for x, y, and z (all set to --- um) with an 'Update' button; 'Micro Camera' with zoom in/out buttons and a scale of 1; and 'Objects' with a table listing 'syringe-chip' as a tracked object. At the bottom, there is a 'Filename prefix' field containing 'stack', a '000.ppm Stepsize' field set to 20 um, a '# Images' field set to 15, and a 'Grab' button. The status bar at the bottom left indicates '6.63283 frames/second'.





# MiCRoN

## robot



\*

<http://vision.eng.shu.ac.uk/mediawiki/>

