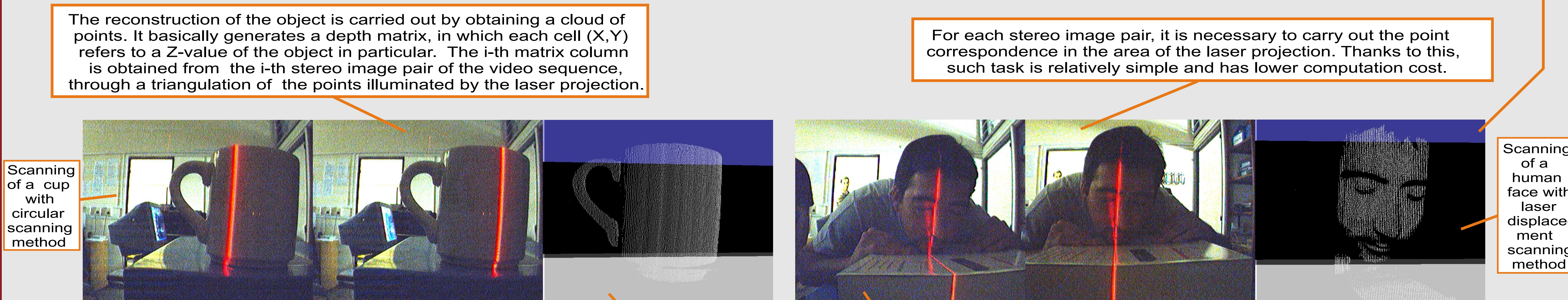# LOW COST 3D SCANNER PROTOTYPE WITH STEREOSCOPIC CAMERAS AND LASER ILLUMINATION

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Class III Low Power Laser, fixed over electric low revolutions motor

The stereo capture is made with two 30 fps, 640x480 webcams. It is necessary to calibrate the cameras intrinsically and extrinsically only once

The structure has certain characteristics that improve the capturing system versatility, such as horizontal controls, camera, laser and object location in multiple positions

Base support, it counts with a mini tripod adjustable head for a better object leveling

Rotating Base (3 rpm electric motor with random rotation direction)

Adjustable Support (butterflies - screws system that gives to the hardware more flexibility and robustness)

The resulting points cloud is viewed in a virtual envionment developed to the project. Also It can be seen in other formats like a VRML viewer

The reconstruction of the object is carried out by obtaining a cloud of points. It basically generates a depth matrix, in which each cell (X,Y) refers to a Z-value of the object in particular. The i-th matrix column is obtained from the i-th stereo image pair of the video sequence, through a triangulation of the points illuminated by the laser projection.

For each stereo image pair, it is necessary to carry out the point correspondence in the area of the laser projection. Thanks to this, such task is relatively simple and has lower computation cost.

Scanning of a cup with circular scanning method

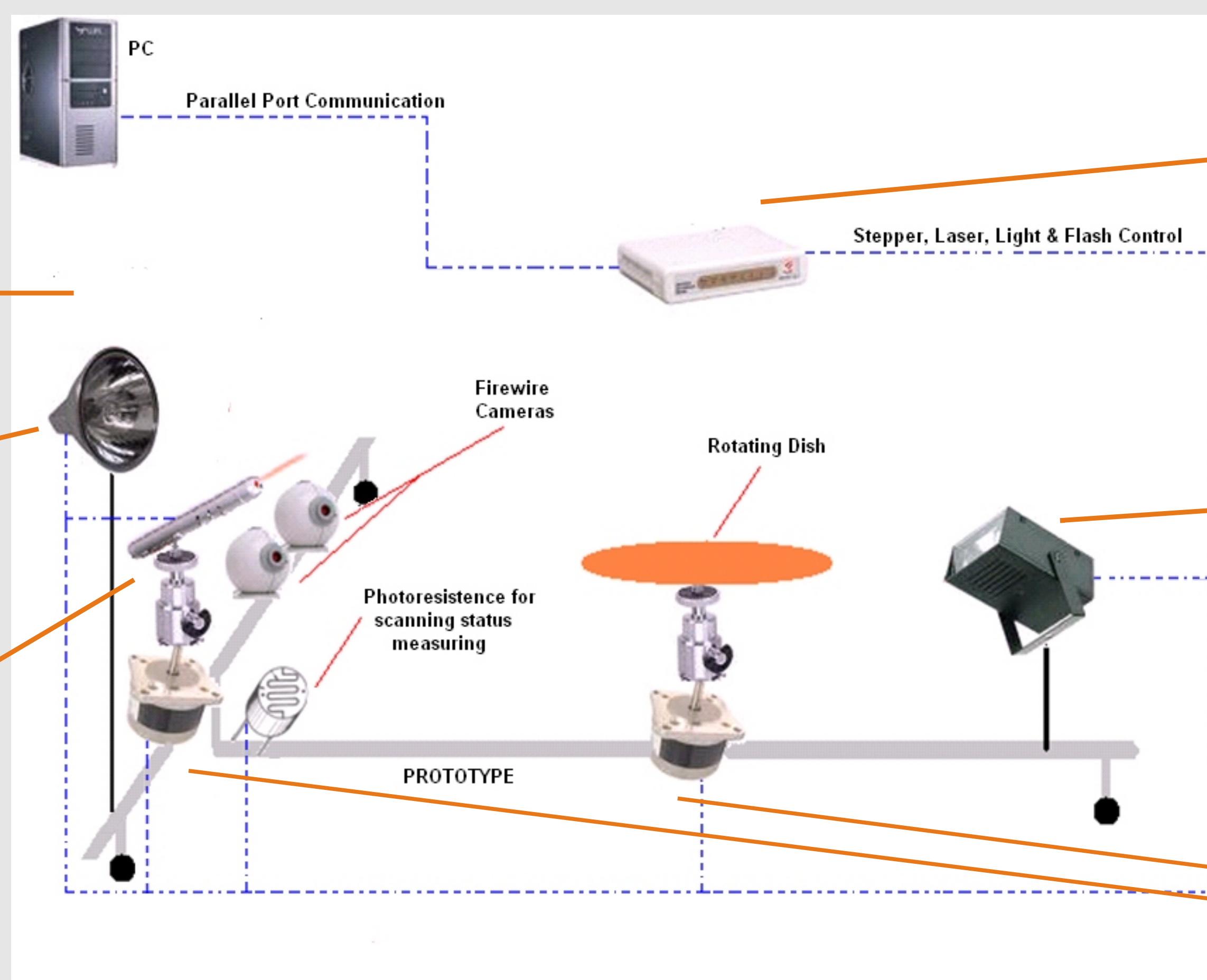Scanning of a human face with laser displacement scanning method

Data acquisition by rotating target: In this case, the laser remains fixed and the object rotates over its axis in order to reveal its surface. It is ideal for objects with cylindrical type volume, such as pots, cups.

Laser scan data acquisition: In this case, the object to be reconstructed remains fixed, while its surface is revealed by scanning the area with a laser. It is intended for objects with no volume of revolution or whose content is shown by a single face.

Currently the hardware is being modified to achieve a total automation of the reconstruction process including the scanning stage

PC
Parallel Port Communication

Prototype Controller Module (power device that connects the PC with the peripheral)

Stepper, Laser, Light & Flash Control

Firewire Cameras

Rotating Dish

Light to texture capturing in a normalized environment

Flash light to stereo videos synch

Photoresistence for scanning status measuring

Class III Low Power Laser mounted over a mini tripod adjustable head

PROTOTYPE

Step by step motors (200 steps with position sensor)

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