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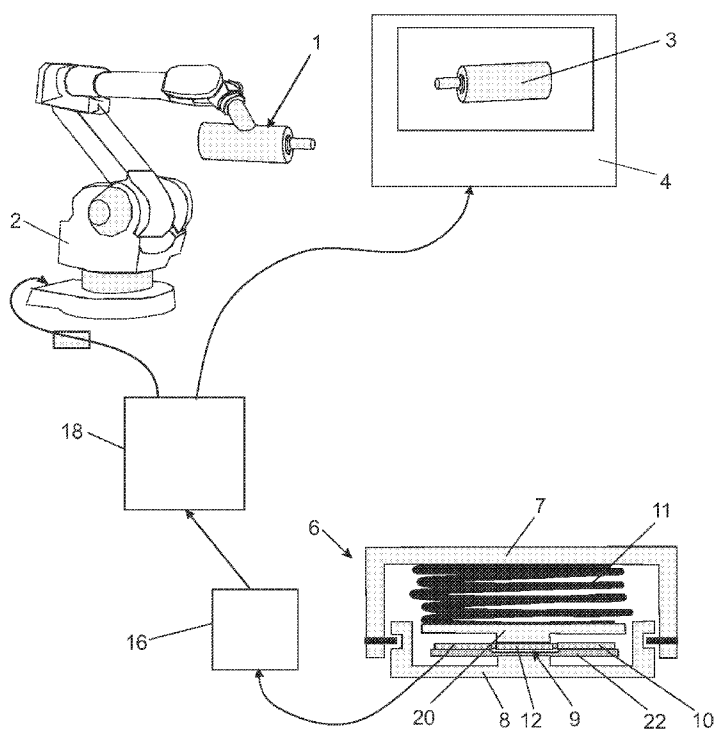
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(54) Title: A SYSTEM FOR CONTROLLING THE POSITION AND ORIENTATION OF AN OBJECT IN DEPENDENCE ON RECEIVED FORCES AND TORQUES FROM A USER



(57) Abstract: The invention relates to a system for controlling the position and orientation of an object (1,3). The system comprises a measuring assembly (6) including a first (7) and a second part (8), wherein the first part is adapted to receive forces and torques from a user, and a sensor (9) adapted to measure forces and torques caused by changes in position and orientation of the first part in relation to the second part, and a data processing unit (18) arranged to receive measured data from said sensor and based thereon to control the position and orientation of the object. The sensor comprises a semiconductor chip with integrated sensor elements. The measuring assembly comprises a spring arrangement (11) mounted between the first and second parts and mechanically connected to the sensor, for converting forces and torques from the user to changes in position and orientation of said first part in relation to said second part, and said sensor is adapted to measure forces and torques from the spring arrangement caused by the changes in position and orientation of the first part.



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A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 199 43 318 A1 (TASSAKOS CHARALAMBOS [DE]) 22 March 2001 (2001-03-22) the whole document	1,13,23, 24
Y	EP 0 333 872 A1 (OKADA KAZUHIRO WAKO KK [JP]) 27 September 1989 (1989-09-27) page 2, line 1 - page 6, line 17 page 16, line 42 - page 17, line 45 page 18, line 30 - page 20, line 51	1,13,23, 24
A	EP 0 210 717 A2 (GRAHN ALLEN ROBERT [US]; ASTLE LYNN [US]) 4 February 1987 (1987-02-04) the whole document	1-24
A	DE 38 36 003 A1 (ZIEGLER WOLFGANG PROF DR ING [DE]) 26 April 1990 (1990-04-26) the whole document	1-24
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 385 508 B1 (MCGEE H DEAN [US] ET AL) 7 May 2002 (2002-05-07) the whole document	1-24
A	----- US 4 589 810 A (HEINDL JOHANN [DE] ET AL) 20 May 1986 (1986-05-20) cited in the application the whole document	1-24
A	----- DE 32 11 992 A1 (WAGNER GMBH J [DE]) 6 October 1983 (1983-10-06) cited in the application the whole document	1-24
A	----- DAO D V; TORIYAMA T; WELLS J C; SUGIYAMA S: "Silicon Piezoresistive 6-DOF Micro Force-Moment Sensing Chip and Application to Fluid Dynamics"[Online] 31 December 2001 (2001-12-31), XP002447657 Retrieved from the Internet: URL: http://www.ritsumeit.ac.jp/acd/cg/se/rt/mems/report/FirstSymposium/proc/Dzung-MicroForce.pdf [retrieved on 2007-08-22] cited in the application the whole document	1-24
A	----- DAO D V ET AL: "A mems-based microsensor to measure all six componets of force and moment on a near-wall particle in turbulent flow" 9 June 2003 (2003-06-09), TRANSDUCERS, SOLID-STATE SENSORS, ACTUATORS AND MICROSYSTEMS, 12TH INNATIONAL CONFERENCE ON, 2003, PISCATAWAY, NJ, USA, IEEE, PAGE(S) 504-507 , XP010646396 ISBN: 0-7803-7731-1 the whole document	1-24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/051549

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19943318	A1	22-03-2001	NONE	
EP 0333872	A1	27-09-1989	DE 3854347 D1 WO 8902587 A1 US 5092645 A	28-09-1995 23-03-1989 03-03-1992
EP 0210717	A2	04-02-1987	DE 3684194 D1 HK 83393 A JP 1862039 C JP 5080971 B JP 62025227 A SG 103292 G US 4704909 A	16-04-1992 20-08-1993 08-08-1994 11-11-1993 03-02-1987 24-12-1992 10-11-1987
DE 3836003	A1	26-04-1990	FR 2638232 A1	27-04-1990
US 6385508	B1	07-05-2002	NONE	
US 4589810	A	20-05-1986	DE 3240251 A1 EP 0108348 A2 JP 1908927 C JP 6010769 B JP 59116806 A	03-05-1984 16-05-1984 24-02-1995 09-02-1994 05-07-1984
DE 3211992	A1	06-10-1983	IT 1163194 B JP 58181598 A SE 8301697 A	08-04-1987 24-10-1983 01-10-1983