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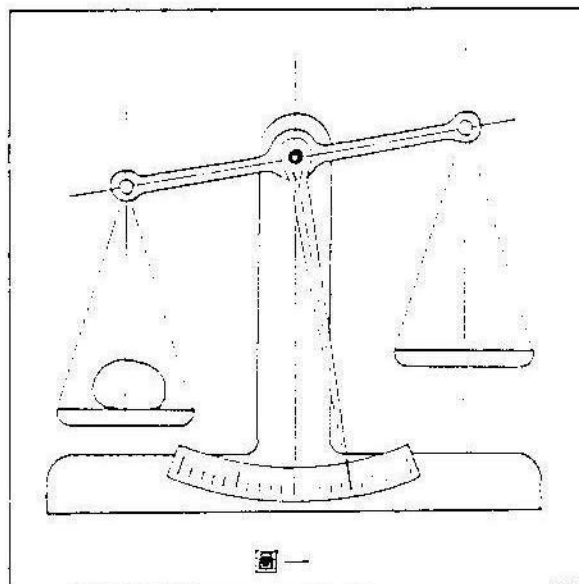
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多桿天平機構簡介

中山大學－蔡穎堅

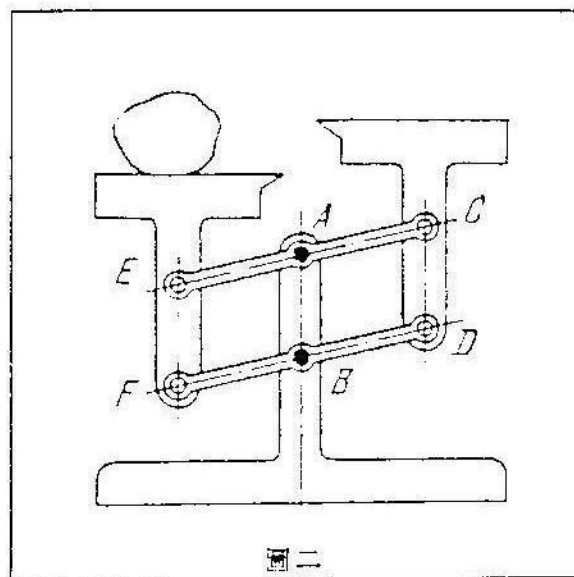
一般常見最原始之天平為四桿開鏈式平面機構(圖一)。在此介紹數種平面多桿閉合鏈之天平機構以供讀者參考。



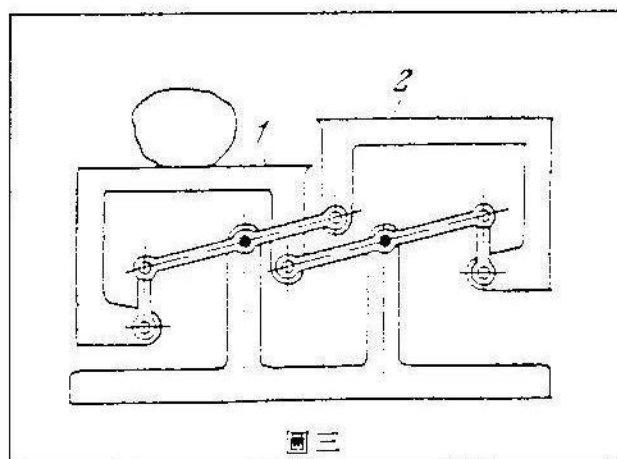
圖一

(1)平面五連桿平板天平：圖二所示為一平面五連桿二迴路機構。若根據Gruebler運動判別式來判斷，一般而言是不能運動；但是其各桿長經特殊安排成為二對稱平行四邊形連桿，故能為具一自由度之機構。此天平之特點為其運動平板不會左右晃動，取放物體方便，承載重量可較圖一者為大。待稱物體放在平板上之位置不影響所稱之結果。

(2)平面七連桿平板天平：當待稱物體體積較大或重量最重時，稱物平板之支持需要加強。(圖三)所示為由兩個平面五連桿合併之平面七連桿機構。此天平除取放物體可允許平板作左右之小弧度運動，以緩衝置物時之側向力。

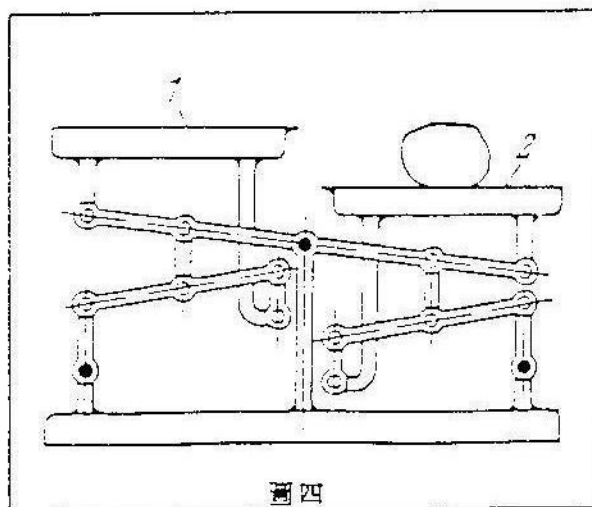


圖二



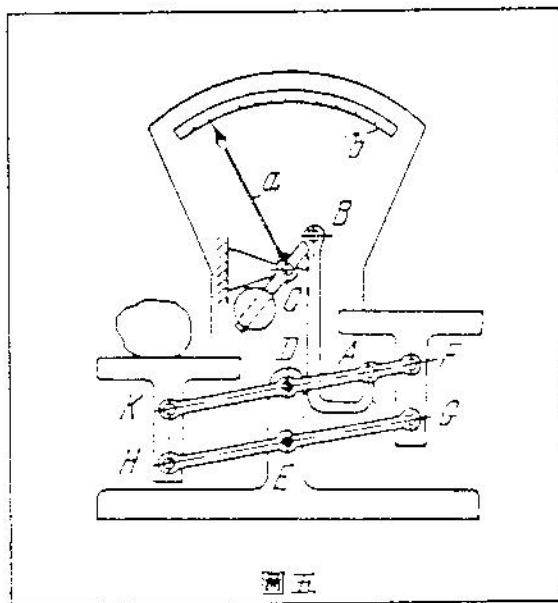
圖三

(3)平面十二連桿平板天平(圖四)：此種天平易於取放物體，平台允許小弧度左右運動以緩衝置物時之側向力。該天平之主要平衡骨架與傳統之T字形天平(圖一)類似，所有力量加於中間平衡桿上而達到二邊力之平衡。由於連桿機構之特殊安排實際加於中間平衡桿上之力量為物重之1.5倍有放大之作用。



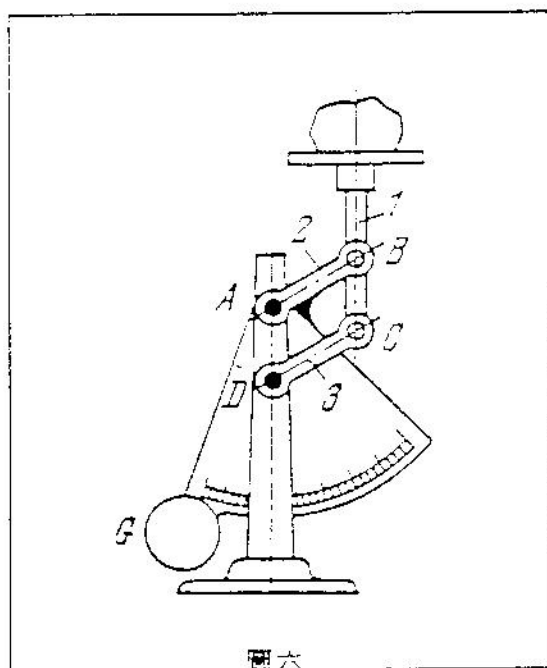
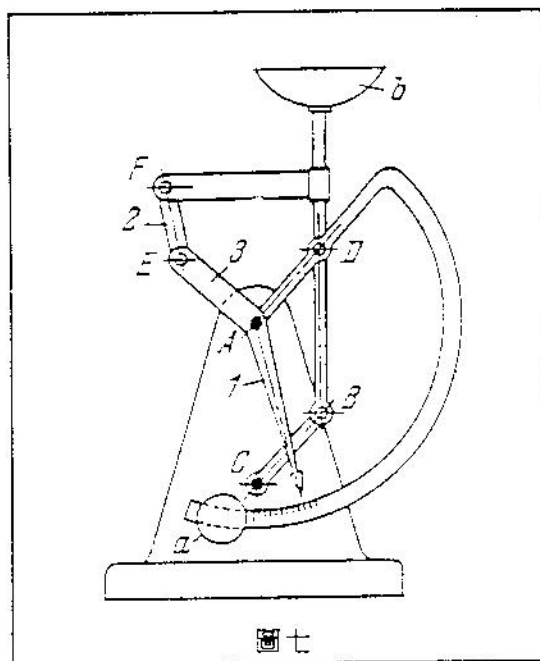
圖四

(4) 多桿針盤天平：若以(圖二)之五桿天平再加上輔助針盤稱重機構則構成一雙用天平(如圖五所示)。可如傳統天平方式以砝碼稱重或直接由針盤刻度讀取稱物重量。不失為一種方便之設計。圖中c之稱錘應先調至歸零位置。



(5) 單盤天平：(圖六)及(圖七)為兩種單盤天平直接由刻度上讀取重量，不必如傳統以砝碼稱重。

(本文取材自 Artobolevsky 所著 Mechanisms in Modern Engineering Design) ■



計算幾何學的 工程應用(I)

中山大學—蔡得民、徐坤龍

幾何形狀的選擇通常是設計機械元件過程中，需要考慮的重要項目之一。無論是基於美學的觀點，或是為了要符合設計所要求的各種功能，使用合適的數學模式來精確描述目的物的幾何形狀，是不可避免的手段。舉例來說，如凸輪運動曲線的設計，必須符合位置、速度、加速度的限制條件，以及考慮壓力角、承受應力等；在高速場合更要考慮運動曲線的特性與整個系統的振動情形。對齒輪之齒形設計，考慮如何以有限空間達到高傳輸功率，降低噪音、振動及高負重要求等。螺旋葉片、壓縮機葉片等之外形設計，則著重在減少紊流、空蝕現象，達到高效率、低振動的要求等。以上所提到的這幾個典型元件，是對於形狀設計非常敏感的例子，其幾何之設計對其功能往往有決定性的影響。

在我們所處的世界裡，各種實體的幾何形狀往往可以有很大的差別。其中有些可以用單一的解析幾何模式做不錯的近似，如圓球形的石頭、扁平橢圓狀的樹葉、螺旋錐狀的貝殼等；也有比例很高的幾何形狀，很難以單一的解析模式來描述，如人類的肢

體及魚類、鳥類的身形等。一般生物體的外形通常比較複雜，有些是具有其特殊的優點；如鳥類、魚類的身形，根據科學家的研究，這些造型使得它們在空氣或水中可以以非常高的效率來運動。在幾何模式的發展上，人們總是希望發展一個模式，就能簡易、快速地描述周遭事物的形狀；以如此的幾何模式除了能模仿外，亦可依據各種設計要求去設計物件，則依此模式所設計出來的產品其幾何設計的部分方可趨近於完善。另外一種幾何設計的步驟，是依據要求就可以導出其解析幾何模式，如探照燈的反射鏡為拋物面、齒輪有漸進線齒形等；但通常幾何設計可以導出解析式的例子並不多，所以一般的作法大多偏向先設計幾何，然後分析其是否可以接受，若否，則再重新設計幾何，然後循環此步驟，一直到可接受為止。在以往幾何的設計上，由於計算工具、加工機不發達，常使用簡單的解析曲面來進行大部分的工作。以如此的設計方法，通常是很難描述諸如生物體之類的複雜曲面。在現今，各類複合曲面模式的出現，使得各種複雜曲面的描述更趨簡易、逼真。人們也可以用這些幾何模式，依所需而自創複雜幾何形狀。不過，雖然現今複合曲面模式日益發達，解析曲面仍有其用途，如前面所提的拋物面反射鏡以及齒輪的漸進線齒形等，都是永遠不會因為歷史的演變而失去其價值的例子。

近年來，由於計算工具的極速發展，使得計算幾何學在近年來有長足的進步；再加上數控加工機的普遍化。對幾何設計者來說，複雜的設計、運算以及傳統加工上所遭遇的困難，已經不再如此困擾。如何以較合適、精確的幾何模式來定義、設計物體的外形，以達到較佳的性能表現，成為此刻重要的課題之一。以曲面的幾何模式為例，以往常使用空間曲線族來描述，使得在設計與加工過程中有所不便；例如在求取曲面偏置時，常要以數值方法近似；至於曲率的分析更是顯得困難重重。

計算幾何學在近代，經由 Coons、Bezier 等人的先導研究而有長足的發展。在 1972 年，由 de Boor 和 Cox 分別在美國及英國同時發表 B 仿線的遞迴表示，造成一股 B 仿線在計算幾何學的應用風潮。B 仿線曲線、曲面表示法之發展至今成為設計複雜曲線、曲面的主要幾何模式。在複合曲面幾何表示法中，B 仿線及其衍生的有理式 B 仿線可說是目前相當理想的幾何表示模式。B 仿線函數所具有的局部改變性質，可使得其所造出之曲線、曲面也具有局部變化的特性。在自由形式的曲線、曲面設計上，也因具備局部的修

改功能而倍受歡迎。另外在曲面的插值設計上，我們可以經由對曲面的基本設計資料點作插值計算，即使在面對大量資料點作插值時仍能穩定平順通過。B 仿線曲面的主要優點有：設計上非常容易達到所需求，其偏置可以精確地由 B 仿線微分遞迴式的求取而獲得，且曲率亦可容易求取。而曲線族曲面的表示法，其偏置常須由數值近似獲得，求其曲率更是不易。

B 仿線幾何模式之局部修改、平滑特性及偏置的容易求取，對幾何設計是一大便利，也是一般商業性 CAD/CAM 軟體，常標榜具 B 仿線曲線、曲面功能的主因。以 B 仿線的方式來處理各類幾何設計問題，因為不論是 B 仿線函數、B 仿線函數的微分值或是更高次微分值，都可以用加、減、乘、除的遞迴運算，算出其精確值，而不是以近似的方式處理。故由 B 仿線所造出的曲線、曲面，其本身及偏置都可以精確地找到，曲率或者更高次的微分應用亦可以求得。

使用二次式曲面於各種元件之設計上，其最大的限制則是本身變化太少，對太複雜的設計無法應付，例如對大量資料點作插值曲線或曲面。然而，對於大多數的工程問題來說，二次式曲面組合的模式仍然是一值得考慮的選擇。工程師在大部分的設計上，通常是盡量偏向以各種簡單的幾何模式組合來達成，使得分析、加工與檢測上較為容易。故雖然複合曲線、曲面如此發達，簡單的解析曲面模式仍然有其使用的價值。我們將陸續介紹、報導幾種常用的二次式參數曲面、B 仿線函數及有理式 B 仿線函數在幾何設計的應用。希望藉由以往的一些小經驗，能與從事這方面工作的會員與讀者們交換心得與經驗。■

本刊長期徵稿
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機器設計應在 理論與經驗上 相輔相成

蘇清洛

本學會各期會刊上，登載了多篇文章，針對機器設計課程及其相關事宜提出很多闡發，上述各篇文章都有很深入的見解，並且具有很高的學術價值，筆者深為佩服。但總使人覺得其仍不脫學院派偏重理論的本色。

筆者由工廠中學徒、技工出身，利用工餘時間求學，後來獲機械工程碩士學位。四十年來擔任機器設計，試驗，研究，及教學工作，不揣冒昧，特就過去所經歷的有關機器設計等問題，提出個人的一些淺見，敬祈同業先進不吝指正之。

如所週知，一個好的機器設計人員，必須有能力把各種理論與實際的製造學連貫起來，組織起來。例如把看似不連貫的學科如固體力學，流體力學，振動學，材料科學，熱力學等，作靈活而實際的連貫運用，繪成圖樣，詳盡註明規格，使工廠方面能按照設計人員的構想，去製造出合用的機器來，此即為機器設計之最後目的。但問題是如何才能做到此一地步與境界？以筆者淺見，簡單來說，就是機器設計人員應該同時具備理論與經驗方面之基礎，方可望其有成。僅具備理論基礎而缺乏實際經驗者，雖然說起來頭頭是道，終究很容易流為空談，並不能立即解決機器設計上所遭遇的實際問題，而收立竿見影的效果；另一方面，若僅具備實際經驗而缺乏好的理論基礎，則很難突破科技上的瓶頸，甚至在理論上誤入歧途，一直往死胡同裡鑽，終至一敗塗地而後止。

茲舉過去工作中所遭遇到的一些案例，來說明必須使理論基礎與實際經驗相輔相成，才是一位成功的機器設計人員，才能創造出更新更好的設計成果。

一、具備理論基礎，但缺乏實際經驗，仍不能成事之實例

在我的經驗中，一般剛從學校畢業初步從事機器設計工作者，總是想將也在學校中所

學到的理論利用機會發揮到淋漓盡致，總是將他所經手的作品設計得很強，加工很細，配合很精，以為這樣做就是最好的設計。殊不知替製造上增加不必要的難度，增加成本，基本上就不是一件好的設計作品，不是一個好的設計人員。

2. 民國六十年空軍航空工業發展中心(簡稱航發中心)開始發展中興號教練機，筆者擔任結構試驗方面工作。當時設計部門聘請一位大學教師來幫忙做應力分析，然後將其分析結果交由我們再做試驗。某次筆者發現一份分析報告很怪異，直覺上覺得不合理，退回請其重算，果然找出了計算上有問題。這時候，應力分析者對我們很佩服，覺得我們試驗工作者很神奇。究其實不過是試驗人員從工作中累積了一些經驗，對各種結構之強度已大概胸有成竹。如果由計算方面送來的數據與實際相差太多，必然會馬上覺察出來的。

3. 1984年筆者年屆五十，在美國 USC (University of South Carolina) 攻讀碩士學位。當時有一位韓籍研究生，準備做太陽能方面的博士論文，但 USC 在這方面的設備不夠夠，他的指導教授建議他到鄰近的 GIT (Georgia Institute of Technology) 去仿造一套試驗設備，他來與我商量。我的意見是仿造設備固然可以，但應有辦法對仿造出來的設備作性能測試 (Calibration)，而且要有可資依據的規範，否則拿未經測試合格的仿造設備作試驗，其試驗數據是沒有意義的。後來這方面的問題無法解決，這位研究生只好更換指導教授，另找論文題目了。

二、具備實際經驗，但缺乏理論基礎，終至不能突破瓶頸之實例

1. 民國三十九年，筆者在聯勤四一二汽車廠做學徒，當時有一位領班黎先生技術很好，忽發奇想，要發明一部類似永動機的機器，也就是將一部發電機與一部電動機連串起來，當開始用外力一旦啓動發電機後，發電機所發之電驅動電動機，而電動機又帶動發電機發電，如此循環互動，此一組合必能永遠轉動不止。殊不知此一構想違反了熱力學第三定律，前人早有定論，勿需再蹈覆轍。但當時以我們的學識程度並不明白有此定律，在黎領班之領導下，利用工餘時間製做零件，裝配後試車，屢戰屢敗，終於弄到精神崩潰而後止。

2. 在台灣目前從事專利發明人士中，一位相當有名氣的邱先生，他是水電工，具有高工畢業程度，也拿到過一些小型的發明專利。在民國六十七年的時候，他想自行研製直昇機。先寫信給國防科技當局，說明他想研製直昇機，但因不懂英文，問可否介紹給他一些有關直昇機理論方面的中文書目。當局

頗感為難，後來由筆者以私人名義回信，告

以直昇機理論很艱深，尤其平衡問題不易克服，勸其不宜以個人力量輕作嘗試。但邱先生意志很強，不聽勸告，終於製造成一架直昇機，並且向當局申請試飛。經航發中心派專家前往檢視，發現其構造不但簡陋，而且是用一部普通五馬力之汽油機當作動力，其餘平衡控制等問題更無周詳之設施。當然，邱先生這一番心血的努力，最後付諸流水了。

3. 民國六十五年，筆者服務於航發中心，曾負責一個直昇機外載裝置專案（請參閱民國七十七年三月，技術學刊第三卷第一期，拙撰“直昇機薄殼梁型外載裝置之初步設計及應力分析”）。發工後，工廠方面之領班，根據他的經驗，認為有一個鑰頭將來與機身之間不能轉動，但經筆者用立體幾何觀念核算，應無問題，在藍圖上加註負責。到最後此一專案製作完成，經海面及空中多次測試，證明性能極為優越。

以上所述不過舉其大端，綜合來說，理論基礎的探討，可說是對一些“思維點”作攻堅突破，修習者必須具備相當智慧，潛力，及毅力；而實際經驗是屬於“接觸面”的問題，需要用時間去歷練。二者的性質不同而目標一致，並且同樣重要。想作為一個好的機器設計人員，究竟是要先學好理論或先歷練經驗，這並不是一個“先有雞或先有蛋”的問題，二者可以同時並進，或交互進行，最重要的是不能分道揚鑣，各行其是，以免對不上樁頭。

再者，未具實際工廠經驗而來從事機器設計教學，其效果只是教會學生如何做習題，如何應付考試，對機械工業之發展前途是很難有所助益的。爾後，如果各級學校中擔任機器設計之教師，都能具備相當程度的實際工廠經驗，料必能對我國機械工業之昇級大有幫助。■

會議紀錄

第二屆第二次理監事聯席會議暨第一次學術出版委員會會議紀錄

時間：民國八十一年十一月廿七日夜間八時十分至九時五十分

地點：國立中山大學圖書資訊大樓十一樓第五研討室

出席人員：宋賢訓、吳隆唐、黃以文、陳明賢、黃文敏、張鴻森、何應勤、馮展華、呂宗熙、許正和、曾清芳、劉俊佑、蔡明俊、廖煒圭、周麗周(廖煒圭代)

主席：蔡穎堅

紀錄：蔡得民

一、主席報告

1. 感謝各位熱心參與開會，日後會務的推廣仍有賴大家多予支持，以期會務能推展得更順利。
2. 台大蔣君宏教授雖已致贈紀念牌給前任執行秘書以表謝意，但自己卻婉謝紀念牌，在此特地再一次感謝蔣教授對本學會所做的貢獻。
3. 1FTOM之Micromechanisms及Mechatronics二個委員會來函徵詢推選委員候選人。
4. 學術委員會擬舉辦研討會；出版委員會之會刊稿件告急，懇請大家多多幫忙。

二、執行秘書報告

1. 本學會至八十一年十一月廿七日止，普通會員共計一四四人，學生會員卅一人。本(八十一)年度普通會員尚未繳交會費者共計卅四人；學生會員則有十八人。
2. 本學會至八十一年十一月廿五日止，會費結餘總計新台幣壹拾叁萬伍仟柒佰叁拾柒元整。詳細帳目見附件一。

三、學術委員會報告

1. 本會以麥金塔建立教授資料庫並已完成初稿，俟核對無誤即提供大家參考。
2. 本會提出舉辦研討會乙案，請各位多予支持。

四、出版委員會報告

1. 自接任以來由於僅收得八篇稿件，致本年九月份因無稿源而發生脫稿之事，甚感遺憾。現十二月已近惟仍不見投稿，謹此緊急呼籲：敬請惠賜稿件以利會刊之出版。
2. 為順利推動出版業務，特商請許正和教授支援會刊校稿及出版印刷等相關工作。

五、討論提案

(一)、案由：請籌辦機構與機器原理學術研討會。(蔡明俊教授提)

說明：本學會自創立以來，已屆四年，參與者都是學術界人士為主，為加強學術交流，學會應考慮辦理學術研討會，建議與國科會工程中心合辦，由其提供經費由本學會負責會務，時間擬在明年4-5月間，人數約150-200人，分兩組為：

1. 機構原理--運動學原理，幾何設計等。
2. 機械設計--以實體設計為主，並有設計競賽及展示。

決議：考量原訂開會期間適值學生畢業前，論文尚未完稿，且研討會發表之論文與將來升等無關，恐論文不易做。惟仍請學會隨 Newsletter 發出調查表給會員以廣徵投稿及參加意願之後，再決定是辦學術研討會或講習會。

(二)、案由：如何讓業界能夠在設計機械時，知道符合功能需求的機構範例？(陳明豐理事提)

說明：

1、由有興趣的教授向有關單位，如國科會或機械所提計劃，包含下列項目：

- 列出主要功能需求項目。
 - 搜集目前已有的機構資料。
 - 依據 a 點功能需求項目分類整理。
- 2、該資料可出版上市。

決議：由於從業基本需求功能涵蓋範圍廣泛，可縮小範圍向業者查詢意願，以項目較明顯且不涉及商業機密者為目標。煩請陳理事明豐先生尋找適當之目標後登載於會刊以徵求有興趣的教授共同參與。

六、臨時動議

(一)、請討論本學會會刊發行改進事宜。(何應勤教授提)

說明：

- 會刊發行採何種方式？
 - 定期出刊(缺點為無稿即脫期)。
 - 不定期出刊(稿件集足即出版)。
- 稿件徵集採責任制，由各學校(機關)分月負責集稿後寄給該屆出版委員會付印；集眾人之力以維持會刊準時發行，才是全體會員之福。

決議：

- 學會會刊仍採定期出刊方式。
- 自八十一年十二月至八十二年九月，每月負責會刊文稿徵集之學校(機關)如下表：

日 期 單 位 名 稱

81年12月	中山大學
82年1月	工研院機械所
82年2月	清華大學
82年3月	交通大學
82年4月	成功大學
82年5月	中央大學
82年6月	中正大學、雲林技術學院
82年7月	台灣技術學院
82年8月	台灣大學
82年9月	海洋大學

(二)、請推薦人選參加 IFToMM 之 Micromechanisms 及 Mechatronics 二個委員會。

說明：IFToMM 之 Micromechanisms 及 Mechatronics 二個委員會來函徵詢各國推薦委員候選人名單。

決議：

- 1、推荐呂宗熙教授參加 Micromechanisms 委員會。
- 2、推荐宋震國教授參加 Mechatronics 委員會。

七、散會■

研 討 會 消 息

1. Micromechanism:

1st IFToMM International Micromechanism Symposium, Tokyo, 6/1-3, 1993

2. Applied Mechanisms & Robotics:

3rd Natl. Conference on Applied Mechanisms and Robotics, Cincinnati, Ohio, 11/8-10, 1993

3. Advanced Robotics:

6th International Conference on Advanced Robotics, Tokyo, 11/1-2, 1993

4. Industrial Robots:

24th International Symposium on Industrial Robots, Tokyo, 11/2-5, 1993

5. Robotics and Its Application:

2nd Asian Conference on Robotics and Its Application, Beijing, 9/18-20, 1993

6. Intelligent Control and Automation

1st Chinese World Congress on Intelligent Control and Automation, Beijing, 8/26-30, 1993

各研討會詳情請閱附件

中華民國機器與機器原理學會經費收支表

日期：81年元月1日至11月25日止

收		支		備	註
科目	金額	科目	金額		
80年度結餘	\$124,370.00	薪津	\$87,500.00		
會刊收入	\$4,080.00	郵費	\$17,411.00		
會費收入	\$55,465.00	印刷費	\$18,683.00		
自由捐贈	\$80,714.00	打字費	\$9,460.00		
自款利息	\$3,826.00	文具費用	\$5,21.00		
廣告收入	\$35,750.00	手續費	\$1,160.00		
		交際費	\$4,709.00		
		IF1000年會費	\$6,203.00		
		雜費	\$2,391.00		
		機費	\$13,630.00		
		電話	\$6,800.00		
合計	\$304,205.00	合計	\$168,468.00		
本期結餘	\$135,737.00	目前現金分佈情形：			
		零用金			\$2,605.00
		郵局存摺			\$133,132.00

理事長：

陳其南

執行秘書：

陳其南

報表：

陳其南

THE SYMPOSIUM
WILL INCLUDE

key lectures : Present State of Art
and Future Developments of Micro-
mechanisms, oral presentations and
Micromechanisms exhibition.

official language :
ENGLISH

Organizing Secretariat

Kiyoshi ITAO
Chuo University
1-13-27 Kasuga, Bunkyo-ku
Tokyo 112 JAPAN
Tel +81-3 3817-1843
Fax +81-3 3817-1820

1st
IFTOMM International
Micromechanism
Symposium

Tokyo

June 1/3, 1993

ABSTRACT AND SUMMARY DEADLINE:
NOVEMBER 30, 1992

1st ANNOUNCEMENT

*Satellite Symposium of the 9th World
Congress on the Theory of Machines
and Mechanisms*

For further information please contact:

Fumikazu OHIRA

NTT

3-9-11 Midori-cho,

Musashino-shi, Tokyo 180

JAPAN

Tel +81-422-59-3357

Fax +81-422-59-2961

Supported by:
IFToMM

Honorary Chairman:
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Politecnico di Milano

Chairman:
Teru HAYASHI
Tokyo Institute of Technology

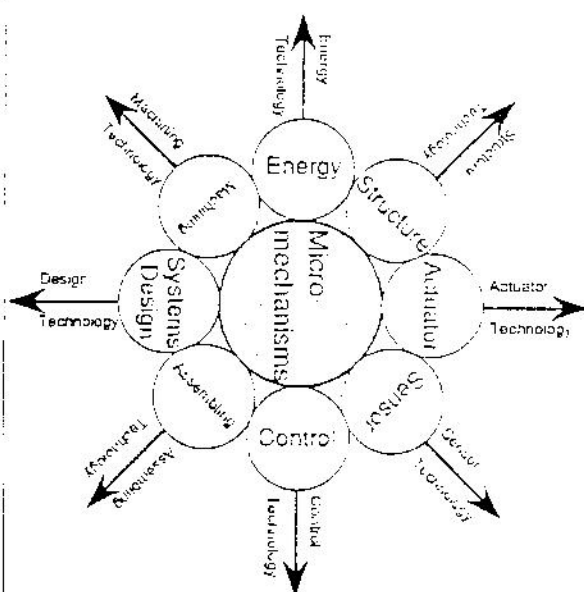
Co-Chairman:
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M.O.M. Osman (Canada)
Ladislav Pust (Czechoslovakia)
T. Leinonen (Finland)
Z. Terplan (Hungary)
B.V.A. Rao (India)
J.C. Guinot (France)
Aldo Rossi (Italy)
J. Oderfeld (Poland)
N.I. Manolescu (Romania)
Liza Hearst (U.K.)
A.P. Bessonov (Russia)

The technical Committee of Micromechanisms has been established in the 8th World Congress on the Theory of Machines and Mechanics in August, 1991.

For the first time, the Committee will hold Symposium. It aims to be an opening door for the following main topics:

- ◎ *Micromechanisms for Mobile Mechanisms in a pipe, on a surface, on a vertical wall, in fly and in float.*
- ◎ *Component and Element Technologies for Micro System*
 - Design, Machining, Assembling
 - Actuators, Sensors, Structures
 - Dynamics and Control
 - Micro-Energy Supply
- ◎ *Science on Micromechanisms*



International Micromechanism Symposium Tokyo - June 1/3, 1993

Please send "Final announcement and Call for Papers"

Title _____ Name _____ Surname _____

Address _____

Organization _____ Position _____

Country _____ Postcode _____ Phone _____

1/23

CALL FOR PAPERS

'93 ICAR, the 6th International Conference on Advanced Robotics, will be held in Tokyo, Japan, from November 1 to 2, 1993.

The main objective of '93 ICAR is to provide an opportunity for the exchange of information on various aspects of research and development in advanced robotics. Robotics has contributed to the automation and improved design of manufacturing environments. The emerging thrust is also in non-manufacturing areas like agriculture, civil engineering, plant maintenance, underwater operation, natural disaster prevention, space, medical and health care, and supporting human daily life. These tasks require robots to be more dexterous and intelligent because the working environments are more complex and unstructured. In this conference, "Advanced Robotics" refers to any area challenging research in the development of robots which can effectively and dexterously execute complex tasks in unstructured environments. On behalf of the '93 ICAR committee, we invite you to submit your papers addressing fundamental technologies, new concepts and new challenging aspects in advanced robotics.

The 1st ICAR conference was established in 1983, as an offshoot of the Williamsburg Summit, as the part of the International Collaborative Project "Advanced Robotics". With this in mind, the subsequent biennial ICARs have focused on international collaborations in advanced robotics. In '93 ICAR, this focus will also be maintained and several events to encourage international collaboration will be planned.

Following the '93 ICAR, the 24th International Symposium on Industrial Robots (ISR) will be held from November 4 to 6, 1993 at the same venue and the '93 International Industrial Robot Exhibition will be held from November 2 to 5, 1993 in Tokyo. A poster conference room will also be planned for the participants. We are very pleased to host the international event and believe that participation in the conference will provide a fruitful opportunity to researchers and engineers who have interests in advanced robotics.

Shiro Kato

Shiro Kato
Chairman
'93 ICAR Organizing Committee

Yoji Chikami

Yoji Chikami
Chairman
'93 ICAR Working Committee

TOPICS

In the conference, "Advanced Robotics" is defined as a challenging field in robotics pursuing the technologies for unstructured environments. With this in mind, papers including the research on advanced robotics and the new technology useful for the robot to work in unstructured environments are especially solicited. Suggested areas include (but are not limited to):

Agriculture
Forestry
Mining
Power Plant Maintenance
Underwater Operations
Civil Engineering and Construction
Space
Natural Disasters and Prevention
Fire-fighting and Rescue
Medical and Health Care

Research on service robots are also suggested.

In addition, the following topics of fundamental research on advanced robotics are suitable for the presentation at the conference:

Actuators and Actuation
Mechanisms
Kinematics and Dynamics
Sensors and Sensor Fusion
Active Perception
Dexterous Manipulation
Locomotion
Human Robot Interface
Intelligent Motion Control
Knowledge-based Control
Behavior-based Control
Autonomous Control
Motion Planning
World Modeling
Vision-based Robotics
Multi-Agent/Multi-Robot Systems
Self-organizing Control
Cellular Robotics
Hybrid Redundant Robotics
Neural Network in Robotics
Genetic Algorithms in Robotics
Biological Robotics
Micro Robotics
TeleRobotics and Virtual Environment

Papers concerning the applied research and development on industrial robots are solicited by 24th ISR which will take place on November 4 to 6 at the same venue in Tokyo, Japan.

SPECIAL EVENTS

Several keynote speeches by authorities and for the growing areas will be planned. Also, a symposium for national and international cooperative projects in robotics will be organized with participation of robotics from countries actively working on the proposition of special sessions, please contact the Secretariat within the paper submission deadline.

PAPER SUBMISSION

A full length manuscript (less than 20 pages, 8.5 x 11 size paper, double spaced) and one page abstract should be submitted for review. All papers and those accepted for the conference will be published in the conference proceedings. The paper's abstract should include:

Title of the paper
Author's name or names
Affiliation
Speaker's name
Name and address for correspondence
Abstract of the paper

Important Deadlines:

Four copies of each manuscript should be submitted to the following address:

The Working Committee of '93 ICAR
c/o Robotics Society of Japan
Bunkyo Shogaku Bldg., 6F 1-15-4 Hongo,
Bunkyo-ku, Tokyo 113 Japan

to arrive no later than March 1, 1993.
Notification of acceptance May 15, 1993.
Submission of Papers in Camera Ready Form July 1, 1993.

Proposals for special session should also be sent to the address no later than March 1, 1993.

All papers should be presented by English or Japanese at the conference. The simultaneous translation will be provided. Any enquiries relating to the conference should be sent to

Ms. Kazuko Higuchi
'93 ICAR Secretariat
c/o Robotics Society of Japan
Bunkyo Shogaku Bldg., 6F 1-15-4 Hongo,
Bunkyo-ku, Tokyo 113 Japan
FAX: 03-33912462

CONFERENCE COMMITTEES

Organizing Committee

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Vice Chairman:

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H. Miura : Prof., The Univ. of Tokyo

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P. A. Jarvis : Prof., Monash Univ., Australia

X. S. Jiang : Prof., Shenyang Inst. of Automation, PRC

O. Kharif : Prof., Stanford Univ., USA

Y. Komori : Director, Secretary General, JIRA, Japan

V. R. Kumar : Prof., Univ. of Pennsylvania, USA

R. Masuda : Prof., Tokai Univ., Japan

R. Nakayama : Manager, Toshiba Corp., Japan

T. Nause : Senior Manager, KOMA/ISU, Japan

T. Oonishi : Manager, Mitsubishi Heavy Industries, Ltd., Japan

F. Pin : Dr., Oak Ridge National Lab., USA

T. S. Low : Dr., National Univ. of Singapore, Singapore

G. Sandini : Prof., Univ. of Genoa, Italy

K. Sugimoto : Dr., Hitachi, Ltd., Japan

A. Takahashi : Prof., Waseda Univ., Japan

K. Tanie : Dr., Mech. Eng. Lab., Japan

R. H. Taylor : Dr., IBM T.J. Watson Research Center, USA

T. Tomita : Dr., Electrotechnical Lab., Japan

J. P. Traverlyan : Dr., Univ. of Western Australia, Australia

T. Tsumeni : Managing Director, Micromachine Center, Japan

T. Uchiyama : Manager, Fijitsu Laboratories, Ltd., Japan

M. Yukolovarovich : Prof., Inst. Mihajlo Popin, Yugoslavia

A. Yasutake : General Manager, IROTA, Japan

T. Yoshida : Manager, Shimizu Corp., Japan

T. Yoshikawa : Prof., Kyoto Univ., Japan

RELATED EVENTS

24th International Symposium on Industrial Robots

Organized by:

Robotics Society of Japan

Society of Biomechanisms Japan

Japan Industrial Robot Association

International Robotics and Factory Automation Center

Micromachine Center

November 4-6, 1993

Keidanren Hall, Keidanren Kaikan Bldgs.

1-9-4 Ohinemachi, Chiyoda-ku, Tokyo, 100

Japan (TEL. 03-3279-1411)

'93 International Industrial Robot Exhibition

Organized by:

Japan Industrial Robot Association

Nikkan Kogyo Shimbun, Ltd.

Period:

November 2-5, 1993

Venue:

Exhibition Hall, International Trade Fair Center, Hamam, Tokyo, Japan

THE SIXTH INTERNATIONAL CONFERENCE ON ADVANCED ROBOTICS ('93 ICAR)

November 1-2, 1993

Keidanren Hall, Keidanren Kaikan Bldg.

1-9-4 Ohinemachi, Chiyoda-ku, Tokyo, Japan

New Technologies for Robotics in Unstructured Environments and Challenge to New Applications

CALL FOR PAPERS

Organized by:
Robotics Society of Japan
The Society of Biomechanisms Japan
Japan Industrial Robot Association (JIRA)
International Robotics and Factory Automation Center (IROFA)
Micromachine Center

Second Announcement

APPLIED MECHANISMS & ROBOTICS CONFERENCE OBJECTIVES:

A series of national conferences on Applied Mechanisms and Robotics is being organized to promote further development, applications and technology transfer of research results in mechanisms and robotics. The conferences will address issues dealing with the importance of mechanisms and robotics applications in today's manufacturing industries.

The conference subject will focus on the following technological issues:

- Kinematics and dynamics of mechanisms and robotics.
- Mechanisms synthesis and analysis
- Gear design and analysis
- Cam design and analysis
- Flexible mechanisms
- Dynamics and control of mechanisms multidegrees of freedom.
- CAD and expert systems for mechanisms and robotics.
- Type synthesis and patent recognition.
- Dexterous hand and flexible gripper design.
- Walking, crawling, mobile, submersible robots and others.
- Computational geometry, geometric modeling and vision systems.
- Case studies in design and development of intelligent machines.

The conference participants will be from universities, industry, government agencies and national laboratories.

CALL FOR PAPERS: Prospective authors are invited to submit papers on one or more of the above subjects. Papers will be reviewed by qualified reviewers of the subject. Those papers which are recommended by the reviewers will be accepted for publication in the proceedings of the conference and included in the conference program for formal presentation.

ANNOUNCEMENT & Call for Papers

THE THIRD NATIONAL CONFERENCE ON APPLIED MECHANISMS & ROBOTICS

DATE: November 8 - 10, 1993

PLACE: Cincinnati, Ohio

Conference Directors:

Dr. A.H. Soni
Director, Center for Advanced
Manufacturing Systems
University of Cincinnati
Cincinnati, OH 45221-0072
Phone (513) 556-2710
Fax (513) 556-3390

&

Dr. Peter Sadler
Dept. of Mechanical Engineering
University of Kentucky
Lexington, KY 40506
Phone (606) 257-6262 Ext 206

Applied Mechanisms & Robotics
P.O. Box 42814
Cincinnati, Ohio 45242



DEADLINE FOR SUBMITTING TECHNICAL ABSTRACTS AND PAPERS

Authors are encouraged to submit a one page abstract of the planned paper before proceeding to submit it in its full length. Upon acceptance of the abstract, the authors will be supplied with special author's kits. Deadline for submitting abstract: March 31, 1993. Final Draft: July 31, 1993.

The authors should submit their abstracts and their final draft of the papers to Prof. Peter Sadler

CONFERENCE FORMAT:

The conference format shall consist of formal presentation of technical papers, case studies, panel sessions and special exhibitions. Individuals who wish to participate in the exhibition should contact Dr. Sadler.

Conference Proceedings: All papers will be reviewed and those recommended will be published in the proceedings of the Conference.

PUBLICATION IN THE JOURNAL OF APPLIED MECHANISMS & ROBOTICS:

Authors who wish to have their papers considered for publication in the Journal of Applied Mechanism & Robotics should also send four copies of their papers separately to:

Dr. K.L. Ting, Technical Editor
Journal of Applied Mechanisms & Robotics
Department of Mechanical Engineering
Tennessee Technological University
Cookeville, TN 38505
(615) 372-3230
(615) 372-6172 Fax

ANNOUNCEMENT OF AWARDS:

Winner of the most prestigious AMR South Pointing Award will be announced at the Conference luncheon. Also the recipients of the following named awards will be announced at the conference: F. Freudenstein Award, A.S. Hall Award, H. Watrous Award, G. Wood Award and the Outstanding Research Contribution Award.

THE PROCTOR & GAMBLE AWARD:

The Proctor & Gamble Award will be in two categories: (1) Professional Award, and (2) Student Award. Details for these awards are available from Dr. Peter Sadler.

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For further information on the Conference contact the Director of the Conference:

Dr. A.H. Soni, Ohio Enduent Scholar
Director, Center for Advanced Manufacturing
Systems
University of Cincinnati
Cincinnati, Ohio 45221-0072
Phone # (513) 556-2709
Fax # (513) 556-3300

APPLIED MECHANISMS & ROBOTICS CONFERENCE November 8 - 10, 1993 Cincinnati, Ohio

I wish to participate in the Applied Mechanisms and Robotics Conference. I wish to contribute to the conference as: Author ☐, Panel Member ☐, Session Chairman ☐, Case Study Presentation ☐, Exhibitor of Software ☐, Models ☐.

NAME: _____
Address: _____
City: _____ State: _____
Zip Code: _____ Phone #: _____

Please fill out this form and mail it to Dr. Peter Sadler, University of Kentucky, Department of Mechanical Engineering, Lexington KY 40506

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Ltd.
K. Yonemoto
Chairman, Japan Industrial Robot Association
T. Yonemoto
Chairman, Japan Industrial Robot Association

24th International Symposium on Industrial Robots

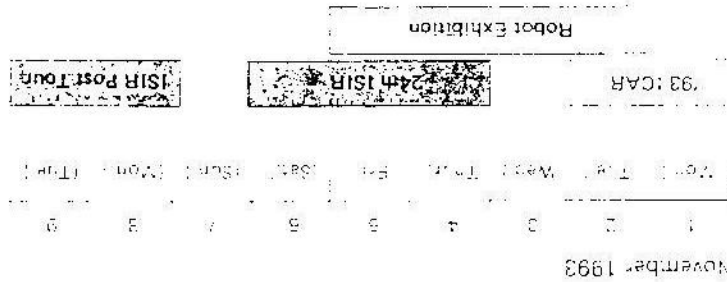
(24th ISIR)

Organized by:

The Society of Biomechanisms, Japan
Robotics Society of Japan
Japan Industrial Robot Association
International Robotics and Factory Automation Center
Micromachine Center

SECOND ANNOUNCEMENT

CALL FOR PAPERS



Schedule of 24th ISIR and Related Events

24th ISIR and Related Events

- International Conference on Advanced Robotics
Nov. 1-2, 1993
at the Keidansen Hall in the Keidansen Kikan, Tokyo
- Robot Exhibition
Nov. 2-5, 1993
at the International Trade Fair Center, Harumi, Tokyo
- 24th International Symposium on Industrial Robots
Nov. 4-6, 1993
at the Keidansen Hall in the Keidansen Kikan, Tokyo

'93 International Industrial Robot Exhibition

Organized by: Japan Industrial Robot Association
The Nippon Kogyo Shimbun, Ltd.

Call For Papers

It is our great pleasure to inform you that the 24th International Symposium for Industrial Robot (24th ISIR) will be held in Tokyo for three days from November 4 to 6, 1993.

The 24th ISIR follows the 23rd ISIR that is to be held in Barcelona, Spain this October. It was decided at the National Coordinator Meeting of the IFR (held during the 22nd ISIR in the U.S.A.) that Tokyo would be the host city for the 24th ISIR.

The ISIR has made major contributions to the development and popularization of robotics technology since it was held in Chicago, U.S.A. in 1970. Since then, it has had an impact on both economic and social aspects in various industries. In other words, the history of ISIR can be said to be synonymous with the history of robotics technology, which thus, can be referred to as the history of expansion in the fields of robot utilization.

The development of robots of the next generation, as well as research and development of robotics technology and discovery of new applications are now gaining much attention on a global basis. Amidst opening the curtains to the 21st century, we are about to enter a new developmental stage in research, development and actualization of robotics technology in the next generation.

Upon holding the 24th ISIR in Tokyo, we would like to call on public enterprises, governmental organizations and scholastic organizations around the world for papers to be presented on the research and development to actualize industrial robots, actual examples of the technologies used, management techniques, national projects and other topics concerning robotics in parallel to the "Suggested Topics for Papers" indicated in the attachment.

Yoshio Kato

Yoshio Kato

Chairman

24th ISIR Organizing Committee

Yukio Hasegawa

Yukio Hasegawa

Chairman

24th ISIR Working Committee

Suggested Topics for Papers

1. Applied Research & Development
 - Robotic Sensors and Sensory Systems
 - Kinematics, Dynamics and Motion Control
 - Intelligent Manipulation
 - Robot Language
 - Locomotion Mechanism and Autonomous Navigation
 - Sensor Fusion
 - Robot Measurement
 - Telerobotics and Tele Existence
 - Human Interface and Virtual Reality, etc.
2. Industrial Applications Technology
 - Robots for Primary Industries: Agriculture, Fishery, Forestry, etc.
 - Robots for Secondary Industries: Manufacturing, Mining, Construction, etc.
 - Robots for Tertiary Industries: Nuclear power, Fire Fighting and Rescue, Medical and Welfare, Service, Transportation, Space, etc.
3. Management & Standardization
 - Socio economic Evaluation, Justification
 - Technology Assessment
 - International Standards, etc.
4. National Governmental Procedures for Promotion R&D and Popularization of Industrial Robots
5. Governmental R&D Program, National Research Projects
6. International Cooperation
 - Industrial Cooperation
 - Technological Cooperation, Joint Venture, Capital Investment
 - Research and Development
 - IAS (Intelligent Manufacturing System)
 - FIREKA, etc.

Remark: Topics of International Conference of Advanced Robotics (ICAR) are mainly designed to the fundamental research in every industries, especially unstructured environment, normal industries and non industrial robot such as Personal Robots.

Abstracts

The official languages of the symposium are English and Japanese. Simultaneous interpretation will be provided, must be submitted in English.

A maximum of 30 minutes will be provided for each question and answers. Prior to submit abstract must be submitted to the following address. The deadline for the receipt of abstracts is January 1993.

Secretariat of 24th ISIR
Japan Industrial Robot Association
Kikar Shinko Kaikan Bldg.
3-5 R. Shiba Koen, Minato Ku, Tokyo 106
Telephone: +81-3-3434-2919
Telefax: +81-3-3578-1404

Abstracts must be in English (approximately 400 words) be headed as follows:

Title of the paper:
Area of Interest (Choose any No. from 1 to 6, mentioned above)
Keywords:
Author's Name or Name:
Affiliation(s):
Speaker's Name:
Name and Address for correspondence:
Telephone: Telefax:

Final selection of abstracts will be decided by the Organizing Committee. Completed papers in camera-ready form must be submitted by September 15, 1993. Special transcript sheets and submission instructions on how to prepare the papers will be provided by the Organizing Committee by a letter dated by August 1993. All accepted papers will be published in the Proceedings of the 24th ISIR which will be available for distribution at the Symposium.

The Proceedings will be published by JIRA, who will hold the right. Any inquiries relating to the Symposium should be sent to the Organizing Committee.

Yasuhiko Kato
Organizing Secretary, the 24th ISIR
Japan Industrial Robot Association
Kikar Shinko Bldg., 3-5 R. Shiba Koen, Minato Ku, Tokyo 106, Japan
Telephone: +81-3-3434-2919, Telefax: +81-3-3578-1404

Visual Aids
Standard slides and overhead projectors will be available. Videos may also be shown in VHS (MIST, PAL System) without notification. Other video systems should be specified at time of summary submission.

2nd Asian Conference on Robotics and Its Application

Date: 18 - 20 September 1993

Location: Beijing China

Organisers:

China Robotic Engineering Association

Co-Sponsor:

Expert Committee of Automation Technology of
National High Technology R & D Program

Robotics Society of Japan

Japan Industrial Robot Association

Hong Kong University of Science & Technology

Chinese Automatic Control society, Taiwan

Conference Chairman:

Cai Da-Lie General Director China Robotic Engineering Association

INTRODUCTION

The Asian Conference On Robotics And Its Application was jointly sponsored and held by China, Japan, and Hongkong, etc.

The 1st Conference was held on Hong Kong in 1991. The atmosphere was lively through out the Conference, and its response was warm. It achieved the goal of technique exchanging, linking up informations and promoting cooperation.

It decided that the Conference will continue to be held, once every two years. The 2nd Conference will be sponsored by China Robotics Engineering Association in Beijing.

SCOPE

Contribution on the following or related subjects are invited:

1. Current Development & Future Trend of Robotic Technology
2. Economic and Social Appraisal of Robot
3. Construction and Transmission Mechanism of Robot
4. Kinematics and Dynamics of Robot
5. Robot Control
6. Transducers and Signal Processing for Robot
7. Measurement System and Error Analysis for Robot
8. Standardization of Robot
9. Flexible Manufacturing System and Its Engineering Application
10. Artificial Intelligence and Expert System for Robot
11. Education and Training in Robotics

Papers dealing with practical experience of applications are especially welcome

NOTES FOR PROSPECTIVE AUTHORS

- English will be the working language of the Conference and will be used for all printed materials, presentation, and discussions.
- Prospective author (s) should first submit for each paper a abstract of not more than 500 words.
- Each abstract submitted should contain the following items:
 - Title of paper
 - Name or Names of Author
 - Affiliation (s)
 - Speaker's Name
 - Name and Address for Correspondence
- Only one speaker is allowed to present the paper and the presentation will be limited to 10 minutes, including the question and answer period.
- The abstract for the paper should reach the address on the next page, before 31st December 1992.
- Authors will be informed of the acceptance of papers by 15th February 1993 and will be required to submit full camera-ready typescripts of papers before 1st April 1993.

Post conference-tours:

Three-guided tours in China will be specially arranged by organizers for the participants.

1. Beijing (2Days) Great Wall, Ming Tombs, Forbidden City, Temple of Heaven, Summer Palace, etc.
2. Beijing Xian Gulin Canton-Exit to Hong Kong (5.5 Days)
3. Beijing-Hangzhou-Yellow Mt.-Shanghai (Su-zhou) Exit (6.5Days)

**FIRST ANNOUNCEMENT
&
CALL FOR PAPERS**

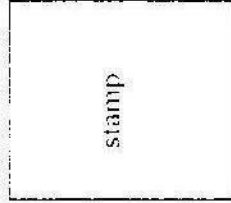
**2nd Asian Conference
on
Robotics and Its Application**



18 20 September 1993

Beijing China

FROM: _____



Mr Cao Xiang Kang
China Robotic Engineering Association
2 Capital Gymnasium South Road
100044 Beijing China

2nd Asian Conference on Robotics and Its Application

- ☐ I wish to submit the following abstract for review. If my final paper is selected will present it myself at the Conference.
- ☐ I wish to receive further information.
- ☐ I am unable to offer a paper but am interested in attending the Conference.

Title: _____

Author(S): _____

Organisation: _____

Address: _____

Tel: _____ Fax: _____

☐ I intend to take part in the post conference tour

会议主题

智能控制与智能自动化的理论、方法与应用

征文范围 (Areas for Regular Papers)

1. 智能系统 (Intelligent Systems)
2. 控制 (Control)
 - 变结构控制 (Variable Structure Control)
 - 模糊控制 (Fuzzy Control)
 - 自适应控制 (Adaptive Control)
 - 学习控制 (Learning Control)
 - 专家控制 (Expert Control)
 - 递阶控制 (Hierarchically Control)
 - 集散控制 (Distributed Control)
 - 集成智能控制 (Integrated Intelligent Control)
 - 其他形式的控制 (Others)
3. 控制理论和系统理论 (Control and Systems Theory)
4. 自治控制系统和容错控制系统 (Autonomous Control Systems and Failure - Tolerant Control Systems)
5. 故障检测、隔离和诊断 (Fault Detection, Isolation and Diagnosis)
6. 实时控制中的人工智能 (Artificial Intelligence in Real-Time Control)
7. 神经网络在建模、辨识和控制中的应用 (Modelling, Identification and Control Using Neural Networks)
8. 机器人控制 (Robot Control)
9. 制造系统 (Manufacturing Systems)
10. 信息处理和信息系统 (Information Processing and Systems)



请填写完整如下回执, 并寄至

大会秘书处, 北京清华大学 自动化系 (WC' 93 秘书处)

(邮政编码: 100081)

论文题目

作者姓名

单位或机构

通信地址

电话

本人签字

职称

传真

电报挂号

日期

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1. 会议期间，由秘书处统一安排食宿，费用由个人自理。会议期间，由秘书处统一安排交通工具，费用由个人自理。会议期间，由秘书处统一安排医疗保健，费用由个人自理。会议期间，由秘书处统一安排其他服务，费用由个人自理。

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请在下列选项中作出选择(同意的用“√”，不同意的用“×”，无选择的用“/”作任何记号)：

- ☐ 愿与大会保持联系，请及时寄给我_____份有关大会的各种信息通报资料。
- ☐ 我将参加本次大会。
- ☐ 我将提交_____篇论文。
- ☐ 我将保证提交一篇符合打印质量规定的论文清稿。
- ☐ 我拟请大会秘书处协助打印我的论文手稿。
- ☐ 在大会学术委员会认为我所提交的论文内容合格，且打印质量合格时，同意由秘书处自行决定对论文重新排版打印。
- ☐ 我希望作为非论文代表参加大会。

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IEEE Robotics and Automation Society

中国自动化学会

中国人工智能学会

大会协办单位

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中国管理科学学会智能控制研究部

Intelligence Engineering Laboratory

University of Alberta, Canada

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吴永春 (新竹交通大学)

胡启运 (重庆大学)

大会秘书处 (Secretariat)

秘书长 (Secretary General)

梁维忠 (北京清华大学)

11. 调度、规划、管理和决策系统 (Scheduling, Planning, Managing and Decision — Making Systems)
12. 计算机辅助分析和 CAD (Computer — Aided Analysis and Design)
13. 智能控制器、传感器和执行机构 (Intelligent Controllers, Sensors and Actuators)
14. 智能元件和仪表 (Intelligent Components and Instruments)
15. 实现技术和应用 (Implementation Technologies and Applications)
16. 其他有关课题 (Other Related Topics)

凡属上述主题范围的研究成果,并且尚未在其他学术会议或书刊刊物发表过,同时也未提交其他学术会议刊物评定的论文,均可提交本届大会。

大会日期和地点

1993 年 8 月 25~30 日

北京

大会秘书处地址

北京 清华大学 自动化系 CWC ICIA '93 秘书处

邮政编码 (Post Code): 100084

电话 (Tel): +8611-2553451-2421

传真 (Fax): +8611-2558134

大会语言

中文(主), 英文(辅)

第一届全球华人智能控制 与智能化大会

The First Chinese World
Congress on Intelligent Control
and
Intelligent Automation
(CWC ICIA)

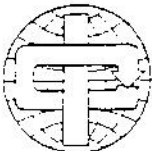


征 文 通 知

CWC ICIA '93

1993 年 8 月 25—30 日

· 北京 ·

ICIA  '93