

Association for Machines and Mechanisms News Bulletin

Volume 6, No. 1

January 2014



Our Objectives and Activities

The main objective of AMM is to contribute to mechanical design at all levels starting from academic research to industrial initiatives, thereby enhancing the quality and reliability of indigenous machines. With this in view, AMM organises the International & National Conference on Machines and Mechanisms, iNaCoMM, and the workshops on Industrial Problems on Machines and Mechanisms, IPRoMM

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Contact Details

Dr. G. Saravana Kumar

Secretary, AMM

Tel: (044) 2257 4736 (O)

Fax: (044) 2257 4732

E-mail: secretary@ammindia.org

Web Site: <http://www.ammindia.org>

Message from the Editor-in-Chief

Technology for Rural India

The situation in rural India has certainly improved for the better in last one decade or so, however, there is still a lot of scope for improvement. There is a need to look at development and strengthening of Rural Technologies and Business Incubators at various locations. Outsourcing manufacturing to villages will lead to the improvement of rural areas by providing jobs to a number of people. This would not only prevent migration of people from villages to cities in search of jobs but also will help in bringing advancements in the rural background in terms of roads, better facilities, etc. Technology should act as a bridge between villages and cities in order to reduce the rural-urban divide. There is thus a great need for balancing economic growth with social development and technology.

With an objective to empower rural India, Rural Technology Action Group (RuTAG) centres have been conceptualized and created by the office of the Principal Scientific Advisor (PSA) to Govt. of India. It is felt that the PSA's office can help through the RuTAG mechanism. A Central RuTAG has specialists in various aspects of rural development and related technologies. A local RuTAG, on the other hand, is assisted by young rural technology professionals. In each region/area, the local RuTAG will essentially do all the activities related to technology delivery. The concept of RuTAG is a synergizing and catalysing mechanism, not a major funding mechanism.

RuTAG was conceived as a mechanism to provide a higher level of technological intervention and support. This could be essentially demand-driven for technology upgradation, hi-tech delivery, technology training and demonstration or through any other innovative method. There are eight centres in various IITs which include: IIT Delhi, IIT Madras, IIT Guwahati, IIT Kharagpur, IIT Roorkee, IIT Bombay, IIT Kanpur, and IIT Ropar. In recent past two more such centres have been established one at NIT Tiruchirapalli and the other one at NIT Hamirpur (NITH). It is expected that these new entrants of technical institutes in the earlier group shall render technical support and help to empower the rural population through various groups/sub-groups.



Dr. R. Chidambaram, Principal Scientific Advisor to Govt. of India during inauguration of RuTAG-NITH



Prof. Rajnish Shrivastava, Director NIT Hamirpur addressing the NGOs

Rajesh Sharma
Editor-in-Chief

Design of Modified Peaucellier Straight Line Mechanism

by

Ashutosh Kumar, Sudhanshu Sachan, Shivendra Vatsa, Arjit Raj,

Prerit Pandey, Prankshu, Amit Rai

B. Tech. Students

Mechanical Engineering Department

National Institute of Technology, Hamirpur (HP)

Peaucellier Straight Line Mechanism is a simple planar mechanism capable of transforming a rotary motion into a straight line motion and vice-versa. It is a simple eight link mechanism having four equal length links forming a rhombus, other two equal longer links are connected to the opposite sides of the diagonal and other end is at the point at B. Another point is lying on the trace of a circle, and its opposite point is on a straight line as shown in Fig. 1. The lengths of the linkage have already been decided by the use of the mathematical relations. The length of the line drawn is constrained by the lengths of the linkages.

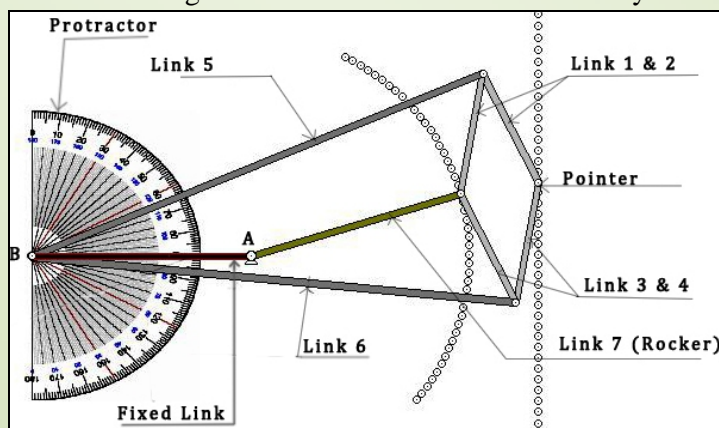


Fig. 1: Peaucellier straight line mechanism

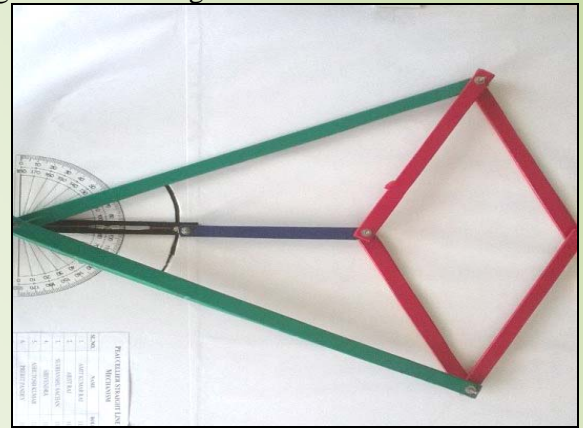


Fig. 2: Fabricated model

The purpose was to design a Peaucellier straight line mechanism such that it is able to draw straight line at required angle and of required lengths. Kinematic synthesis of the mechanism was done and a working model was subsequently fabricated (Fig. 2).

The four linkages of the mechanism are of equal lengths. Apart from these, there are two links equal in lengths but longer than the rest whereas the seventh link acts as a rocker. The eighth one is the frame. The links are connected and placed on the seventh link called rocker. The rocker has a groove in the middle. In the mechanism, one point is fixed around which the link revolves; this point is common for marker and longer link.

Modifications

1. LINES AT ANY ANGLE

In the seventh link, one end of the link is hinged to the fixed link at point A. The fixed link has the other end hinged to the center of a Protractor at point B. For making lines at a particular angle the fixed link can be rotated to the required angle and then lines can be drawn.

2. PARALLEL LINES

An eighth (fixed) link is provided which carries the seventh link. This link allows lateral movement of the seventh link. The seventh link slides over the eighth link and enables us to draw parallel lines at different distances.

Conclusion

The project was developed to study the motion and make the above mentioned modifications to have a wide use in the day to day life. The mechanism is useful in drawing angular lines and parallel lines at any angle.

Report on iNaCoMM 2013

by

Pushparaj Mani Pathak, Organising Secretary

IIT Roorkee

1st International and 16th National Conference on Machines and Mechanisms (iNaCoMM 2013) was organised by the Mechanical & Industrial Engineering Department, IIT Roorkee during December 18 - 20, 2013.

Dr. S. Guruprasad, Director, Defence Research & Development Establishment (DRDO) was the chief guest of the inaugural function of iNaCoMM 2013. Prof. S. P. Gupta, Deputy Director, IIT Roorkee presided over the function. The inaugural talk was delivered by Prof. Y. Nakamura from the Univ. of Tokyo, Japan and President, International Federation for the Promotion of Mechanism and Machine Science (IFTToMM) on *Robotics to Estimate Human Sensation*. Prof. C. Amarnath, President, AMM also addressed the delegates.

Three workshops were organised on the first day.

- *Bond Graph Modeling* by Prof. Belkacem Ould-Bouamama, Ecole Polytechnique de Lille, France
- *Compliant Mechanisms* by Prof. G. K. Ananthasuresh, IISc, Bangalore
- *Multi Body Dynamics* by Prof. Javier Cuadrado, Universidad de La Coruña, Spain

Four invited talks were delivered by eminent speakers:

- i. *Control of Under-actuated Mechanical Systems* by Prof. Ranjan Mukherjee, Michigan State University, USA.
- ii. *Dynamic Analysis of Mechanisms dealing with Complex Boundary Conditions* by Dr. S. Guruprasad, Director, Defence Research & Development Establishment (DRDO).
- iii. *Design and Manufacturing of Biologically Inspired Robots* by Prof. Satyandra K. Gupta, National Science Foundation, USA through video conference.
- iv. *Research Issues in Cooperative Control of Multiple Robots* by Prof. D. P. Garg, Duke University USA.

Two special sessions were also organised during the conference. The details are:

- i. **Multibody Dynamics** by Prof. S. K. Saha, IIT Delhi and Prof. Javier Cuadrado, Spain (Chair of IFTToMM Technical Committee for Multibody Dynamics).
- ii. **Bond graph Modelling of Mechanical and Mechatronic Systems** by Dr. A. K. Samantaray, IIT Kharagpur and Prof. Rochdi Merzouki, Ecole Polytechnique de Lille, France.

A total of 110 papers out of 120 registered articles were read, and 30 posters out of 39 were presented during the conference.

Student mechanism design contest (SMDC) was also organised which was attended by 7 teams from different parts of India. The judges for SMDC were Prof. S.K. Saha from IIT Delhi and Prof. Jung-Min Yang from South Korea. The team from CMERI, Durgapur was declared as winner. Two best paper awards were given, one in general category and the other in student category. The award was given based on reviewers' scores and the critical evaluation by two judges, Prof. Anand Vaz from NIT Jalandhar and Prof. P. S. Gandhi from IIT Bombay. The best paper under general category was given to Shai Arogeti, Rami Levy, and Danwei Wang for their paper entitled *Improving Mode-Change and Fault Isolation of a Hybrid System Using Instantaneous Sensitivity Matrices*. The best paper award under the student category was given to Santosh D. B. Bhargav, Nikhil Jorapur and G. K. Ananthasuresh for their paper *Evaluating Bulk Stiffness of MCF-7 Cells using Micro-scale Composite Compliant Mechanisms*.

In general the conference was well attended and many experts appreciated the high quality of the papers.



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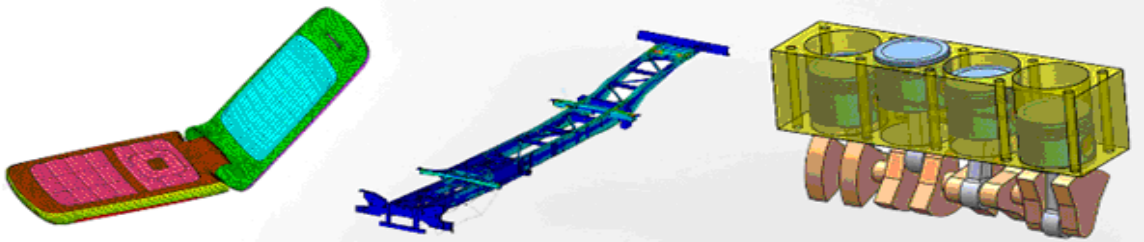
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Delhi : B. Sridhar - 98110 68096
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