



**Er. PERUMAL MANIMEKALAI POLYTECHNIC COLLEGE**

An ISO 9001:2015 Certified Institutions  
(Approved by AICTE, New Delhi, and Government of Tamil Nadu)  
Koneripalli, Hosur - 635 117.



# Er. Perumal Manimekalai Polytechnic college Department of Electronics (Robotics) Engineering

*2<sup>nd</sup> National level Technical symposium – convergence 2022*



**Held on 29-04-2022**

## Our Institution

“PMC TECH play influential role with Industries for providing meaningful impact on overall competency and skill levels of the students in relation to knowledge updating with practicality in learning and professionalizing them aiming at the developing scenario of current and future technologies.”

PMC TECH Group of Institutions, Hosur, Tamilnadu established in the year 1996 is run by “Er. Perumal Manimekalai Telugu Minority Educational and Charitable Trust” under the dynamic leadership of Shri. Er. P. Perumal, Founder Chairman. The Institutions comprise Matriculation School, ITI, Polytechnic, Engineering College and Research Studies providing quality education in the region.

Er. Perumal Manimekalai polytechnic college (established 1996) approved by AICTE and affiliated to DOTE Chennai, is an ISO 9001:2015 certified Institution. The Institute provide scholarly and professional environment with quality education & skill oriented training that help students becoming best employable for Industries and professional entrepreneurs for the Nation. The Institute supports students’ creativity/innovations by establishing Scientific and Industrial Research Organization (SIRO), Women Technology Park (WTP), Centre for IIT Bombay Employability Skill Trainings, Business Incubation Centre (MSME BI), Innovation & Entrepreneurship Development Centre (IEDC) etc., for research and developments.

### **Vision:**

PMC Tech -Polytechnic College shall emerge as a premier Institute for valued added technical education coupled with Innovation, Incubation, Ethics and Professional values.

### **Mission:**

1. To foster the professional competence through excellence in teaching and learning.
2. To nurture overall development of students by providing Quality Education & Training.
3. To provide innovative environment to learn, innovate and create new ideas for the betterment of oneself and society.

## About the Department

The Department of Diploma in Electronics (Robotics) Engineering was established in the academic year 2005-2006. It has well equipped laboratories with a state of art Computer Laboratory, Electronics Devices etc... Robotics, and Mechanical Related Labs Pneumatic, Hydraulic, Manufacturing, CNC, CAD Laboratories, Qualified and experienced faculty members have been involved in teaching and conducting various short term courses for the benefit of students.

### Vision:

To develop Electronics (Robotics) Engineering diploma holders to meet the Growing needs of Industry and Society.

### Mission:

- To foster the professional competence through excellence in teaching and learning.
- To nurture overall development of students by providing Quality Education & Training.
- To create conducive environment for students to learn, innovate and conceive for the betterment of oneself and society.

### Program Educational Objectives (PEOs)

1. **Core Competence:** Our students will exhibit the knowledge in Mathematics, fundamentals of Mechanical, Electrical, Electronics and Computer Engineering to solve Engineering problems.
2. **Breadth:** Our students will be able to design and create novel products and solutions for real life problems using the knowledge of Scientific, Mechanical, Electronics and Computer Engineering.
3. **Professionalism:** Our students exhibit professional and ethical attitude, effective communication skills and exhibit teamwork over multidisciplinary areas.
4. **Higher studies and Employability:** Our students succeed in industry / technical profession by creating an environment excellence and a high order of ethics and a zeal for lifelong learning.

### Program Specific Outcomes (PSOs)

**PSO1:** Ability to understand the integration of engineering applications such as electronic, Mechanical, electromechanical, control and computer systems that contain software And hardware components including sensors, actuators and controllers.

**PSO2:** An ability to exhibit the knowledge of electrical and electronic circuits, Hydraulic & Pneumatic control system, logic design and image processing using hardware and Soft programming for automation.

## About the Symposium

Most of the present day research are taking place with focus towards technology and education in this engineering the foremost leader. It plays a unique role in exploiting innovative technology

This Conference provides a real opportunity to bring together scientists, researchers and academician of different disciplines to discuss new issues, tackle complex problems and find advanced solutions breeding new trends in Engineering.

## **Chairman's Message**

### **Organizing Committee Members**

#### **Chief Patrons**

**Er. P. Perumal, Chairman, PMC TECH – Group of Institutions**

**Shri. P. Kumar, Secretary, PMC TECH – Group of Institutions**

**Smt. P. Mallar, Trustee, PMC TECH – Group of Institutions**

#### **Patron**

**Mr. N. Balasubramaniam, Principal, PMC TECH – Polytechnic College**

#### **Convener**

**Mr. k. Arunkumar M.E., HOD/ E(Robotics)**

#### **Co-ordinators**

**Mr. M. Mohammad Jinna M.E., Lecturer /E(Robotics)**

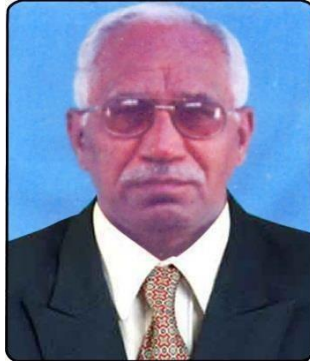
#### **Members**

**Mr. A. Ravikumar B.E., Lecturer/ E(Robotics)**

**Mr. K. Muralidharan M.E., Lecturer / E( Robotics)**

**Mr. D. Subramani M.E., Lecturer / E(Robotics)**

## Chairman's Message



I feel immense pleasure to inscribe my message for the souvenir. It has been said that the mask of success contains many hidden faces behind it. **CONVERGENCE 2022 SYMPOSIUM** as well as this institution is an assertion of this fact.

Absolute teamwork and strong vision resulted in Digital Marketing (**convergence 2022**)” a National level symposium organized by the Department of Electronics (Robotics) Engineering. Our Institution Strive to travel beyond the boundaries of Mere books. We have realized that our future is abstract and unknown but youth in our hands are real and can be molded. This souvenir gives us just the glimpses of the achievements be held by our institution. Brighter days are still to come. And my heartfelt wishes for that.

The diligent contribution made by our faculty members and elaborated endeavor done by our students are the foundations of **convergence 2022** Conference.

“Be with wise people that make you wise”

My best wishes for the future!

**Er. P. Perumal**Chairman,  
**PMC TECH – Group of Institutions.**

## Secretary's Message



It gives me great pleasure to send the message for the souvenir, which is to be released at *Convergence 2022* Symposium. *Convergence 2022* Symposium is being organized on 7<sup>th</sup> Feb 2020 by Department of Electronics (Robotics), Hosur.

An Institution of Higher Education, where students and faculty members are busy in learning and research, organizes such co-curricular activities for giving an opportunity to the students to celebrate their competence in technology and to inculcate in them the qualities of confidence, innovative thinking and analytical abilities. Co-curricular activities are intimately connected with the inner-being of a person. On the one hand, these permit an individual to express oneself and understand oneself better.

We want PMC Tech to be a great Institution. While making every single classroom, laboratory and workshop interesting is important, while working to make our programs practice-oriented is PMC Tech's mission, development of the complete personality of every student in all the hues, which come together to create a great human being, is the objective of the Institution. Such programs contribute a great deal in achieving the PMC Tech's objectives.

I convey my Best Wishes for the success of *Convergence 2022*, organized by department of Electrical and Electronics Engineering.

**Shri. P. Kumar,**  
**Secretary,**

**PMC TECH – Group of Institutions.**



## Trustee's Message



A feeling of great pride and contentment rises to witness our event “*Convergence 2022*” and this souvenir is nothing else but the reflection of the success saga our institution has created.

It has always been a tradition of our institution of confer holistic education to the learners which not only gives the qualification but also intends to mold them into better human beings. And I wish the same tradition will be followed in future years. Being a constant witness of the progress of our institution, I can surely acclaim that in times to come, our institution will prove to be an epitome of excellence in imparting quality education.

The sincere work and strength put up by our faculties and dear students in materializing this conference is worth admiring. This souvenir reflects aspiring vision and inspiring insight of our students and faculties.

So, my good wishes are always with them.

Many congratulations to all!

**Smt. P. Mallar,**

**Trustee,**

**PMC TECH – Group of Institutions.**



## Principal's Message



Er. Perumal Manimekalai Polytechnic College has been the crest of jewels in the educational map of Tamilnadu. Its unrivalled excellence in conferring quality education of PMC Tech has played pivotal role in the technical development of the learners.

The sincere and meticulous work pattern has been the heritage given by our Institution. As a consequence, our institution has cultivated a tradition of bestowing learners with best quality academic education. Apart from that, to develop creative, conceptive and analytical skills as well as to furnish the learners with research and leadership skills technical festivals are essential. So the Department of Electronics (Robotics) Engineering has organized “*Convergence 2022*” a National level Symposium and it stands a class apart from all the events. And I dream our conference will provide a forum for all the students to exchange their learning experiences as well as their creative technical knowledge. I am assured that our Symposium will represent the students both quantitatively and qualitatively.

My cordial felicitations to all!

Congratulation to all of the students. Yours efforts have not gone unnoticed!

Best wishes for this, **National Level Symposium – *Convergence 2022***.

**Mr. N. Balasubramaiam,**  
**Principal,**

## HoD's Message



This National conference on "*Convergence 2022*" organized by E(Robotics) department, to focus the attention of all concerned professionals to discuss at length concern with emerging trends in engineering and technology.

To seek solutions wherever possible and identify areas where further in research. Invited contributions from professional bodies for knowledge sharing. Enormous participants confirmed their registration and presentation in National level symposium.

PMC Tech is making strides towards evolving directions for the growth and dissemination of technical knowledge for the purpose of research and innovation. It is with these clear thoughts the department of Electronics (Robotics) Engineering has been organizing National level Symposium. This year the focus is on

Moreover, this whole event is a conclusion of synchronized efforts done by our faculty members and students. Congratulations to them for their sincere and earnest hard work. I, hope this conference will be a platform for all our energized students where they can explore their hidden potential.

Wish you best of luck in your endeavor.

**Mr. K. Arunkumar HOD/ E(Robotics)**

**PMC TECH – Polytechnic College.**

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# ROBOTICS FOR THE NEXT MANUFACTURING REVOLUTION

## ABSTRACT

The emphasis of the journal *Robotics and Computer-Integrated Manufacturing* is on disseminating the application of research to the development of new or improved industrially-relevant robotics, manufacturing technologies, and innovative manufacturing strategies. Preference is given to papers describing original research that includes both theory and experimental validation. Comprehensive review papers on topical issues related to robotics and manufacturing will also be considered. Papers on conventional machining processes, modelling and simulation, supply chain management, and resource optimization, will generally be considered out of scope, as there are other more appropriate journals in these areas. Overly theoretical or mathematical papers will be directed to other more appropriate journals as well. Original papers are welcomed in the areas of industrial robotics, human-robot collaborative manufacturing, cloud-based manufacturing, cyber-physical production systems, big data analytics in manufacturing, smart mechatronics, machine learning, adaptive and sustainable manufacturing, and other fields involving unique manufacturing technologies.

# **CLOUD ROBOTS**

## **ABSTRACT**

IROS is a largest and most impacting robotics research conference worldwide. It provides an international forum for the international robotics research community to explore the frontier of science and technology in intelligent robots and smart machines. In addition to technical sessions and multi-media presentations, IROS conferences also hold panel discussions, forums, workshops, tutorials, exhibits, and technical tours to enrich the fruitful discussions among conference attendees. The topics related - but not limited - to: robot design, robot kinematics/dynamics/control, system integration, AI in robotics, sensor/actuator networks, distributed and cloud robotics, bio-inspired systems, service robots, robotics in automation, biomedical applications, autonomous vehicles (land, sea, and air), robot perception, manipulation with multifinger hands, micro/nano systems, sensor information, multimodal interface and human robot interaction, and robot vision

# CLUSTER COMPUTING

## ABSTRACT

The IEEE Cluster Conference serves as a major international forum for presenting and sharing recent accomplishments and technological developments in the field of cluster computing as well as the use of cluster systems for scientific and commercial applications. Cluster 2022 involves participants (researchers, developers, and users) from academia, industry, laboratories, and commerce, coming together to discuss recent advances and trends in, but not limited to: Applications, Algorithms, and Libraries Architecture, Networks/Communication, and Management Programming and Systems Software Data, Storage, and Visualization

# GOOGLE BRAIN ROBOTICS

## ABSTRACT

Intracortical brain-machine interface (iBMI) is an assistive strategy to restore lost sensorimotor function by bridging the disrupted neural pathways to reanimate paralyzed limbs. However, to date, none of the studies explored the trade-offs between the performance criteria of different iBMI systems that decode discrete upper limb movements from intracortical neural recordings.

A systematic review of electronic databases using different MeSH terms from January 1990 to December 2019 was conducted. IBM® SPSS statistics version 25 (Released 2017, Armonk, NY: IBM) was used to evaluate for differences between groups using independent sample t-tests.

A total of 18 patients from 15 studies were included in our analysis. The included studies involved iBMI controlled 5-robotic and 10-neuromuscular stimulated orthotics to perform skillful and coordinated movements that resulted in a clinically significant gain in tests of upper-limb functions. Pooled analysis revealed that the mean response time to execute 3-D reach and grasp task by the robotic-assisted limb was relatively longer (46.8  $\pm$  101.5 s) compared to the neuro-muscular stimulated orthotics (15.8  $\pm$  15.2 s); however, statistically insignificant [Mean difference (MD): 30.9, 95 % Confidence Interval (CI): -40.4–102.3,  $p = 0.35$ ]. Furthermore, the accuracy in performing 3-D reach and grasp tasks after repetitive trials were better among patients with neuro-muscular stimulated orthotics (83.5  $\pm$  12.7 %) compared to those with robotic-assisted prosthetic limb (69.1  $\pm$  23.6 %) with statistically significant difference (MD: 15.9, 95 % CI: 1.65–32.5,  $p = 0.05$ ).



# ROBOTICS KINEMATICS AND DYNAMICS

## ABSTRACT

The movement of a walking six – legged robot hexabot (a "spider" robot) with the possibility of implementing various movements is considered. The equations of kinematics and dynamics of a separate robot leg with three degrees of freedom are written out, and the question of optimizing the robot movement is considered based on the study of dynamic equations. At the first stage for solving this problem, one leg is considered separately, as a kinematic system with open kinematics and with three degrees of freedom. The kinematics equations were presented in matrix form using the principle of rotation of the coordinate system. The dynamics equations are based on Lagrange equations of the second kind. The mass of the legs, reduced to the center of gravity, moments of inertia, moments developed by engines were taken into account, and etc. The conclusions were made about the optimal movement of the leg based on the obtained equation of kinetic energy of the robot's leg based on the obtained equation of the kinetic energy of the robot leg. This paper doesn't consider the movement of the entire platform (the spider's "body"), nor does it consider the influence of the friction force that occurs in kinematic pairs and when the robot's legs touch the surface during movement.