UBT College

Research Plan of Mechatronics Engineering Faculty (2025-2030)

2025

Vision

To lead in developing innovative technologies in robotics, engineering design, and artificial intelligence, contributing to sustainability and progress in the region

Mission

To advance research in robotics, engineering design, and artificial intelligence through innovation and international collaborations, creating sustainable solutions for industry and society.

Research Focus Areas

- Robotics and Control Systems
- Engineering Design & Manufacturing
- Applications of Artificial Intelligence in Medicine and Agriculture

Goals and Objectives

Goal 1: Advance Research in Robotics and Control Systems

Objectives:

- Develop advanced algorithms for autonomous robot control and integrated systems.
- Create experimental platforms to test and validate robotic solutions.
- Collaborate with industry for implementing robotic systems in diverse sectors.

Indicators:

- Development and testing of at least five new algorithms for autonomous robotics by 2027.
- Establishment of two experimental platforms published in research papers.
- Completion of three successful industry collaborations for robotic implementations.

Actions:

- Form a specialized task force for developing algorithms and simulations for robotics.
- Invest in advanced laboratory equipment for robotic testing and control systems.
- Organize workshops and meetings with industrial partners for practical applications.

Goal 2: Enhance Engineering Design and Manufacturing Processes

Objectives:

- Develop new manufacturing methods such as 3D printing and advanced material processing.
- Optimize product design using advanced engineering tools and simulations.
- Apply AI for process optimization in manufacturing.

Indicators:

- Introduction of three new manufacturing methods implemented in industry by 2028.
- Design and optimization of five new products using innovative tools.
- Demonstration of 20% improvement in production efficiency using AI by 2030.

Actions:

- Invest in state-of-the-art production technologies and new materials.
- Develop and test prototypes in dedicated labs for optimization.
- Implement AI in simulations and optimization of manufacturing processes.

Goal 3: Apply Artificial Intelligence in Agriculture and Medicine

Objectives:

1. Use AI to analyze and optimize agricultural production systems and medical diagnostics.
2. Apply AI for personalized solutions in patient treatment and crop optimization.
3. Develop intelligent tools to improve efficiency in medical diagnostics and resource management in agriculture.

Indicators:

- Number of successful projects implemented with AI in medicine and agriculture.
- Improvement in efficiency and accuracy of medical diagnostics through AI.
- Increased productivity in agriculture through AI technologies.

Actions:

- Establish specialized research groups in AI applications for medical diagnostics and agricultural production.
- Develop and test AI algorithms to enhance diagnostics and resource management in medicine and agriculture.
- Collaborate with healthcare and agricultural institutions to implement AI-based solutions that improve outcomes in both fields.

Methodology

1. **Multidisciplinary Approach:** Encourage collaboration between various engineering and science disciplines.
2. **International Partnerships:** Strengthen global collaborations through joint research projects and academic exchange programs.
3. **Industry Engagement:** Involve industry stakeholders to ensure applicable and real-world impact of research outcomes.
4. **Innovation and Sustainability:** Focus on creating innovative, sustainable, and impactful research results.
5. **Continuous Evaluation:** Regularly assess research progress and alignment with strategic goals to ensure effective implementation.

Roles and Responsibilities

- **Faculty Researchers:** Lead specific projects aligned with focus areas and mentor students.
- **Research Groups:** Collaborate across disciplines to address complex problems.
- **Industry Partners:** Provide practical insights and funding for research initiatives.

Expected Impact

- Significant contribution to the development of advanced technologies in robotics and AI.
- Strengthened connections between academia and industry, driving innovation and economic growth.
- Enhanced international visibility through participation in global research projects and publications.

Risk Management

- **Financial Constraints:** Proactively apply for international research grants and industry sponsorships.
- **Resource Limitations:** Optimize existing resources and foster collaborative research.
- **Technological Challenges:** Engage with experts and adopt cutting-edge methodologies.

Evaluation and Monitoring

- Biannual review of research progress and outcomes.
- Measurable KPIs for each goal and action.
- Feedback from industry partners and academic peers.