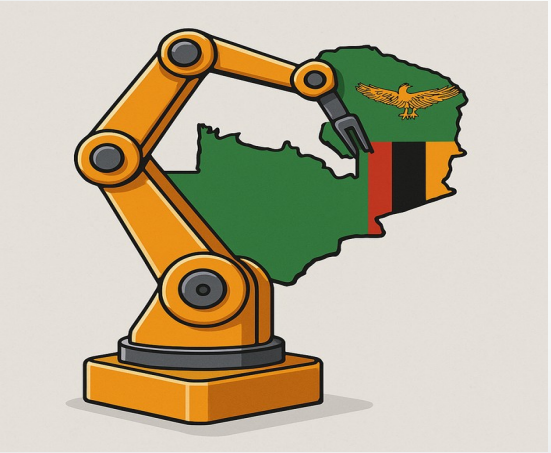
INTRODUCTION OF MECHATRONICS AT SINOZAM



PRESENTED BY

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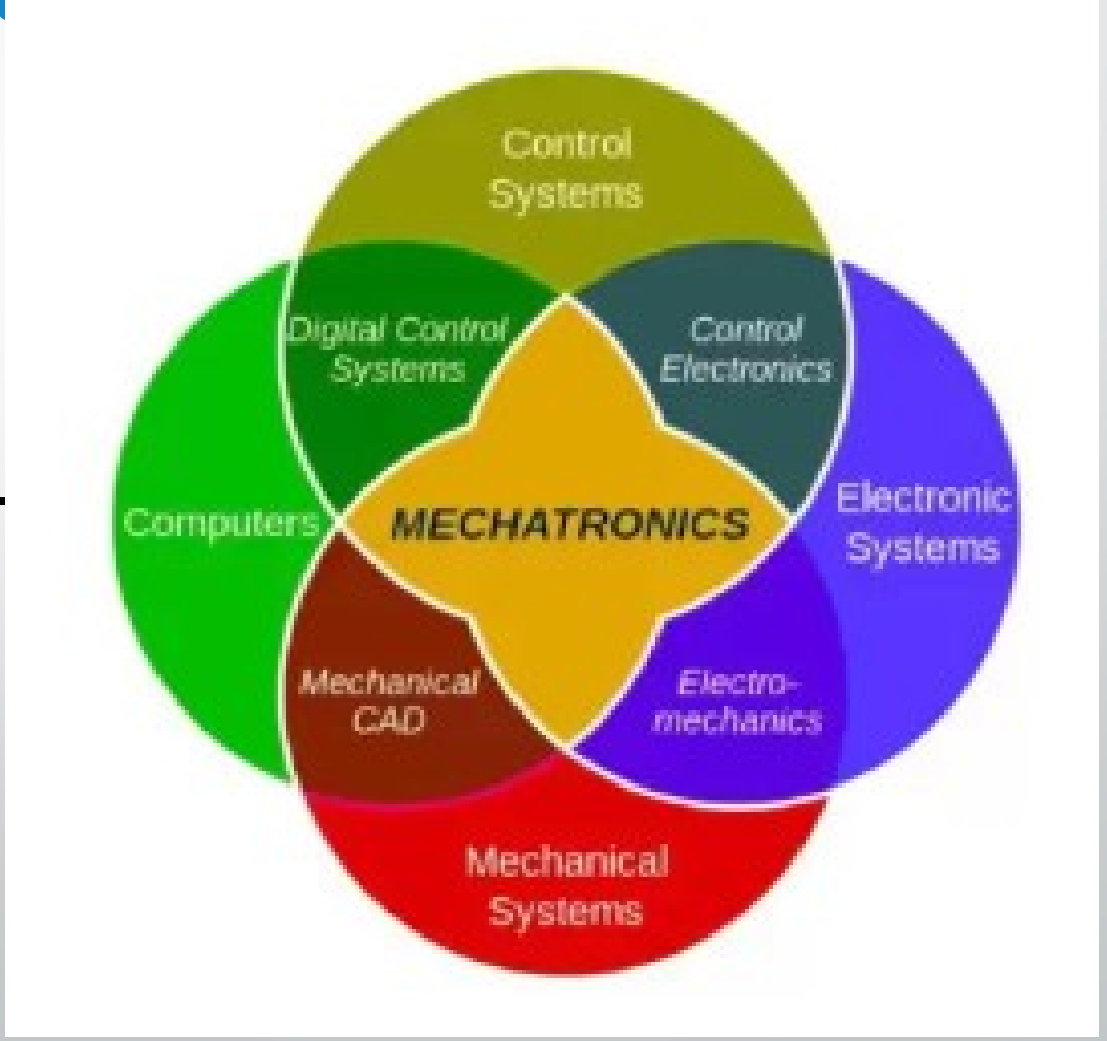
Introduction

- What is mechatronics?
- Mechatronics is an interdisciplinary field of engineering that integrates mechanical engineering, electrical engineering, computer science, and control engineering to design and create intelligent systems and products.
- It focuses on the



Brief History

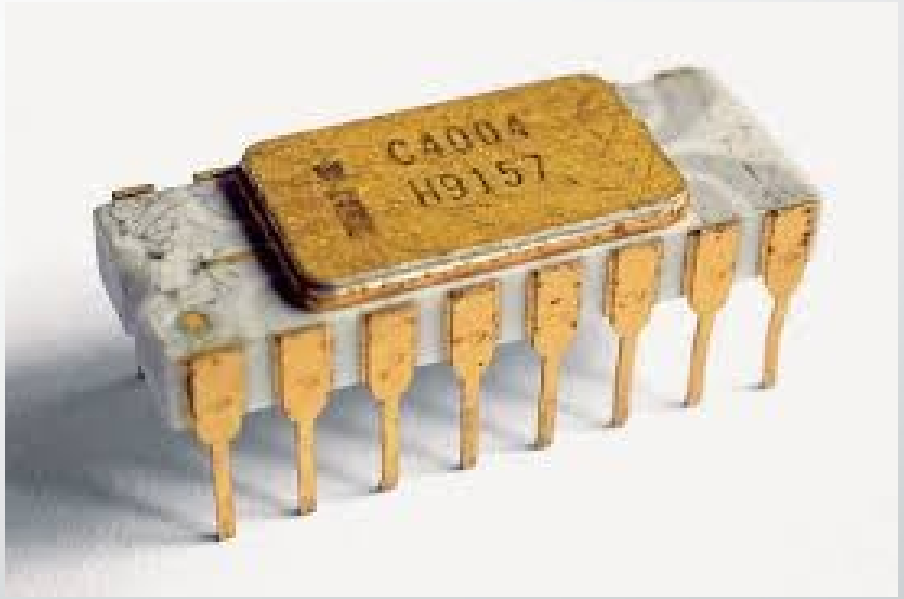
- **1960s:**

The term **"Mechatronics"** was coined by **Tetsuro Mori** of **Yasakawa Electric** in Japan in **1969**.

The concept originally focused on the integration of **mechanical systems** and **electronics** in manufacturing and automation

Brief History

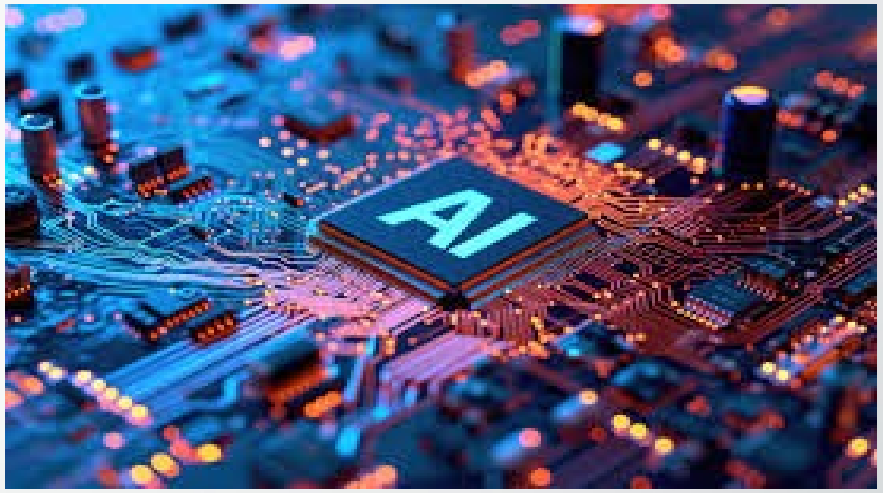
- **1980s**:
- The 1980s witnessed the widespread adoption of microprocessors
- Integration of **control systems** and **computer programming** advanced automation, enabling **smarter machines**
- Mechatronics played a crucial role in developing advanced automotive features like anti-lock braking systems (ABS) and
- electric seats, which required the integration of mechanical and electronic components.



Brief History

1990s-Present:

- The field saw rapid growth with the rise of **embedded systems**, **IoT**, and **artificial intelligence**.
- Mechatronics now plays a key role in industries such as **robotics**, **autonomous vehicles**, **smart factories**, **healthcare technologies**, and **renewable energy**



Why Zambia needs Mechatronics

- **Key Problems in Agriculture:**
- **Low Mechanization** – Farmers rely on outdated or manual equipment.
- **Water Waste & Low Yield** – Inefficient irrigation systems lead to losses.
- **Post-Harvest Losses** – Lack of automated storage & processing solutions.

Why Zambia needs Mechatronics

- **Key Problems in Industries**
- **Low Industrial Automation** – Many factories & industries still rely on manual labor.
- **Frequent Equipment Failures** – Lack of predictive maintenance leads to high downtime.
- **High Production Costs** – Inefficient processes increase manufacturing expenses.
- **Lack of Skilled Technicians** – Shortage of mechatronics-trained professionals.

Why Zambia needs Mechatronics

- **Key Problems in Mining:**
- **Unsafe Working Conditions** – Heavy reliance on manual operations in hazardous zones.
- **Inefficient Ore Processing** – High energy consumption & material losses.
- **Unplanned Downtime** – Equipment failures cause costly disruptions.

Why Zambia needs Mechatronics

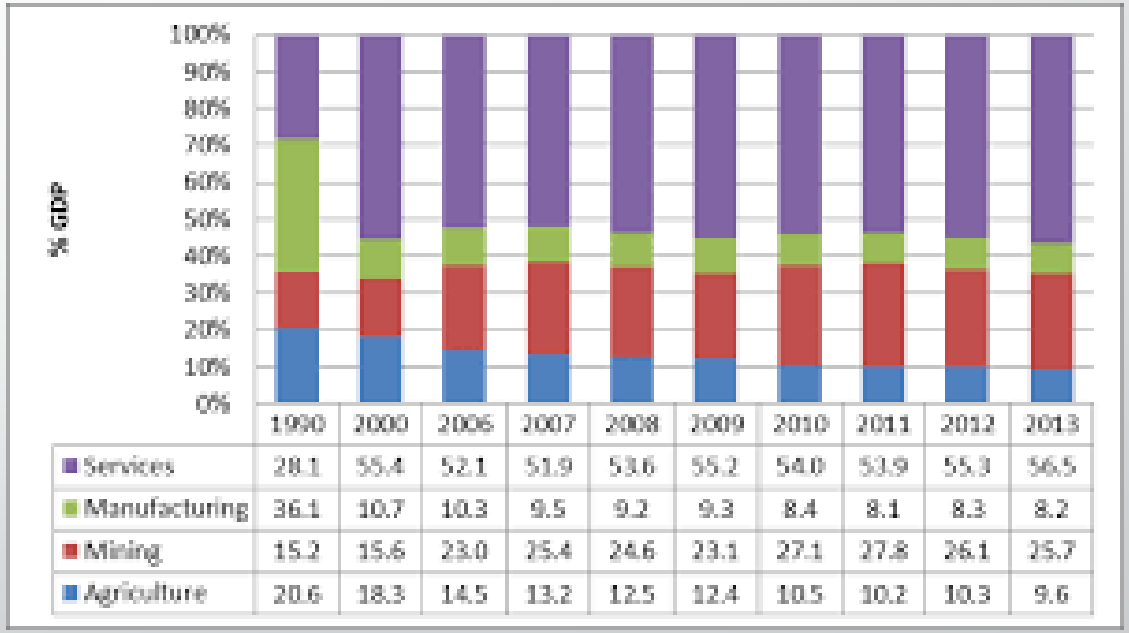
- **Key Problems in Energy & Infrastructure:**
- **Power Outages & High Energy Losses** – Poor grid management affects industries & homes.
- **Limited Smart Infrastructure** – Poor urban planning & outdated transport systems.

Why Zambia needs Mechatronics

- **Key Problems in Manufacturing:**
- **Limited Local Production** – Dependence on imported goods due to lack of automation.
- **High Waste & Low Efficiency** – Poor quality control increases manufacturing defects.

Importance Of Mechatronics In Zambia Today

- Zambia is undergoing rapid industrial growth in sectors like **mining**, **manufacturing**, and **agriculture**.
- **Mechatronics** offers a solution to meet the increasing demands for efficiency, precision, and automation in these sectors



	1990	2000	2006	2007	2008	2009	2010	2011	2012	2013
Services	28.1	55.4	52.1	51.9	53.6	55.2	54.0	53.9	55.3	56.5
Manufacturing	36.1	10.7	10.3	9.5	9.2	9.3	8.4	8.1	8.3	8.2
Mining	15.2	15.6	23.0	25.4	24.6	23.1	27.1	27.8	26.1	25.7
Agriculture	20.6	18.3	14.5	13.2	12.5	12.4	10.5	10.2	10.3	9.6

Mechatronics in Zambia today

- Mechatronics can help modernize Zambia’s **manufacturing**, **Agriculture** and **mining** sectors.
- It bridges the gap between traditional engineering methods and advanced technology.
- The integration of **automation** is vital for reducing labor costs and enhancing productivity in industrial operations

Solutions that Mechatronics can offer in Agriculture

Precision Farming & Automation

- Automated Climate Control:
- Hydroponic &

Livestock Management

- Automated Feeding Systems:
- Health Monitoring with Wearable Sensors:
- Robotic Milking

Mechanized Harvesting & Processing

- Especially useful for large farms.
- Reduces waste and increases efficiency i
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Mechatronics in Zambia today
Mining

Automation & Robotics in Mining

a. Robotic Drilling & Blasting Systems
b. Drones for Mine Inspection & Surveying

Enhancing Safety in Mining Operations

c. Real-Time Monitoring & Hazard Detection
d. Remote-Controlled Equipment
e. AI-Based Predictive Maintenance

Mechatronics in Zambia today
Mining

Energy Efficiency & Environmental Sustainability

- Smart Power Management Systems
- Water Recycling & Smart Waste Management
- Renewable Energy Integration

Workforce Training & Skill Development

- Simulation-Based Training for Miners
- Automation & Robotics Training

How Mechatronics Can Transform the Education System in Zambia

Smart Classrooms & Interactive Learning

- Mechatronics in Special Education
- Automating School Administration & Security
- Preparing Students for the Future Workforce

HOW IS SINOZAM IS HELPING IN SKILLS DEVELOPMENT

- Sinozam vocational college of science and technology is a college in Luanshya
- It is a private institution owned by CNMC Luanshya Copper Mine
- It is offers programs in , mechatronics ,AIT ,MMA ,MMMEE …
- All these programs are sponsored by different colleges and universities in china.

HOW IS SINOZAM IS HELPING IN SKILLS DEVELOPMENT IN MECHATRONICS

Sinozam has developed a diploma in mechatronics accredited by TAVETA with an emphasis on the following key courses

a. Fundamentals of mechatronics
b. Mechanical engineering principles
c. Sensor Technology
d. Control system and automation
e. Microcontrollers and embedded systems
f. Pneumatics and hydraulics
g. Computer Aided Design

HOW IS SINOZAM IS HELPING IN SKILLS DEVELOPMENT

Collaborating with the mother company CNMC-CLM

a. expose all the students to the mining industry in terms of attachments
b. Exposing the students to the latest technology in the mines
c. Encouraging students by awarding the best performing students
d. Sponsoring students to China for further skills development

HOW IS SINOZAM IS HELPING IN SKILLS DEVELOPMENT

OFFERING HANDS ON LEARNING

a. student are exposed to the latest embedded systems training kits
b. students are trained on actual PLC for automation
c. Students are exposed to different automated machining methods eg lathe, NC machines and 3D printers
d. students are required to come up with project at the end of the year

HOW IS SINOZAM IS HELPING IN SKILLS DEVELOPMENT

- We recently participated in skills competition in china, which we won a bronze medal
- We have hosted local world skills competitions in mechatronics and specialised welding
- We are going to send out participants to world skills to be held in Livingstone

HOW IS SINOZAM IS HELPING IN SKILLS DEVELOPMENT

Collaboration

a. CNMC-CLM
b. CBU
c. The Chinese government
d. 15MCC
e. Nazhin university of technology
f. Benjin college of technology

THANK YOU FOR YOUR TIME