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Smart, Adaptive, and Future Electronic Systems

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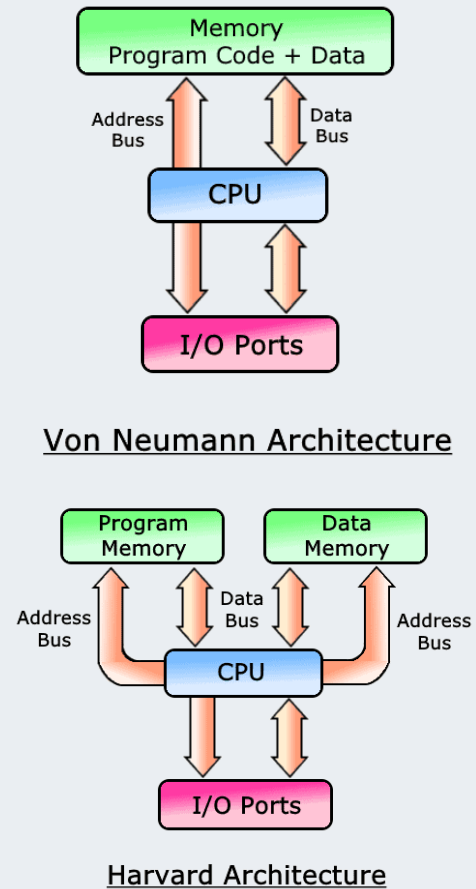


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1. Today's Intelligence

1.1 Microcontrollers



1. Today's Intelligence

1.1 Microcontrollers

UPPER BLINKWATER MINIGRID SOUTH AFRICA

Rural electrification in South Africa has usually been via conventional Eskom power lines or low voltage solar home systems. Some geographically isolated communities have never stood a chance of grid connection because of low electricity demand, population density, and the high cost and technical difficulty of grid extension. However, the hybrid Upper Blinkwater Minigrid pilot project in the Eastern Cape Province shows the way for far-flung rural areas.

The project comprises 75kWp solar PV modules, 21kW wind power, 130kWh battery storage, and a diesel backup generator linked to 57 households outfitted with smart prepaid meters integrated into the municipal billing system.



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1. Today's Intelligence

1.2 FPGAs (Field Programmable Gate Arrays)

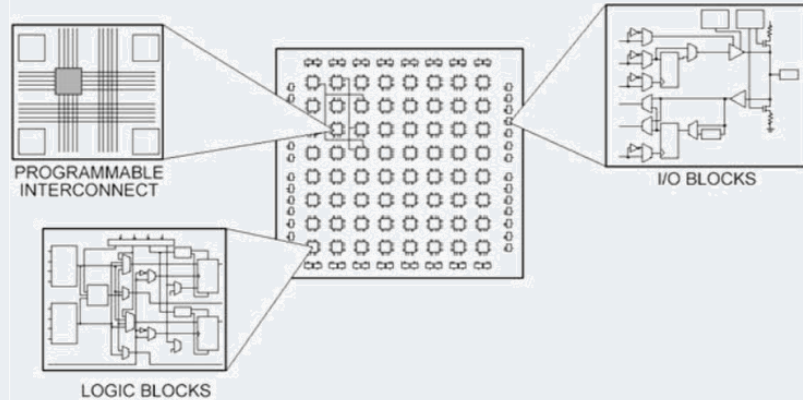
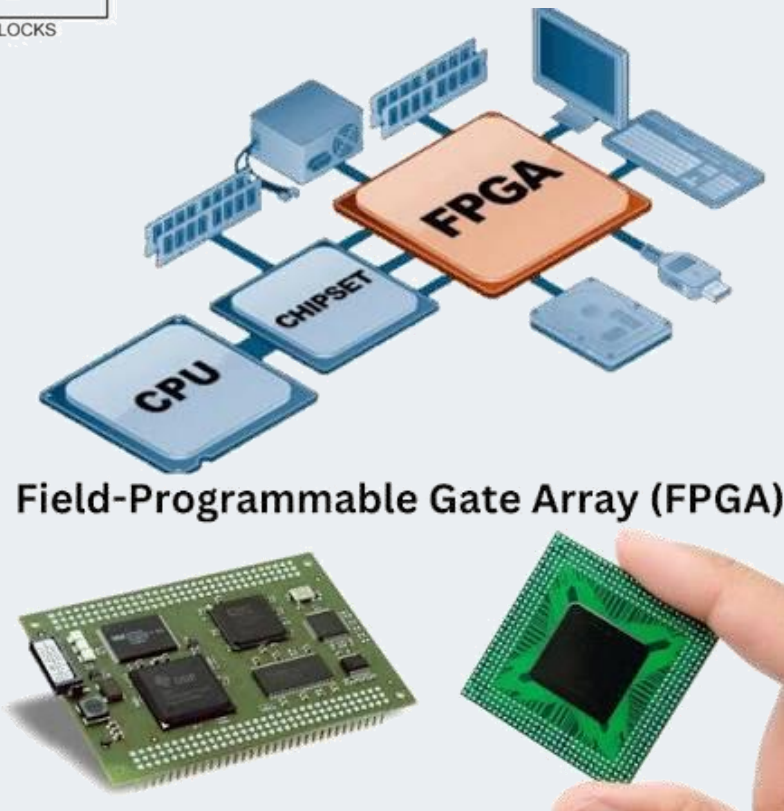


Figure 2: The Different Parts of an FPGA



Field-Programmable Gate Array (FPGA)



1. Today's Intelligence

1.2 FPGAs (Field Programmable Gate Arrays)

From connected to intelligent mines: South Africa's next transformation

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Charlie Li, Oil & Mining Business Director of Huawei Sub-Saharan Africa, shared Huawei's vision for accelerating intelligent mining through artificial intelligence (AI) and digital infrastructure.



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Intelligent Mining



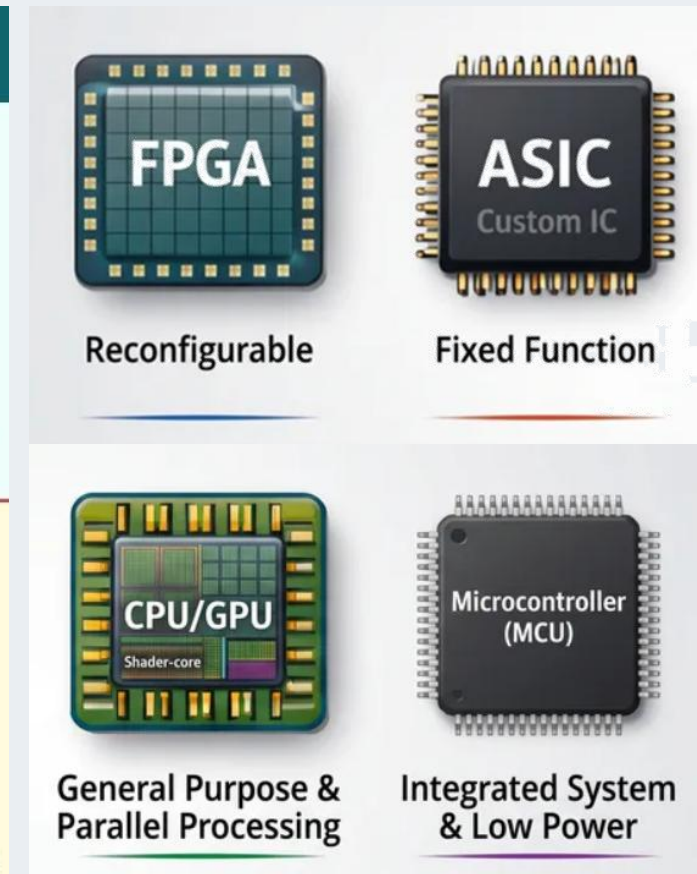
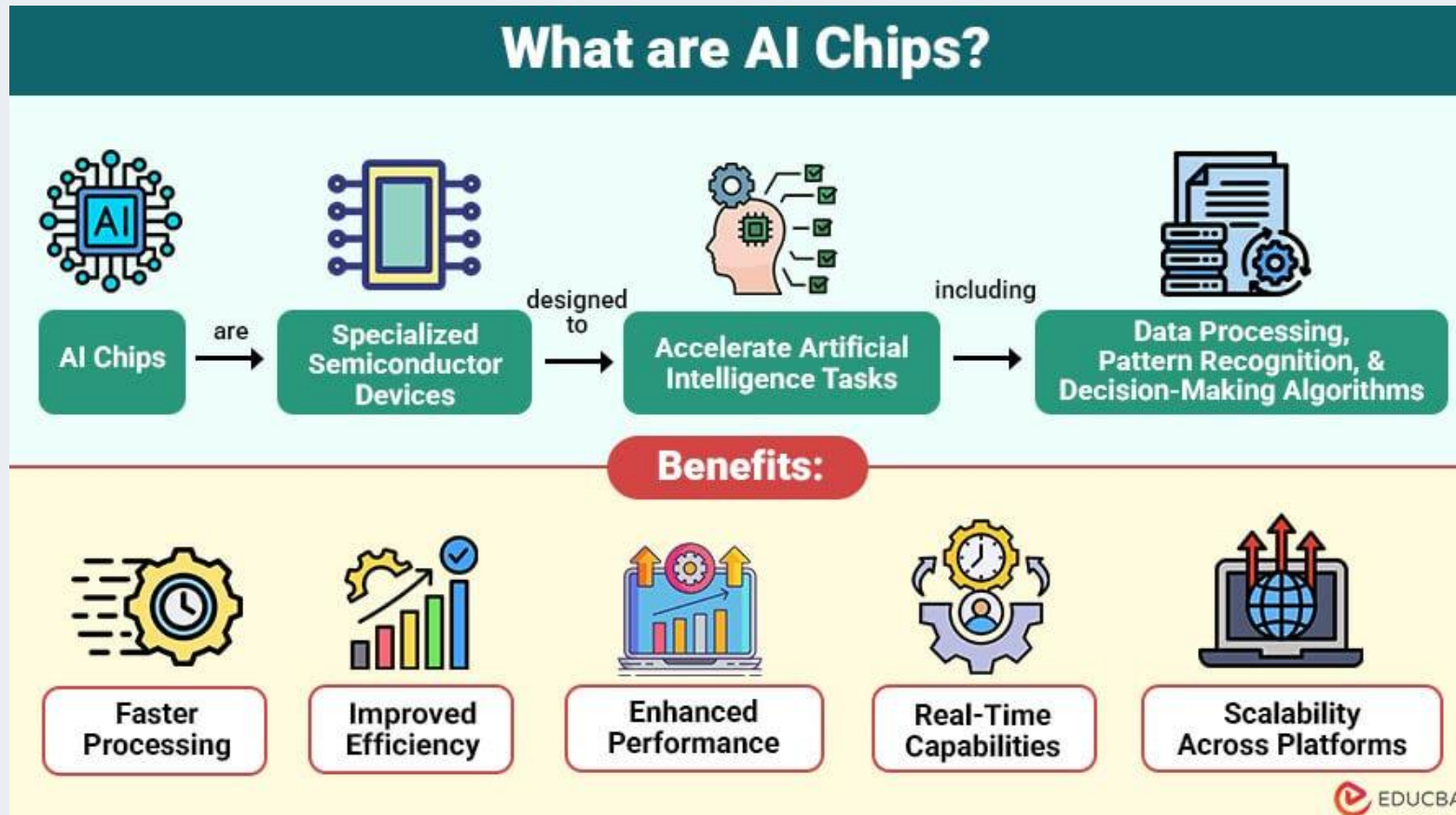
Innovation & Technology

Intelligent Mining Systems is not about technology for its own sake — it's about using the right tools, in the right way, to achieve real-world results. Drones, UAVs, sensors, and machine learning models help create safer, cleaner, and more efficient mining environments.

- **Drones and UAVs:** Rapid mapping and data models that reduce risk and enhance exploration.
- **Sensor Networks:** Embedded ground sensors and equipment monitors track real-time conditions, with machine learning algorithms identifying issues before they escalate.
- **Traffic Simulators:** Animated dashboards that optimise material flow, reduce emissions, and prevent collisions.

1. Today's Intelligence

1.3 AI-enabled chips



FPGA vs. ASIC vs. CPU GPU vs. Microcontroller

1. Today's Intelligence

1.3 AI-enabled chips

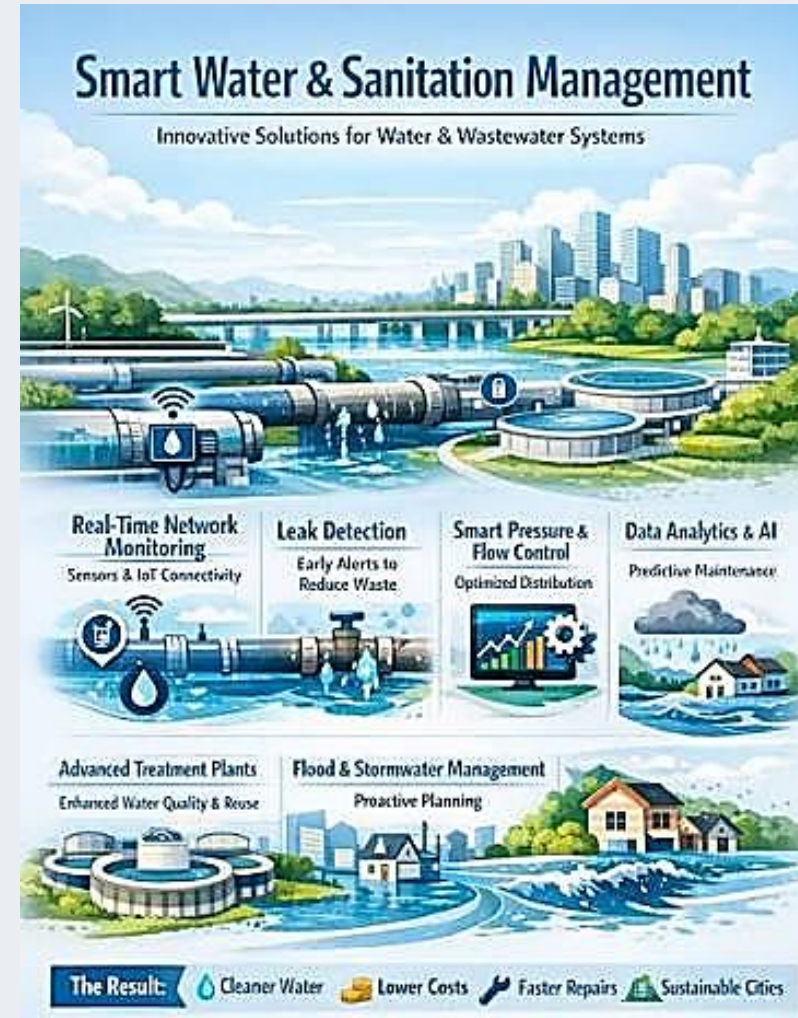
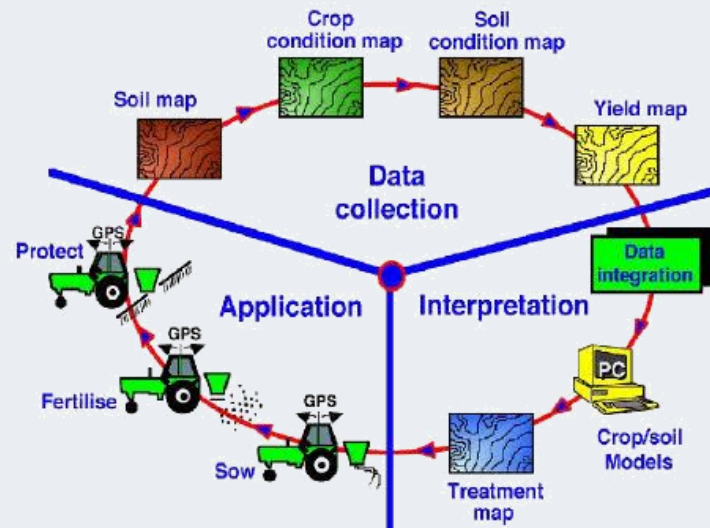
1. Capitec: AI-Powered Customer Support

2. Nedbank: AI for Risk and Fraud Detection

5. SPAR: AI for Operational Efficiency

9. EskomSePush (ESP): AI for Smarter Community Chats

2. Connected Ecosystems



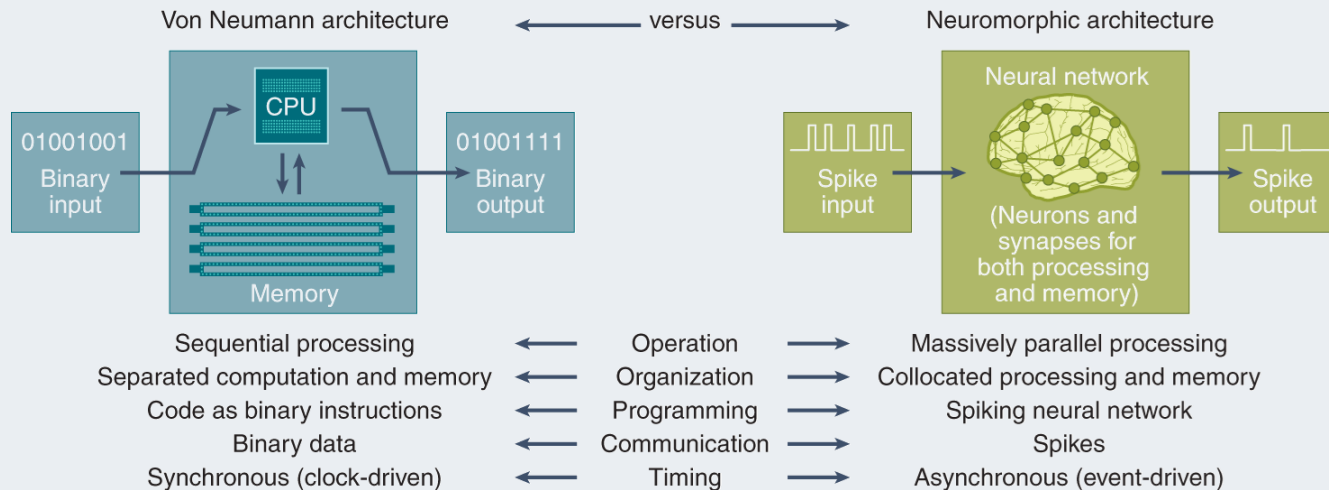
2. Connected Ecosystems



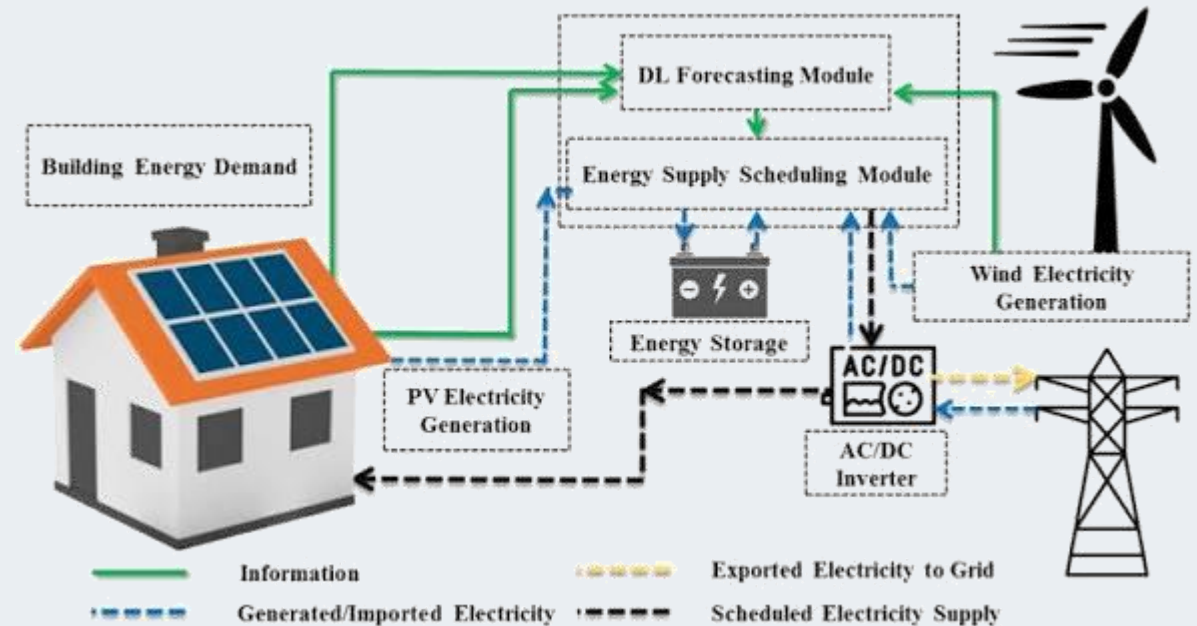
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QUANTUM ELECTRONICS



4. Future Outlook



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