MALLAREDDY INSTITUTE OF ENGINEERING AND TECHNOLOGY

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Department of Electronics & Communication Engineering

TECHNICAL SEMINAR ON

INTERNET OF THINGS (IOT) USING RASPBERRY PI

Technical seminar
Guide:
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22W95A0405

Internet of Things (IoT) Using Raspberry Pi

Welcome! Today we'll explore the exciting world of the Internet of Things (IoT) and how Raspberry Pi empowers its development. Discover how this versatile technology is shaping the future of connectivity and automation.

Introduction to IoT

Connecting the Physical World

The IoT interconnects physical devices, enabling them to exchange data over the internet.

Diverse Applications

IoT is transforming industries such as smart homes, healthcare, agriculture, and manufacturing.

Key Components of IoT

1 Sensors

Gather data about the physical world, like temperature, humidity, or motion.

2 Actuators

Perform actions based on received data, like controlling appliances or adjusting settings.

3 Connectivity

Enable communication between devices through technologies like Wi-Fi, Bluetooth, and Zigbee.

4 Cloud Computing

Store, process, and analyze data from IoT devices.

What is Raspberry Pi?

Affordable Computer

A credit-card-sized, low-cost computer with a wide range of applications.

GPIO Pins

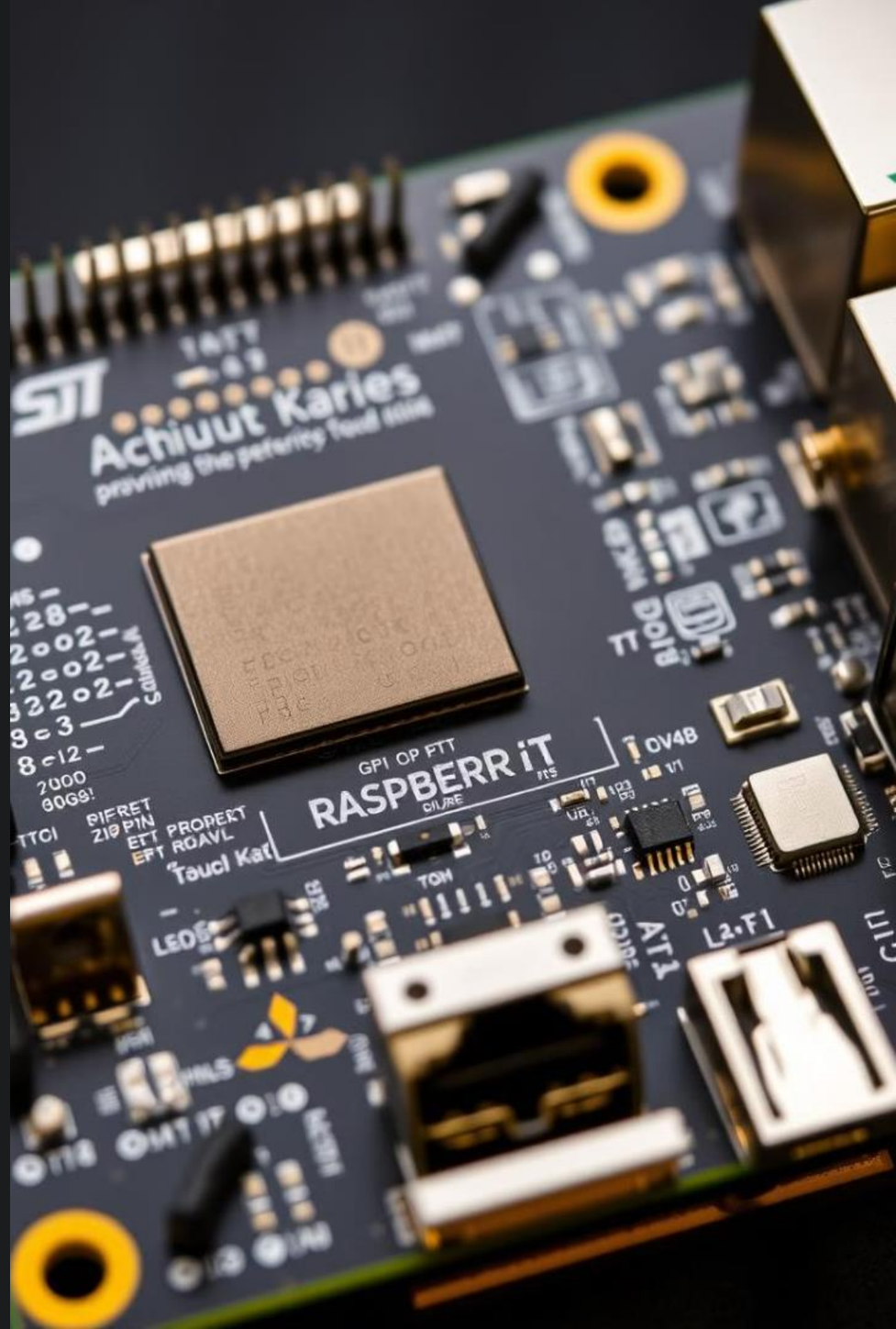
40 general-purpose input/output pins for connecting to sensors and actuators.

Connectivity

Features USB, Ethernet, and Wi-Fi for communication and data exchange.

Programming Support

Supports popular languages like Python, making it accessible for developers.



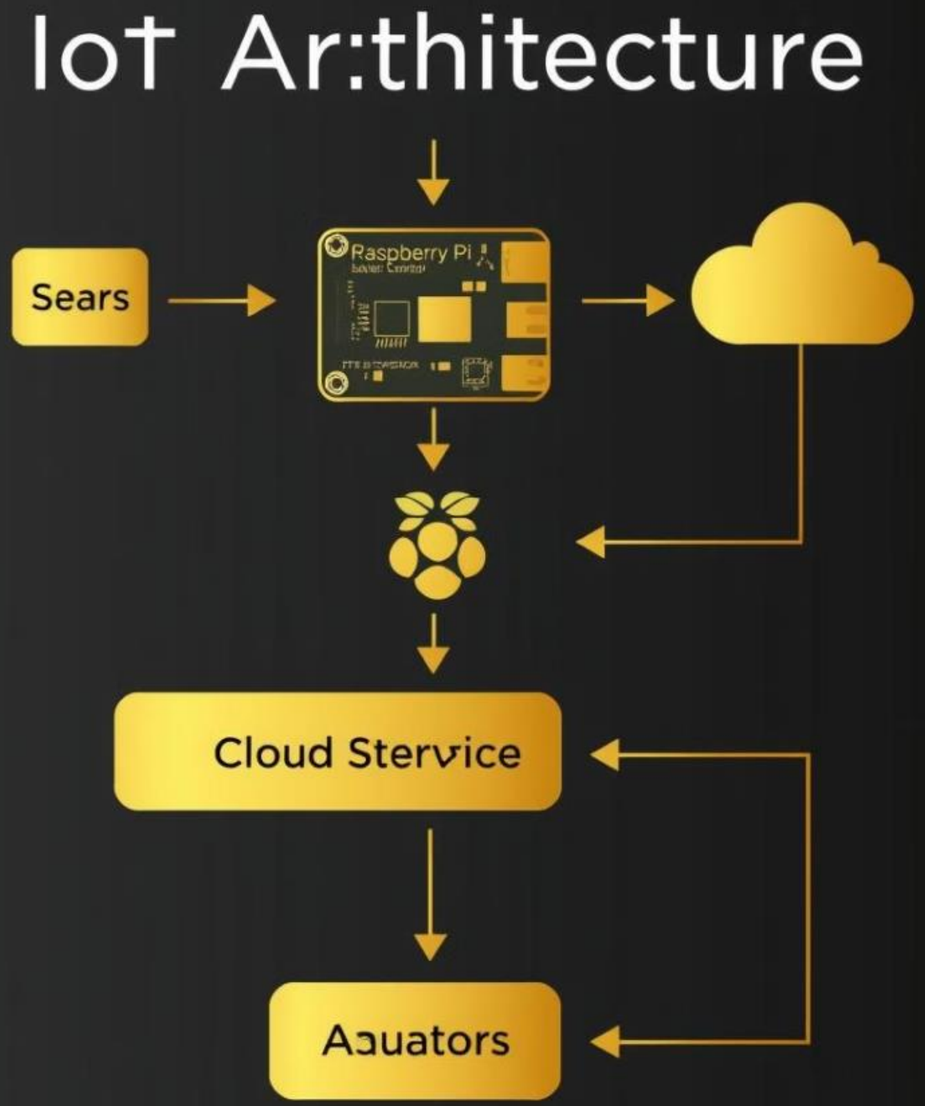
Why Raspberry Pi for IoT?

Advantages of Raspberry Pi

- Low-cost and versatile
- Powerful real-time data processing
- Extensive community support and documentation

Raspberry Pi vs. Arduino

Comparison table highlighting the strengths of Raspberry Pi for IoT projects.



IoT Architecture Using Raspberry Pi

1 **Perception**

Sensors gather data about the environment.

2 **Network**

Data is transmitted using protocols like Wi-Fi and MQTT.

3 **Processing**

Raspberry Pi processes data and makes decisions.

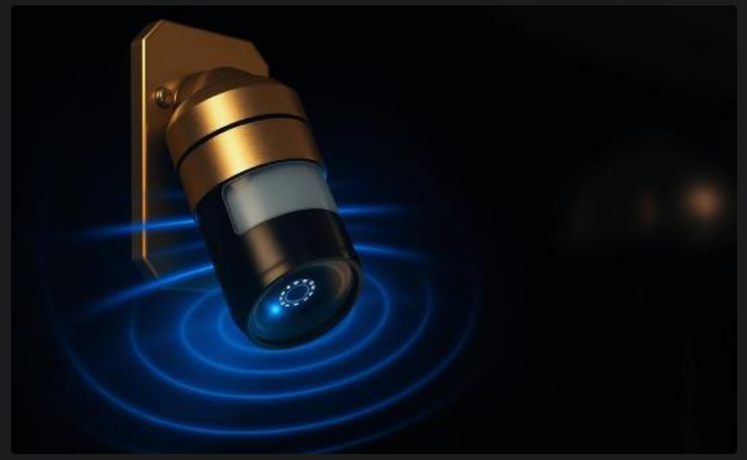
4 **Application**

Users interact with the system through dashboards and mobile apps.

Sensors and Actuators

DHTll Sensor

Measures temperature and humidity for environmental monitoring.



PIR Sensor

Detects movement for security and automation purposes.

Relay Modules

Control appliances and devices by switching power circuits on and off.

Protocols for IoT Communication

MQTT

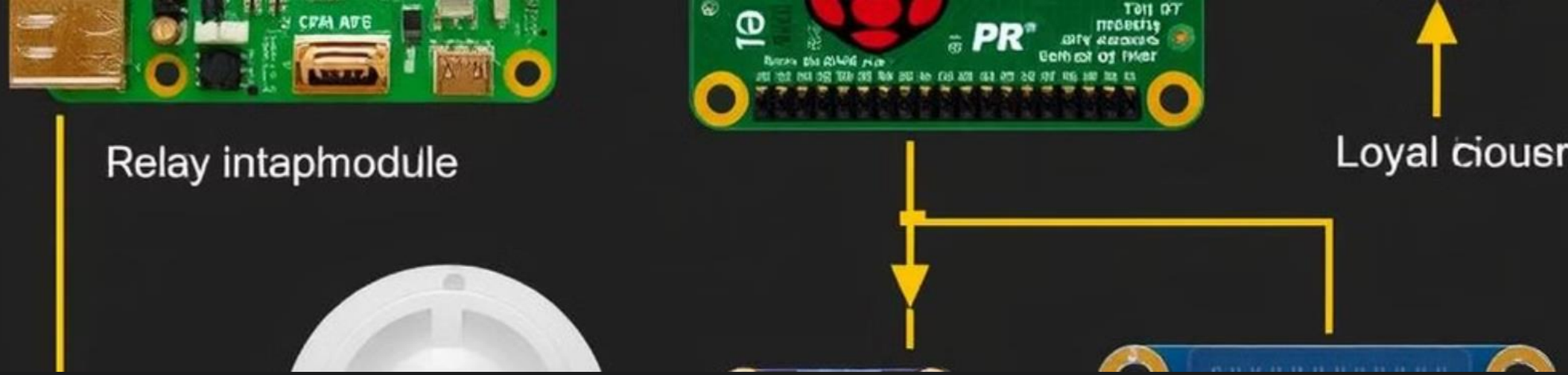
Lightweight messaging protocol, ideal for resource-constrained devices.

HTTP/HTTPS

Web-based protocols used for data exchange over the internet.

CoAP

Optimized for low-power devices, often used in constrained environments.



Example Project: Smart Home Automation

1

Objective

Automate appliances and monitor the environment remotely.

2

Components

Raspberry Pi, sensors (DHT11, PIR), and relay modules.

3

Communication

MQTT for message exchange between devices.

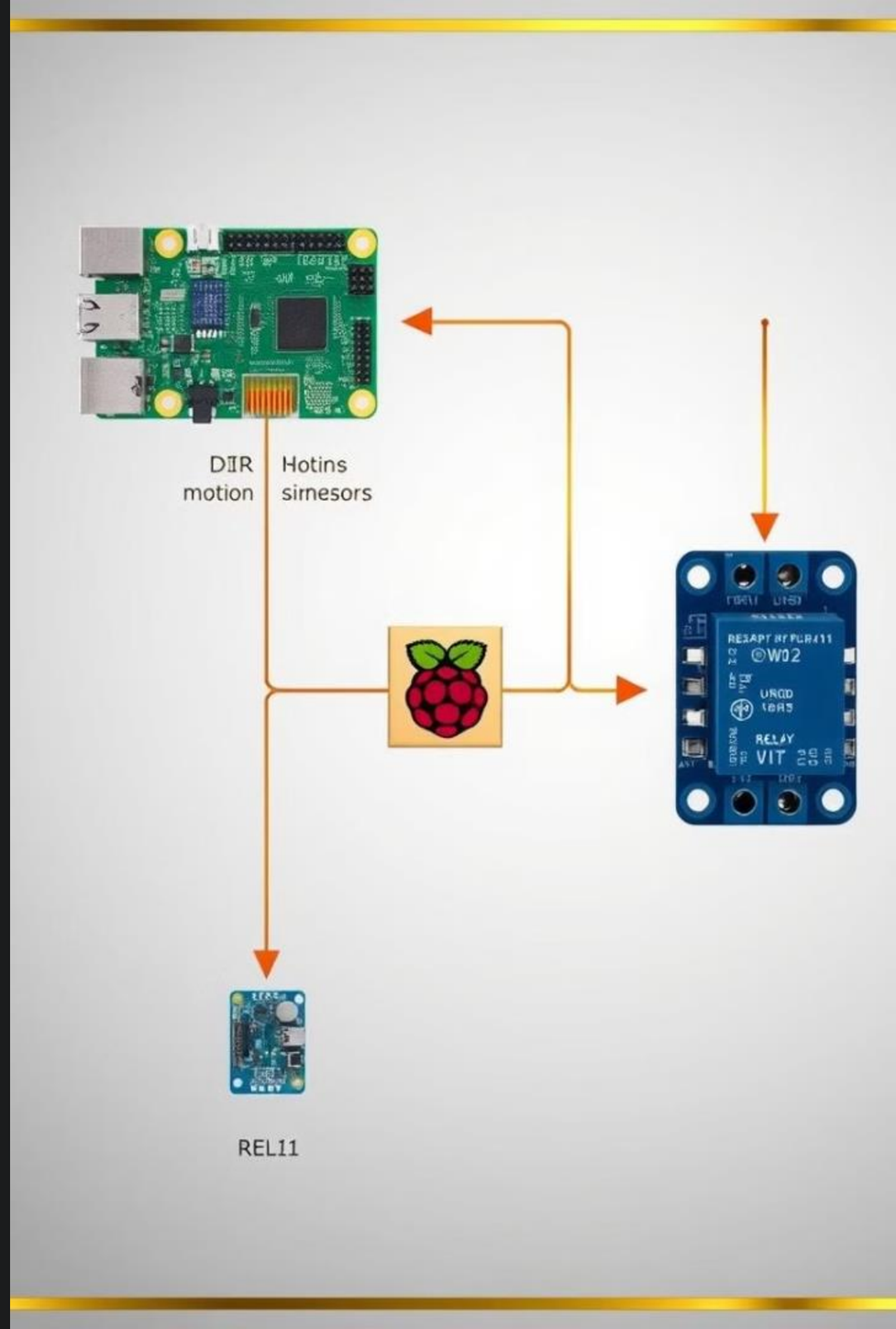
4

Control

Use a mobile app to interact with the system.

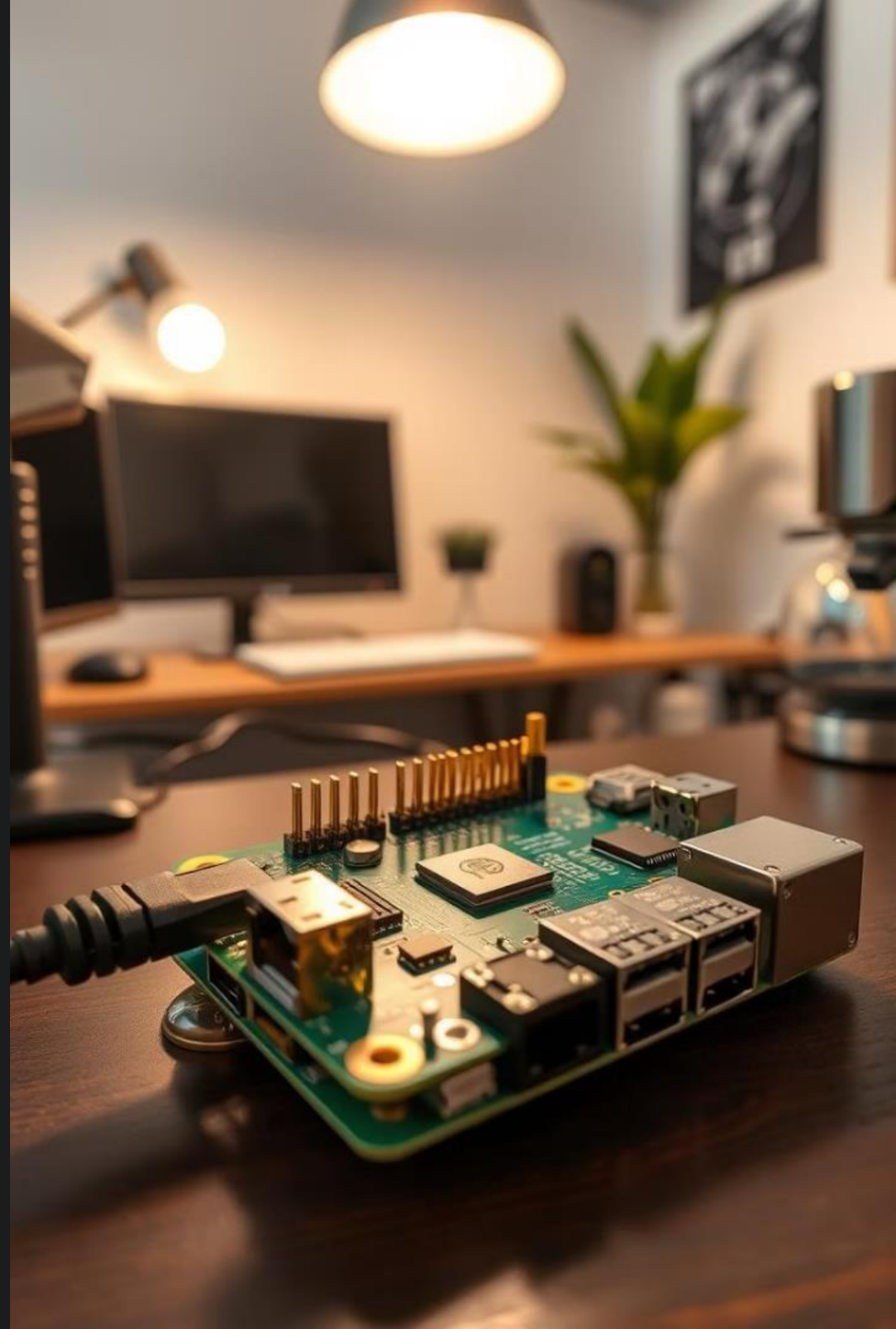
Circuit Diagram

The circuit diagram shows the connections between the Raspberry Pi and the sensors and actuators. The DHT11 sensor is connected to GPIO pins for data transmission, while the PIR sensor is connected to a separate GPIO pin for motion detection. The relay module is connected to a GPIO pin for controlling the power output.



Raspberry Pi for IoT: Powering Smart Systems

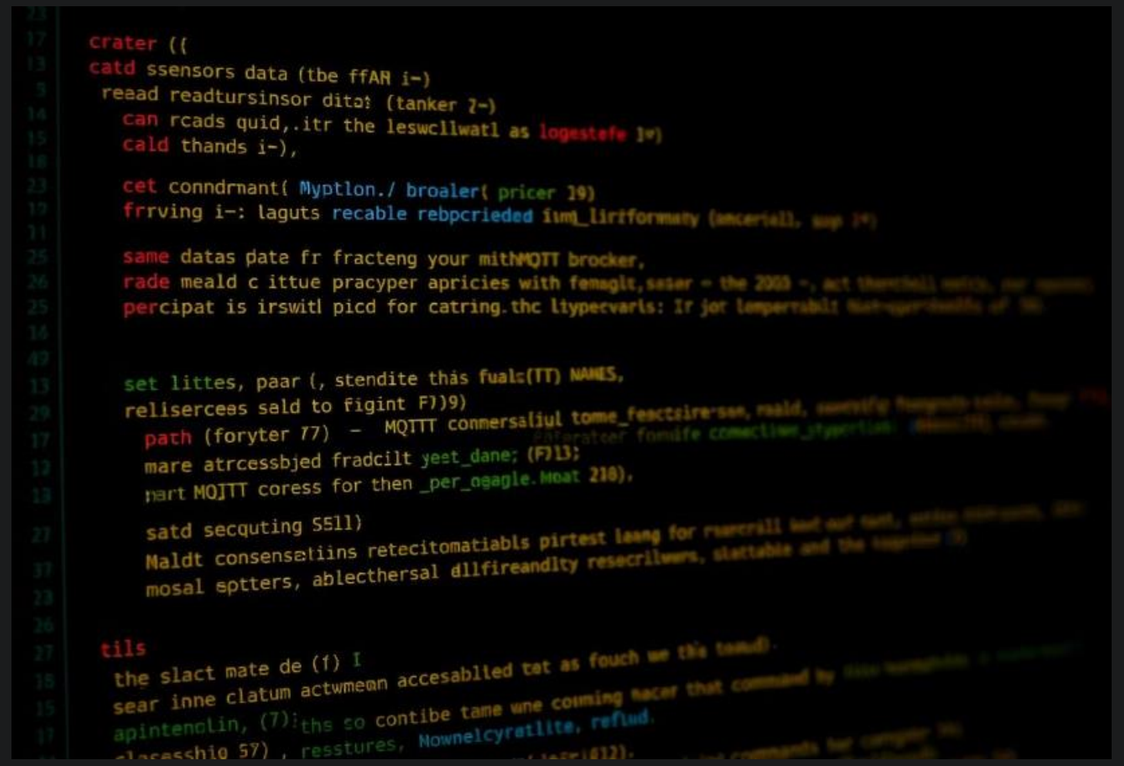
Welcome to this exploration of Raspberry Pi's role in the fascinating world of the Internet of Things (IoT). Discover its potential, challenges, and future trends in making everyday objects smart.



Code Overview: The Brains of the Operation

Python Script Tasks

- Reading sensor data
- Sending data to the cloud via MQTT
- Receiving commands to control relays



IoT Platforms: Building the Ecosystem

Thingspeak

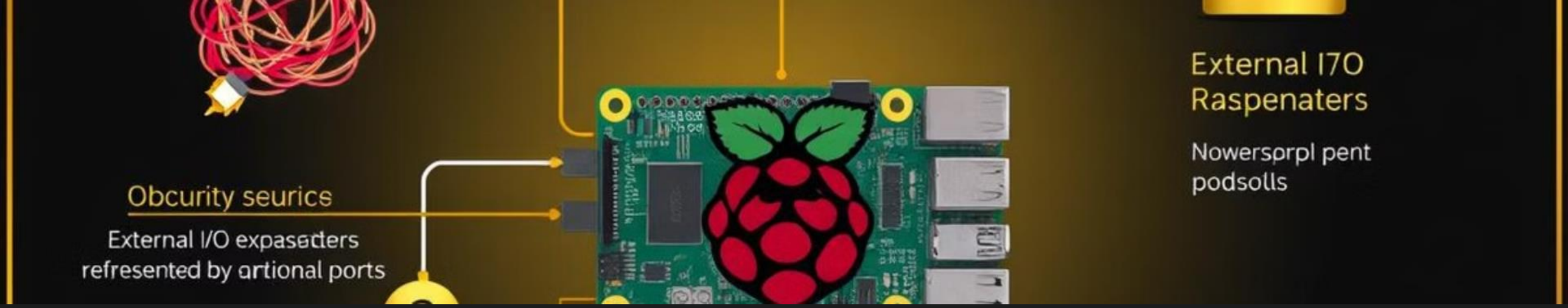
Data logging and visualization platform ideal for quick prototyping and educational projects.

AWS IoT

Scalable cloud service for managing and interacting with IoT devices at scale.

Node-RED

Visual programming tool for easily wiring together IoT components and creating custom workflows.



Challenges in IoT: Overcoming the Obstacles

Hardware Limitations

Limited GPIO pins and processing power necessitate careful resource management.

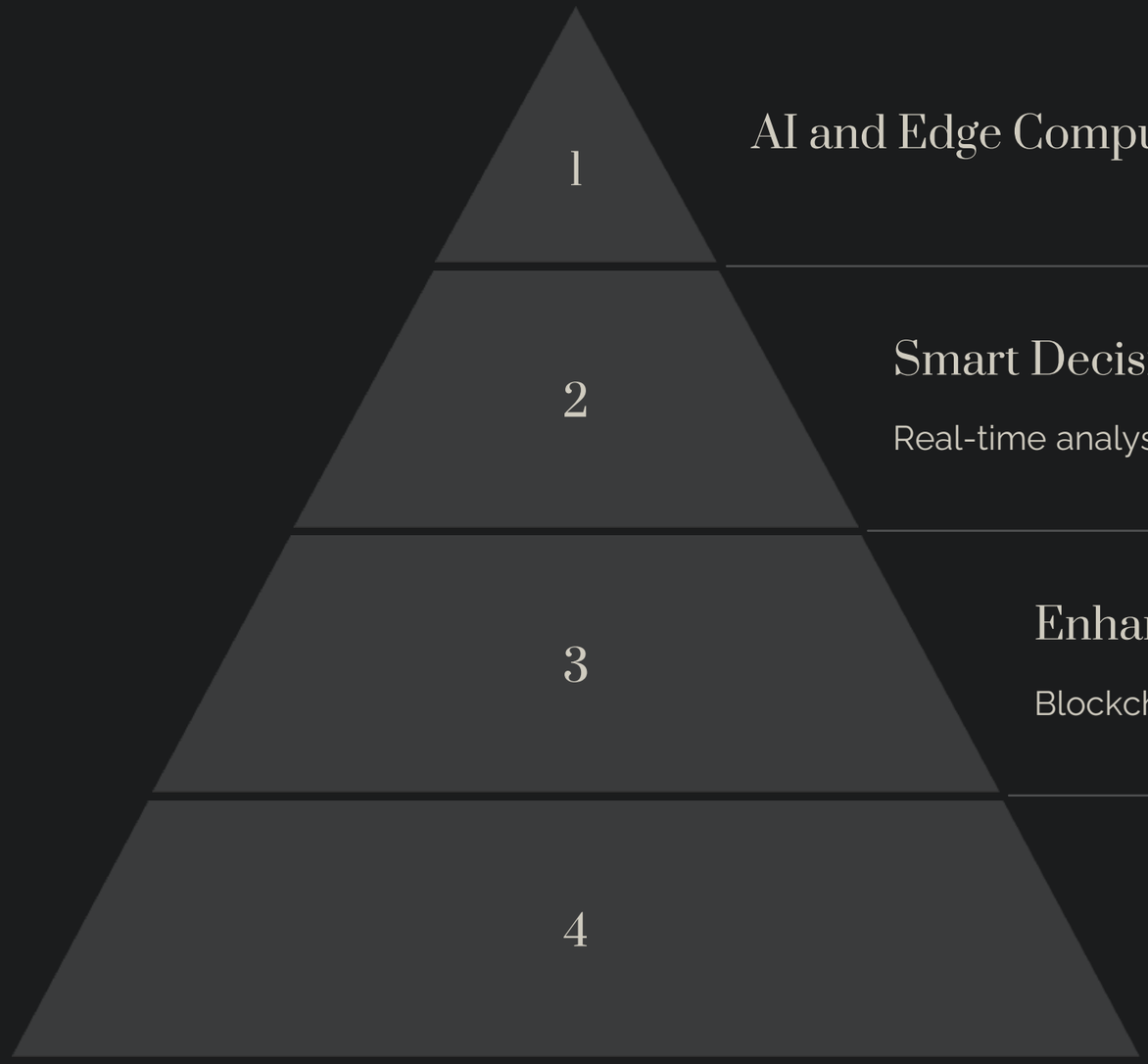
Security Risks

Vulnerabilities to cyberattacks require robust security measures and updates.

Power Consumption

Efficient power management is crucial for 24/7 operation, particularly with sensors and actuators.

Future Trends: Shaping the Future of IoT



AI and Edge Computing

Smart Decision-Making

Real-time analysis and local processing for intelligent responses.

Enhanced Security

Blockchain-based encryption for secure data transmission and storage.

Energy-Efficient Devices

Low-power components and optimized algorithms for sustainable IoT.

Conclusion and Q&A



Raspberry Pi empowers accessible and efficient IoT solutions, opening up possibilities in automation and smart systems. We're ready to answer your questions!