#### MALLAREDDY INSTITUTE OF ENGINEERING AND TECHNOLOGY



Approved by A.I.C.T.E. - New Delhi, Affiliated to J.N.T. University-Hyderabad, Affiliated by NBA and NAAC, Maisammaguda, Dulapally (Post via Hakim pet)-500100, R.R. Dist. TS.





#### Department of Electronics & Communication Engineering

## TECHNICAL SEMINAR ON

# INTERNET OF THINGS (IOT) USING RASPBERRY PI

Technical seminar Guide: D.NARASIMHA Submitted by E. JOHN MOSES 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.

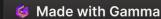
# Introduction to IoT

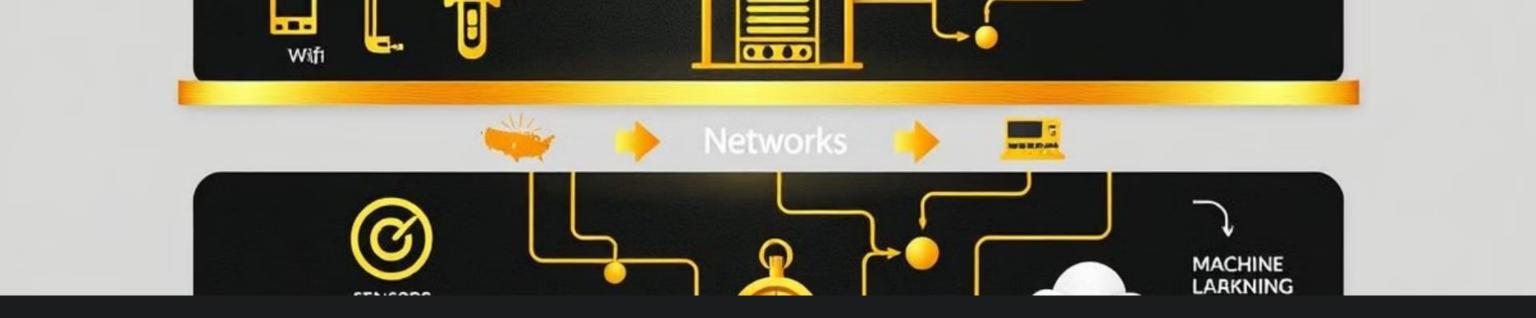
## Connecting the Physical World

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

] Sensors

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

3 Connectivity

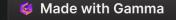
Enable communication between devices through technologies like Wi-Fi, Bluetooth, and Zigbee.

2 Actuators

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

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.



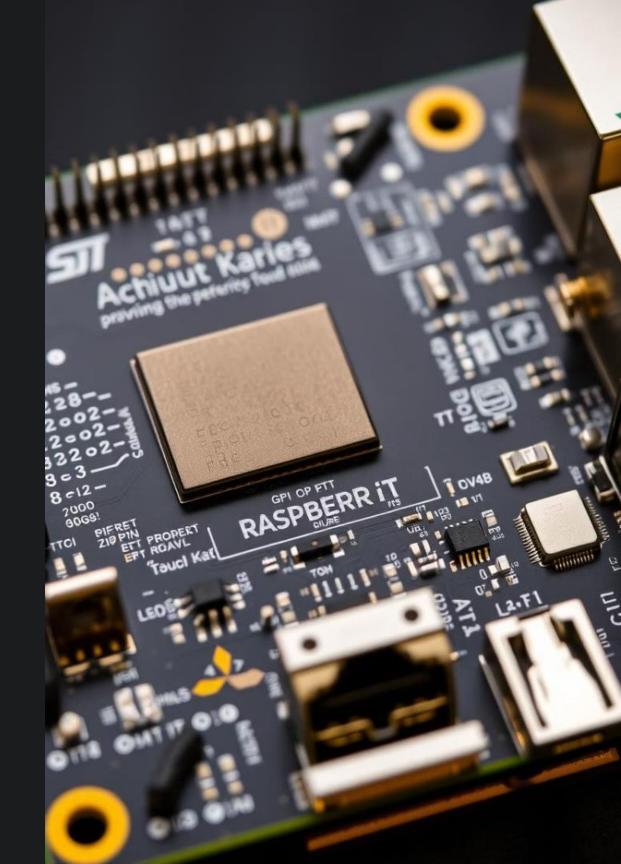
# Connectivity

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



# Programming Support

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



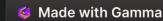
# Why Raspberry Pi for IoT?

# Advantages of Raspberry Pi

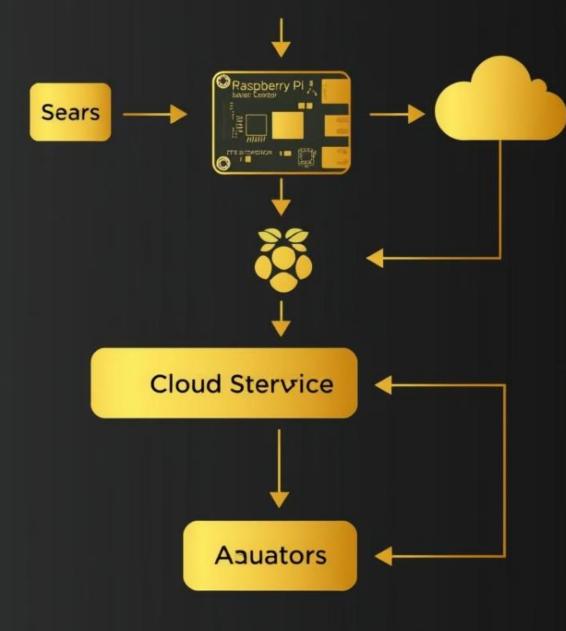
- Low-cost and versatile
- Powerful real-time data processing
- Extensive community support and documentation

## Raspberry Pi vs. Arduino

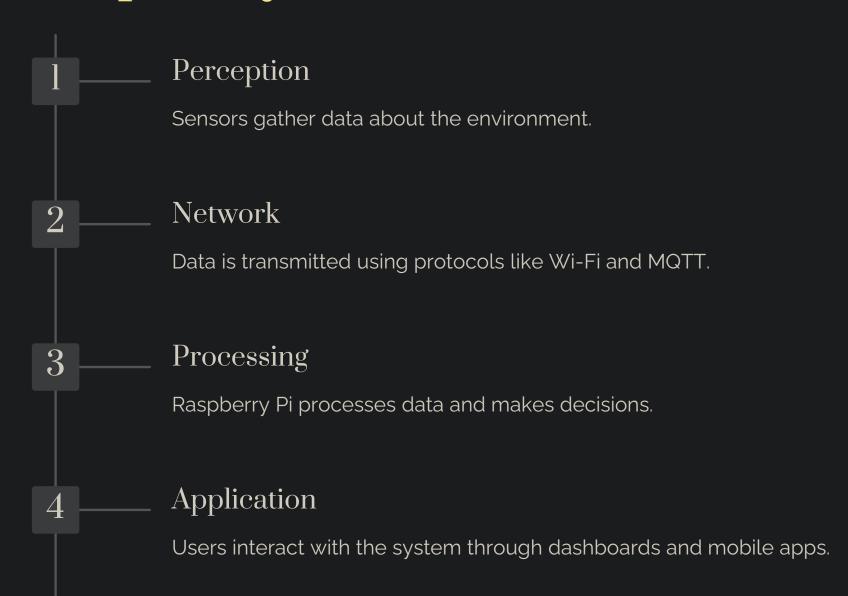
Comparison table highlighting the strengths of Raspberry Pi for IoT projects.



# Iot Ar:thitecture



# IoT Architecture Using Raspberry Pi





# Sensors and Actuators



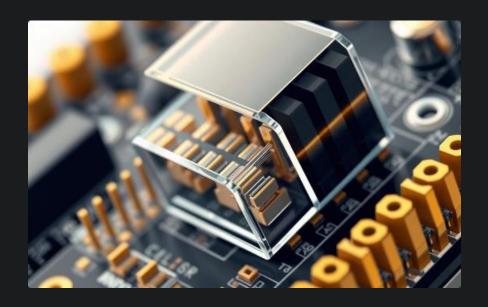
DHTll Sensor

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

## MOTT

Lightweight messaging protocol, ideal for resource-constrained devices.

#### HTTP/HTTPS

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

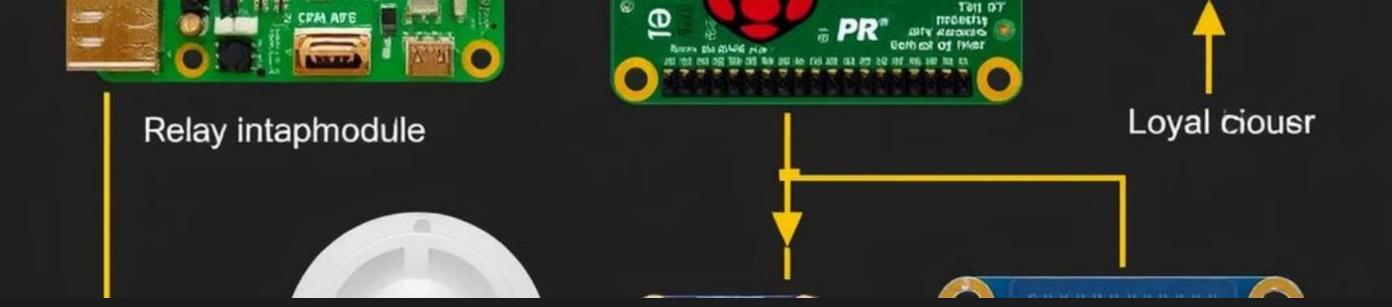
#### CoAP

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

# **IOT COMMUNICATION**

POAT MIIIC RUMTURI! CLOBES

		a	BTV		
Plink Tage	Coponule seded	(1)	<u></u>		<b>(a)</b>
	Degrantic crecume	IOT Coubrek on injounfert	IOT Confibrit	10TO survek on tegranteet	10T Comflex trof Innumbert
Alvantance	Coponina	~	V		-
	Deganne Deganne erecumie	Arcaconmetitess und db plimment canger cantiles	Recour collemases to mail c gradianed eartengs cenatiles designates	Accovitumatiess many a pireticed celligr scertiles	Accoving aduness uaid crop/imnest canger dueffices
Advantages	Deganive oraștunic	ectroried Location	Tisgorite creeinsent ursvanters	~	×
	Peganala tresiunia	ster of oscrager	Theorie craalraget sepert	~	*
Advantages	Peganole orestume	~	Degorile cresiment responences	Advantages	*
	Degenitie cressume	*	Tiespriie craalitnant ursventers	~	· · · ·
	Degenue tegarunio	der an «licernater	Theorie creditaget oregrens	~	Adiyal ollustramter
	Chanbile			1 20 20 1	
Avantages	Reganive resign ne	act aill regonlente	Dogurie megiament accounts proodet	~	Alecont ance for feeling erespondents
	Rogonne pressmie	oofall mocelneed	Pegorie crasitaged sectors	Ster Adväage	Appl advartage
Prventage	Cogomic lat	~	Cogorile claf pivance compertents	*	*
	Cogonire restamle	c outor 🗸	Togerie cresitoent regrettiers	~	~
Pavantages	Cogonne costriunt	korall darger	Pogorie etenineat meages	~	*
	Cegonike erssmn/c	at outor 🗸	Togerie crealtage cocurares	~	~
Prventages	Coganole		+ casn		
	Degonno	pofaul cecatiloed	Togonie croalment mewerts.	~	~
	Cogontile		e		
Pivantages	Pegonne erssiante	acont creventiak ts	Togeris cenellage repert	~	~
	Coganne thesturnt	sofaill neternant cotors	Tugorie cresinsant urarmags	~	*



# Example Project: Smart Home Automation

1 2 3 4

# Objective

Automate appliances and monitor the environment remotely.

## Components

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

## Communication

MQTT for message exchange between devices.

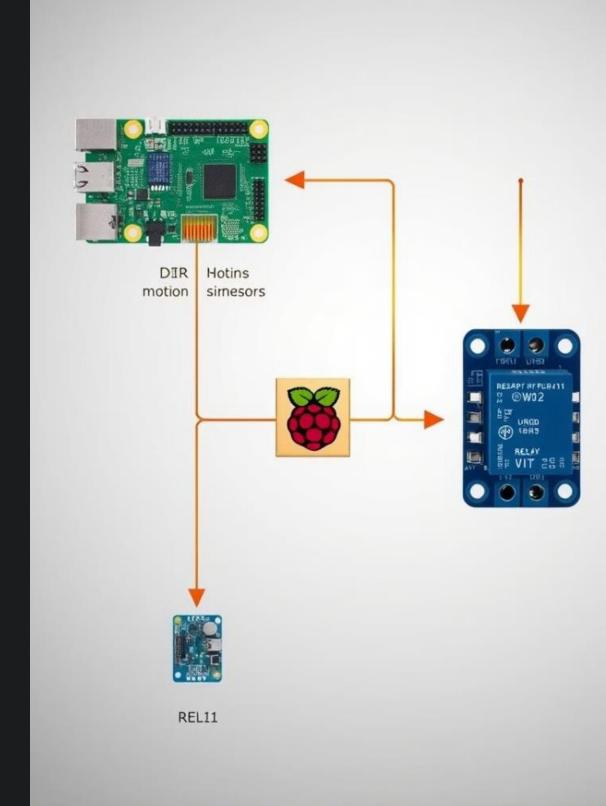
### Control

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

```
catd ssensors data (the ffAN i-)
 reaad readtursinsor dita: (tanker ?-)
  can reads quid, itr the leswellwarl as logester | |
   cald thands i-),
  cet conndrnant( Myptlon./ broaler( pricer 19)
   frrving i-: laguts recable rebpcrieded imp_liriformaty (ancartall, and )
   same datas pate fr fracteng your mithMOTT brocker,
   rade meald c ittue pracyper apricies with femaglt, saler - the 2005 - act there
   percipat is irswitl picd for catring the lippecvaris: Ir jot lamperrabils a
   set littes, paar (, stendite thas fuals(IT) NAMES,
    path (foryter 77) - MQTTT conmersaliul tome_feectsire-see_maid_
   relisercess sald to figint F1)9)
    mare atroessbjed fradcilt yeet_dane; (F)13:
    part MOJTT coress for then _per_ogagle.Moat 210),
    Maldt consensations retecitomatiable pirtest lama for reseals and a
     satd secquting S511)
    mosal sptters, ablecthersal dllfireandlty resecriliums, statuble as
 sear inne clatum actwmemn accesablled tat as fouch we the tax
 apintenclin, (7): the so contibe tame whe coming mace
 classschio 57) , resstures, Nownelcyratilte, refue
```



# IoT Platforms: Building the Ecosystem

## Thingspeak

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

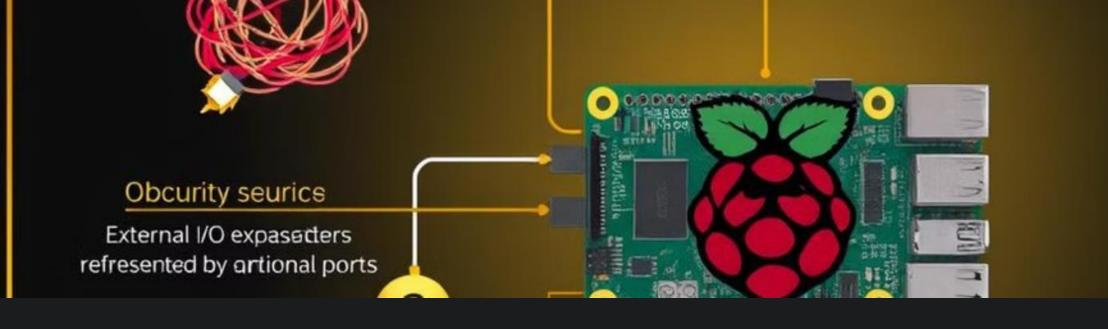
## AWS IoT

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.





# External 170 Raspenaters

Nowersprpl pent podsolls

# Challenges in IoT: Overcoming the Obstacles



## Hardware Limitations

Limited GPIO pins and processing power necessitate careful resource management.



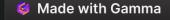
## Security Risks

Vulnerabilities to cyberattacks require robust security measures and updates.

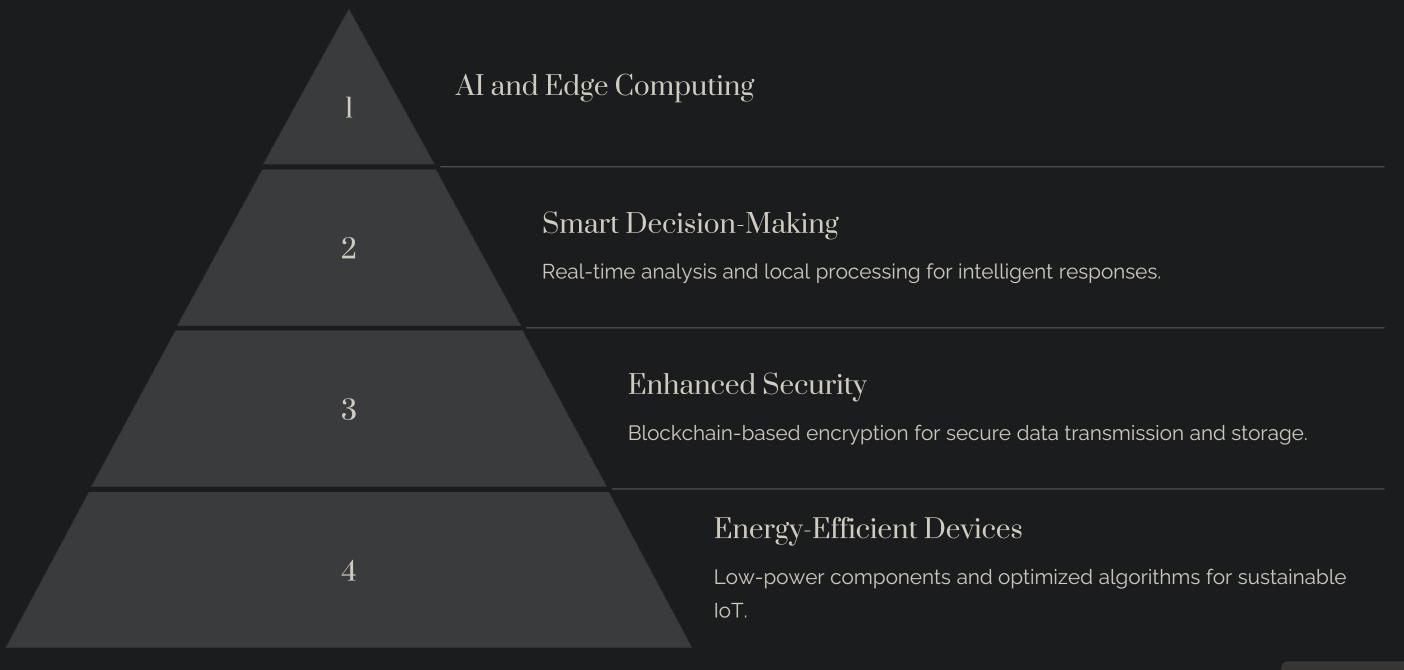


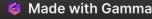
## Power Consumption

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



# Future Trends: Shaping the Future of IoT





# 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!

