FUTURE NOW
etisalat digital
Build an IoT Smart Home System
Powered by Etisalat Digital
Date & time: Saturday, 14th December, 11:00am - 2:00pm
ptc
THEASSEMBLY
تركيب

ABOUT THE ASSEMBLY

- A **Smart Lab** based out of **in5** since December 2014
- Over 250 Free workshops done
- **Assembly : HACK** - Embedded systems, IOT, hardware.
- **Assembly : CODE** - Software projects - APIs, frameworks, apps
- **Assembly: Data Science** - Advanced topics related to AI/Machine Learning
- Target Audience – **Students** | **Professionals** | **Entrepreneurs**
- Focus on Smart Technology and Practical Applications
- Forum: members.theassembly.ae

ABOUT THE ASSEMBLY

FACEBOOK The Assembly - @MakeSmartThings

TWITTER @MakeSmartThings

INSTAGRAM @MakeSmartThings

YOUTUBE The Assembly

OVERVIEW

OBJECTIVE: To build a distributed **IoT smart home system**, that:

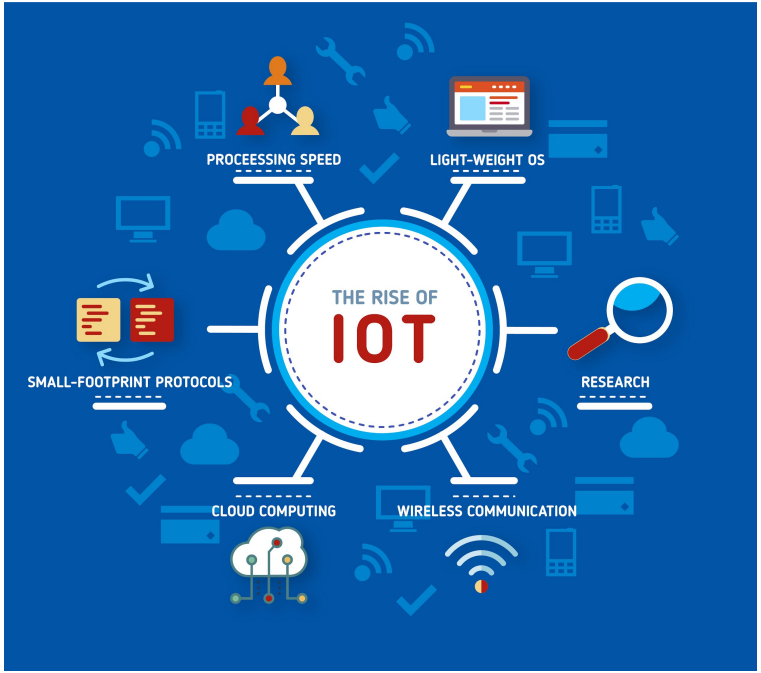
- Checks the status of home devices such as locks, lights and cameras on various edge devices (ie; **Raspberry Pis**)
- Syncs up that data with **the Thingworx cloud platform** in real time
- Allows for remote control of these devices
- Presents data and encapsulates functionality in the form of a web application accessible at a remote location

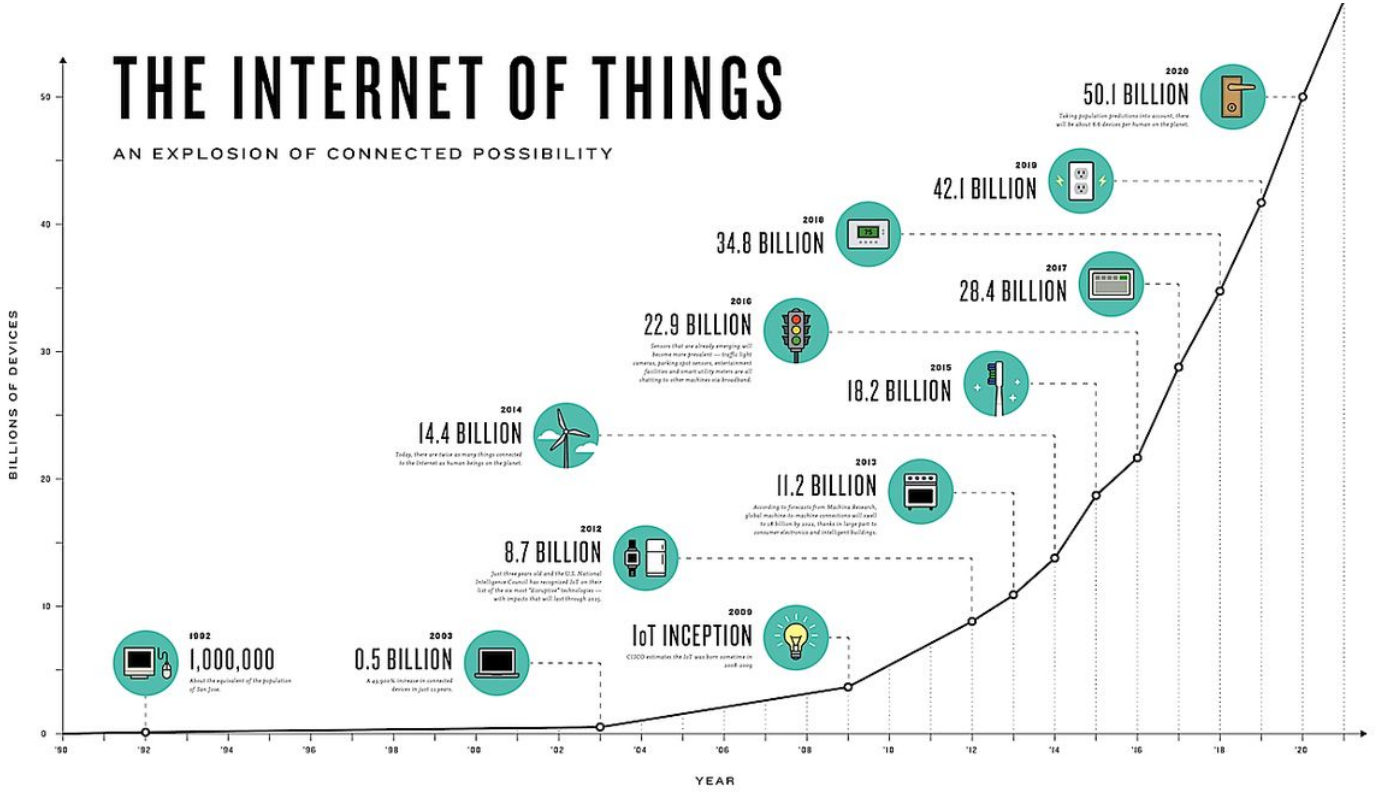
GITHUB

- PASTEBIN: https://pastebin.com/ZzY42Ejv
- GITHUB: https://github.com/the-assembly

THE INTERNET OF THINGS

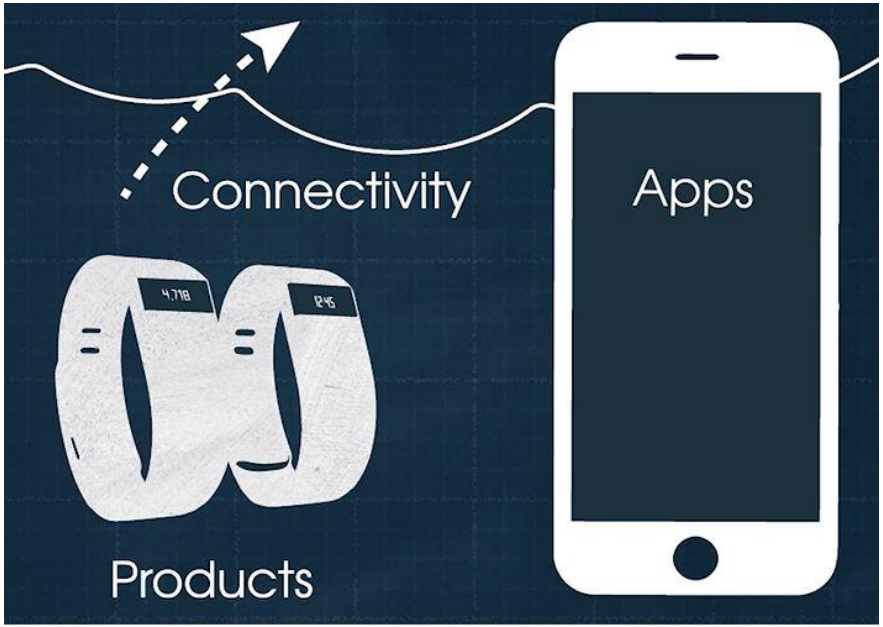
- The Internet Of Things (IoT) is **the network of physical objects that can exchange data for value**




THE INTERNET OF THINGS
AN EXPLOSION OF CONNECTED POSSIBILITY
BILLIONS OF DEVICES
YEAR
1992
1,000,000
About the equivalent of the population of San Jose.
2003
0.5 BILLION
A 4,900% increase in connected devices in just 10 years.
2009
IoT INCEPTION
CISCO estimates the IoT was born sometime in 2008-2009.
2012
8.7 BILLION
Just three years old and the U.S. National Intelligence Council has recognized IoT on their list of the six most "disruptive" technologies — with impacts that will last through 2025.
2013
11.2 BILLION
According to forecasts from Machina Research, global machine-to-machine connections will swell to 18 billion by 2022, thanks in large part to consumer electronics and intelligent buildings.
2014
14.4 BILLION
Today, there are twice as many things connected to the Internet as human beings on the planet.
2015
18.2 BILLION
2016
22.9 BILLION
Sensors that are already emerging will become more prevalent — traffic light cameras, parking spot sensors, entertainment facilities and smart utility meters are all chatting to other machines via broadband.
2017
28.4 BILLION
2018
34.8 BILLION
2019
42.1 BILLION
2020
50.1 BILLION
Taking population predictions into account, there will be about 6.6 devices per human on the planet.
0
10
20
30
40
50
'90
'92
'94
'96
'98
'00
'02
'04
'06
'08
'10
'12
'14
'16
'18
'20

SMART, CONNECTED PRODUCTS

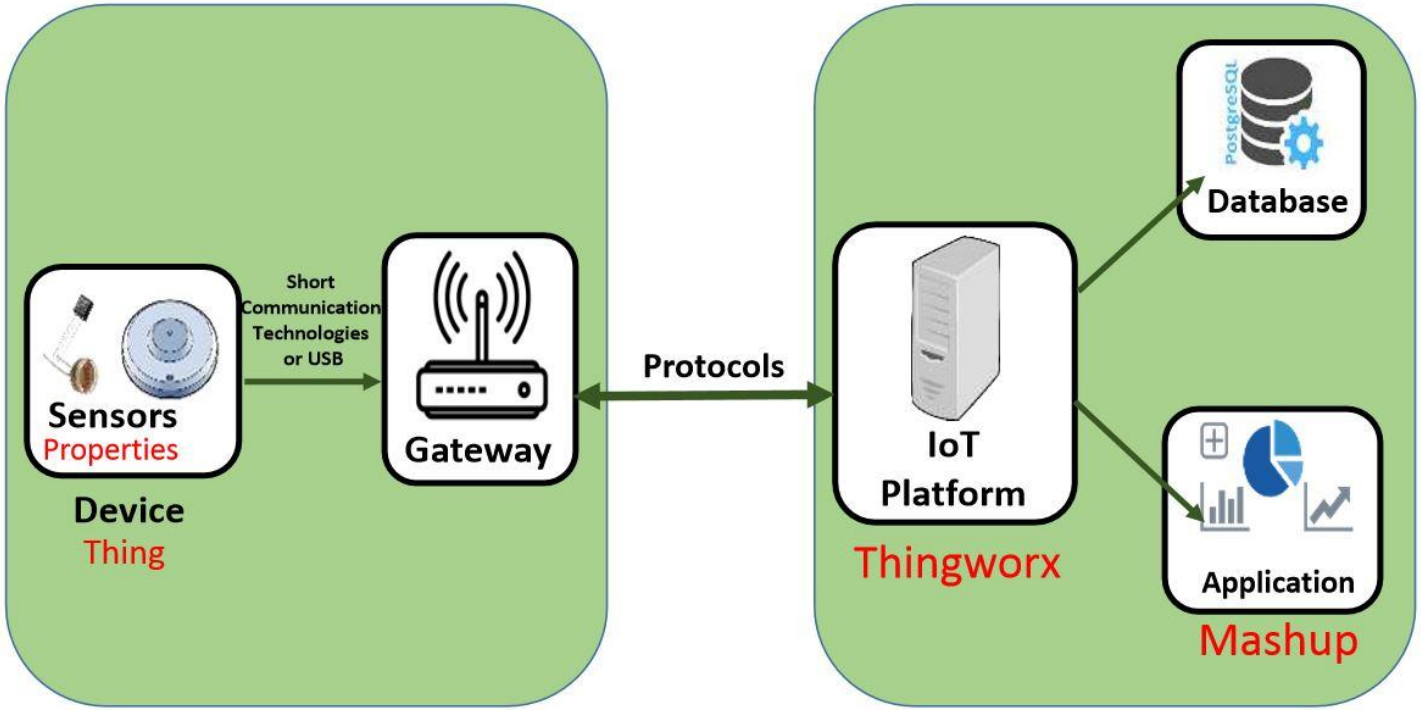
- Harvard Business Review
- Capabilities of a **Smart, Connected Product (SCP)**
  - Monitor
  - Control
  - Optimize
  - Automate

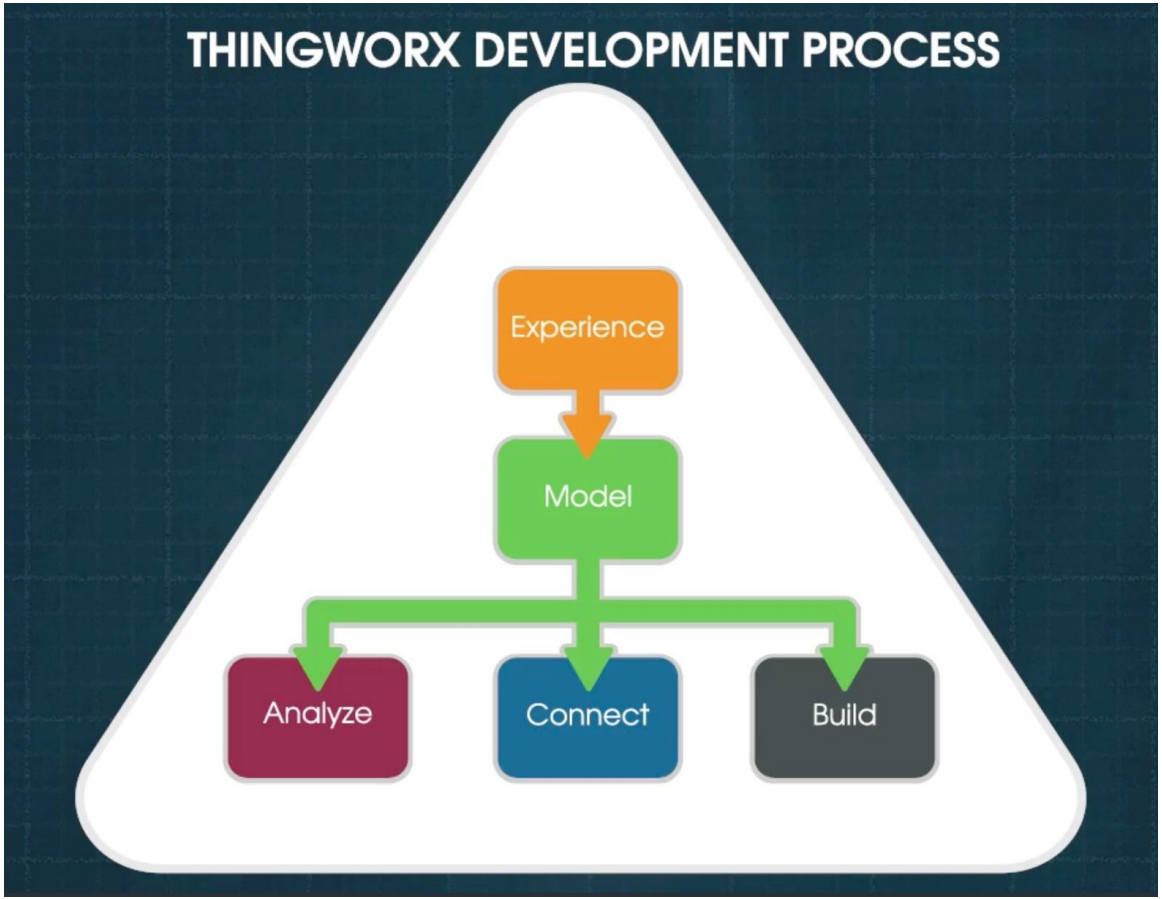


THINGWORX FEATURES

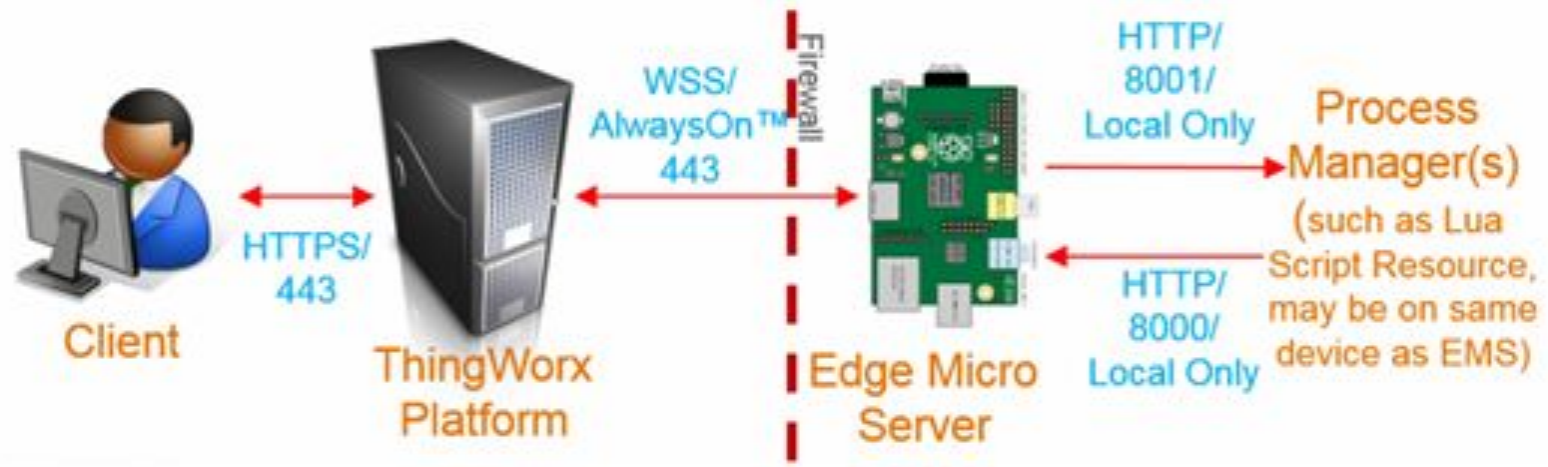
- Fast To Market
- Simplicity
- Scalability
- Built-in Analytics
- Multi-tenancy model
- Data Encryption

THINGWORX GENERAL STRUCTURE



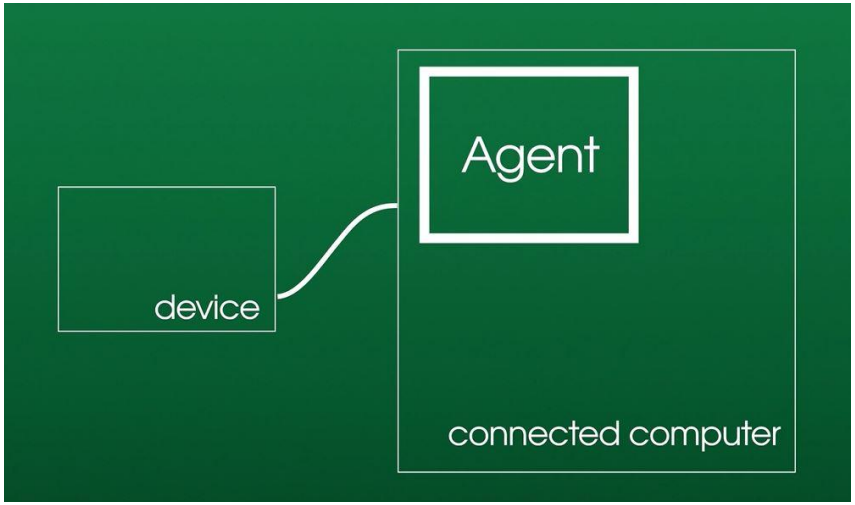

THINGWORX DEVELOPMENT PROCESS
Experience
Model
Analyze
Connect
Build

CONNECTIVITY



EDGE AGENTS

- Software to monitor data from / control device(s)
- Can be used to:
  - Change configs
  - Update firmware
  - Optimize procedures
- **Kepware**
- Edge SDKs (C, Java, JS)



WEB SOCKETS

APPLICATION	TRANSPORT	INTERNET	LINK

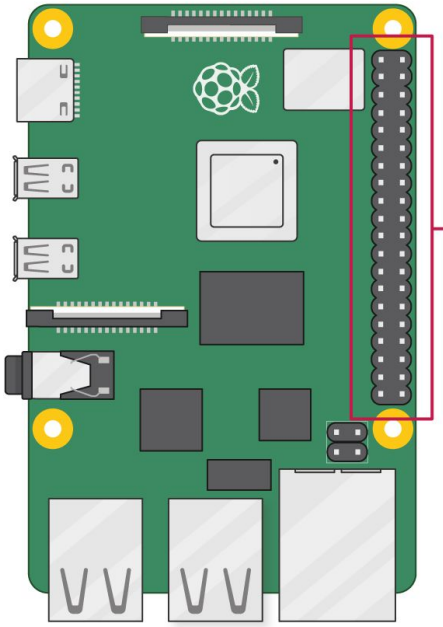
EDGE MICROSERVER (EMS)

- Out of the box edge agent with **Thingworx**
- **EMS can:**
  - Bind remote things on cloud to virtual things on edge
  - Maintain AlwaysOn connection with cloud
  - Allow device to call cloud REST API in LAN
  - Enable **File Transfer** & **Tunneling**

LUA SCRIPT RESOURCE

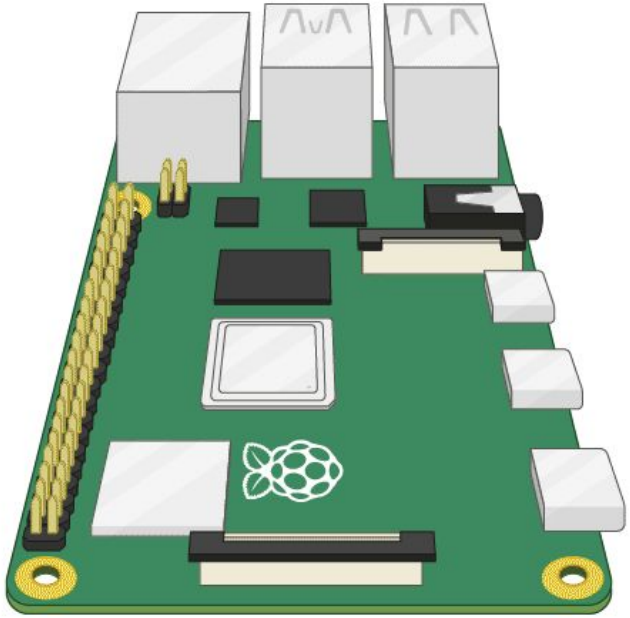
- EMS cannot manage remote properties, events or services
- LUA Script Resource acts as a process manager to do this
- Can be on same machine as EMS

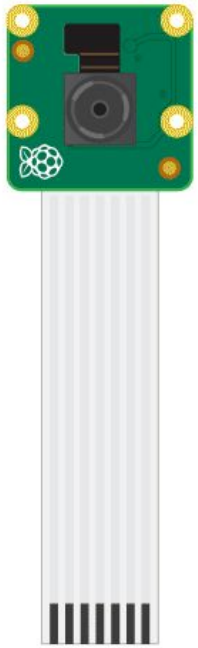
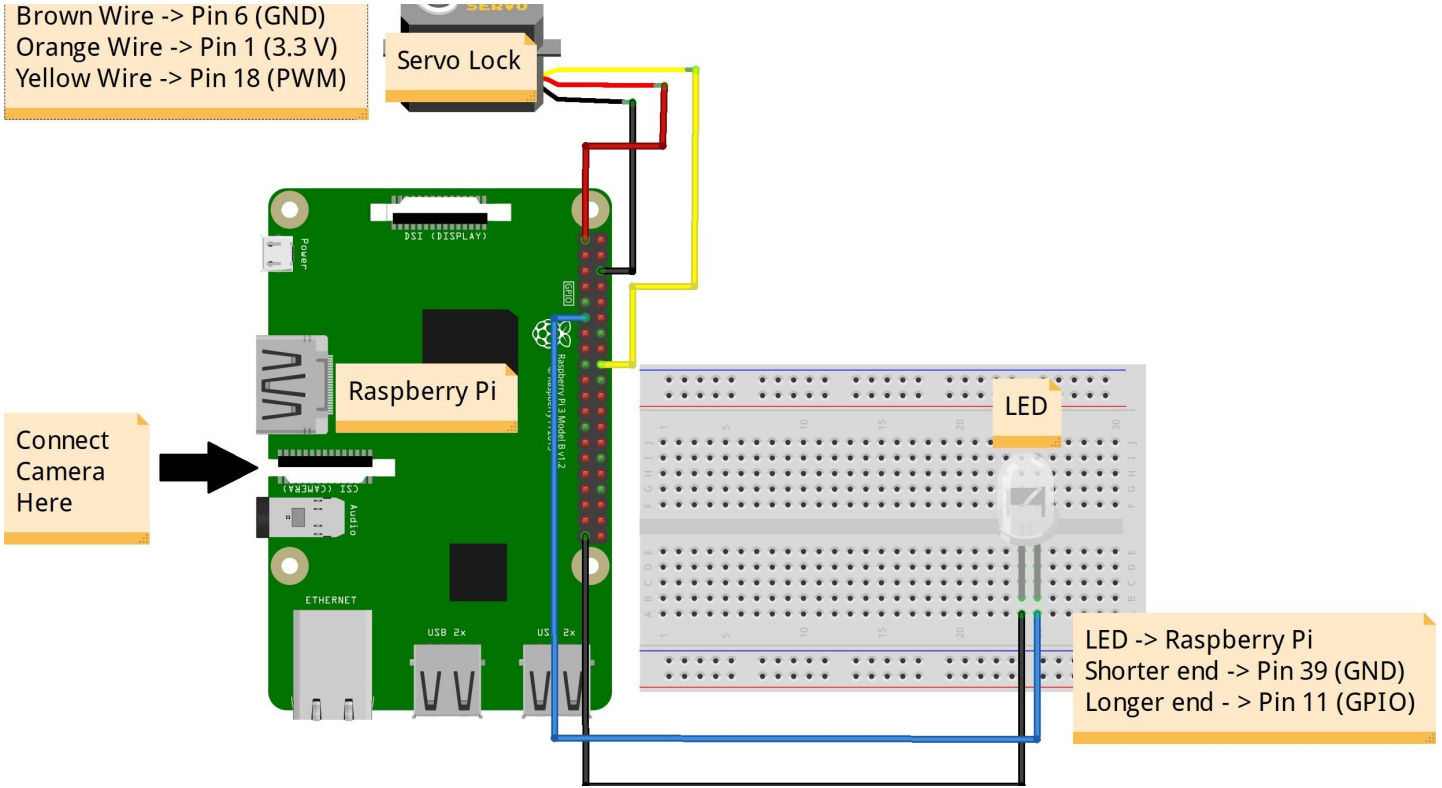
RASPBERRY PI PINOUT



3V3 power	1	2		5V power
GPIO 2 (SDA)	3	4		5V power
GPIO 3 (SCL)	5	6		Ground
GPIO 4 (GPCLK0)	7	8		GPIO 14 (TXD)
Ground	9	10		GPIO 15 (RXD)
GPIO 17	11	12		GPIO 18 (PCM_CLK)
GPIO 27	13	14		Ground
GPIO 22	15	16		GPIO 23
3V3 power	17	18		GPIO 24
GPIO 10 (MOSI)	19	20		Ground
GPIO 9 (MISO)	21	22		GPIO 25
GPIO 11 (SCLK)	23	24		GPIO 8 (CE0)
Ground	25	26		GPIO 7 (CE1)
GPIO 0 (ID_SD)	27	28		GPIO 1 (ID_SC)
GPIO 5	29	30		Ground
GPIO 6	31	32		GPIO 12 (PWM0)
GPIO 13 (PWM1)	33	34		Ground
GPIO 19 (PCM_FS)	35	36		GPIO 16
GPIO 26	37	38		GPIO 20 (PCM_DIN)
Ground	39	40		GPIO 21 (PCM_DOUT)

CONNECTING THE PI CAMERA





CIRCUIT DIAGRAM