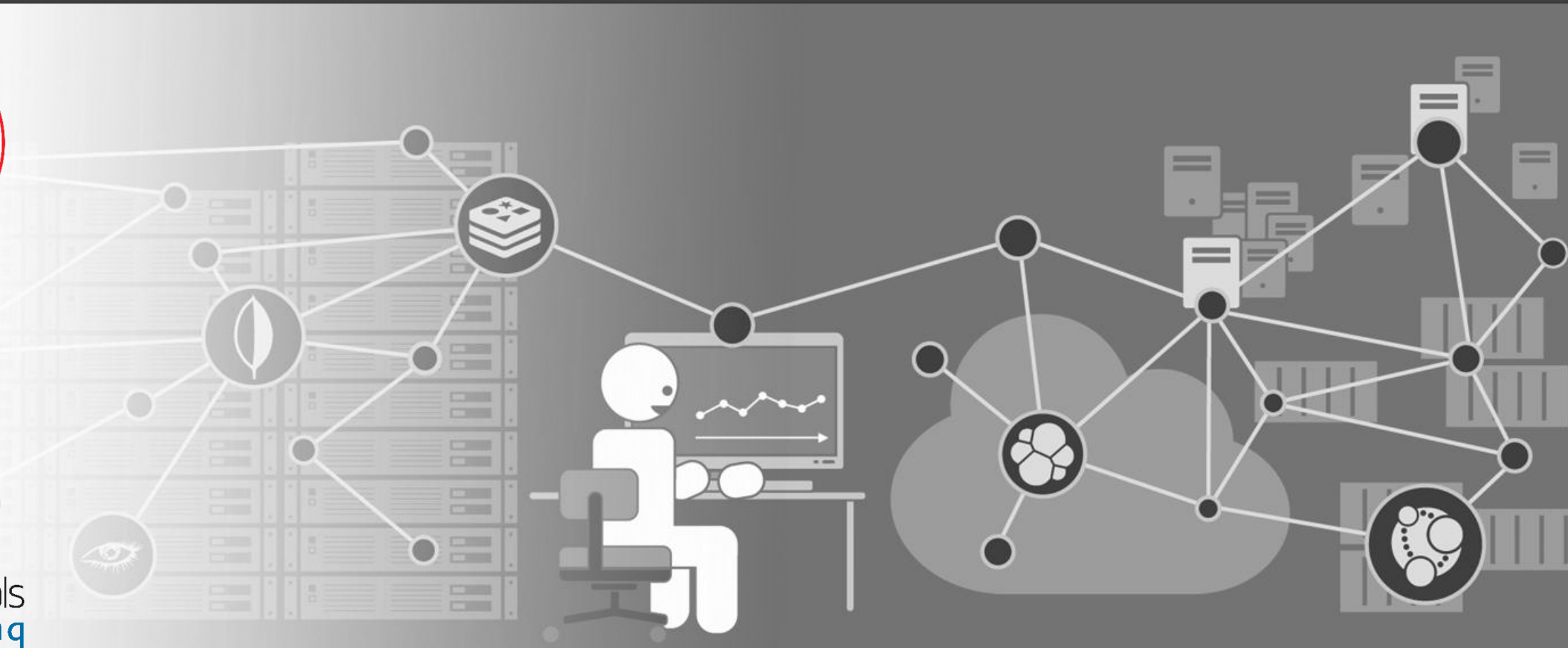
Workshop on **Embedded Systems & IoT Technology**

“Always ready to help you” AI assistant

Aseel Ismael Ali



Outlines

- Introduction to Artificial Intelligence
- Types of AI
- Future Of AI
- AI on your hand
- Fuzzy logic system
- How to make washing machine intelligence

Introduction to AI

Definition

- AI is the ability of a machine or a computer program to think and learn.
- AI Fields
  - Education field
  - Medical field
  - Industry field
  - Military field
  - Economic field
  - Games

Introduction to AI

Language

- Symbolic Programming Languages
  - Prolog
- Object Oriented Languages
  - C++
  - C#
  - Java
  - Others

Types of AI

- Weak of artificial intelligence
  - is a form of AI specifically designed to be focused on a narrow task and to seem very intelligent at it.
  - Apple's Siri
- Strong artificial Intelligence
  - is an artificial intelligence construct that has mental capabilities and functions that mimic the human brain.
  - full AI.

Future of AI

Generation AI

- Life stage: infants
  - “The advent of low-cost sensors incorporated with AI will enhance health diagnosis and medical treatments. Using virtual reality technology, doctors will be able to diagnose and correct astigmatism in an infant’s vision, or teach an autistic child to communicate.”
  - EX: AI Predicts Autism From Infant Brain Scans
- Life stage: toddler
  - “Toddlers will benefit from any kind of robotic toy with AI capabilities. This could be a full-time nanny to help keep toddlers engaged and also take care of them. Using built-in cameras as well as voice recognition capabilities in these AI toys can help parents raise their Generation AI toddlers.”

Future of AI

Generation AI

- Life stage: childhood
  - Generation AI will converse with AI gadgets and assistants to get help with homework, play games, and even listen to stories. Children will not need to ask their parents and teachers for help — they'll learn to depend on AI devices for the answers they seek.
  - ex: An Intelligent Tutoring System over a social network for mathematics learning
- Life stage: Teen Years
  - Teens won't be driving their cars. AI will be behind the wheel.

Future of AI

Generation AI

- Life Stage: Middle Age
  - Artificial Intelligence will be a big part of healthcare for Generation AI as they reach middle age.
  - Medical devices will also help diagnose Generation AI's diseases. They'll visit doctor's offices less, and through the use of AI, will be diagnosed and treated for illnesses.
- Life stage: retirement
  - When Generation AI hits their golden years, they'll become even more dependent on AI to help them complete everyday tasks. AI will also help alleviate some of the loneliness that comes with advancing age. AI companions that understand how to interact with elderly people can help Generation AI be more social at this stage in life.

AI in your hand

- Assistant is able to
  - search the Internet,
  - schedule events and alarms,
  - adjust hardware settings on the user's device,
  - maintain a shopping list
  - and show information from the user's Google account.
- Assistant will be able to
  - identify objects and gather visual information through the device's camera,
  - and support purchasing products and sending money,
  - identifying songs.

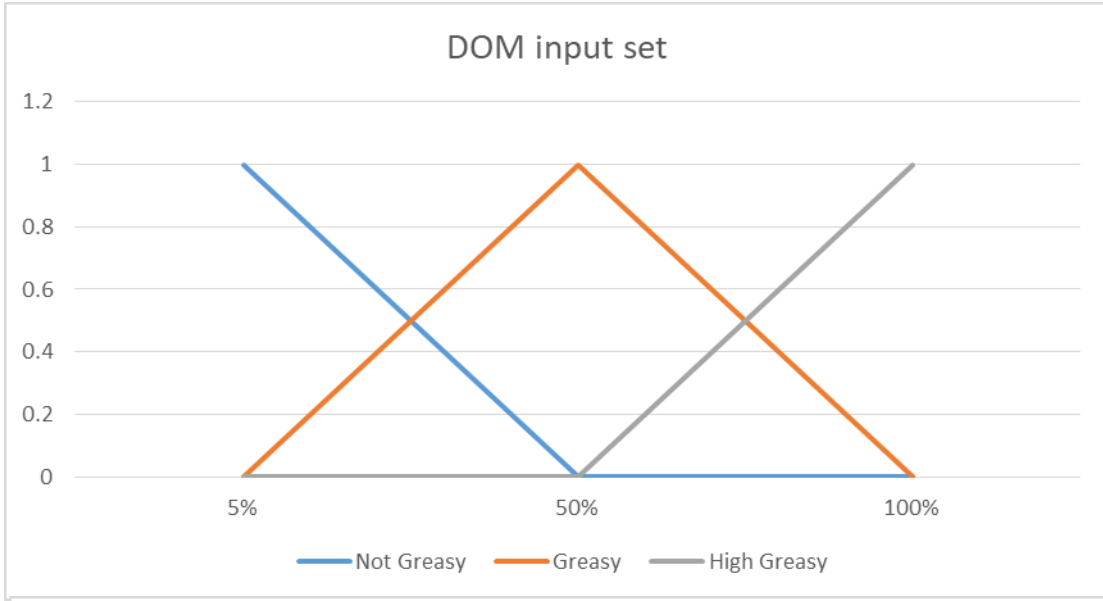
Fuzzy Logic

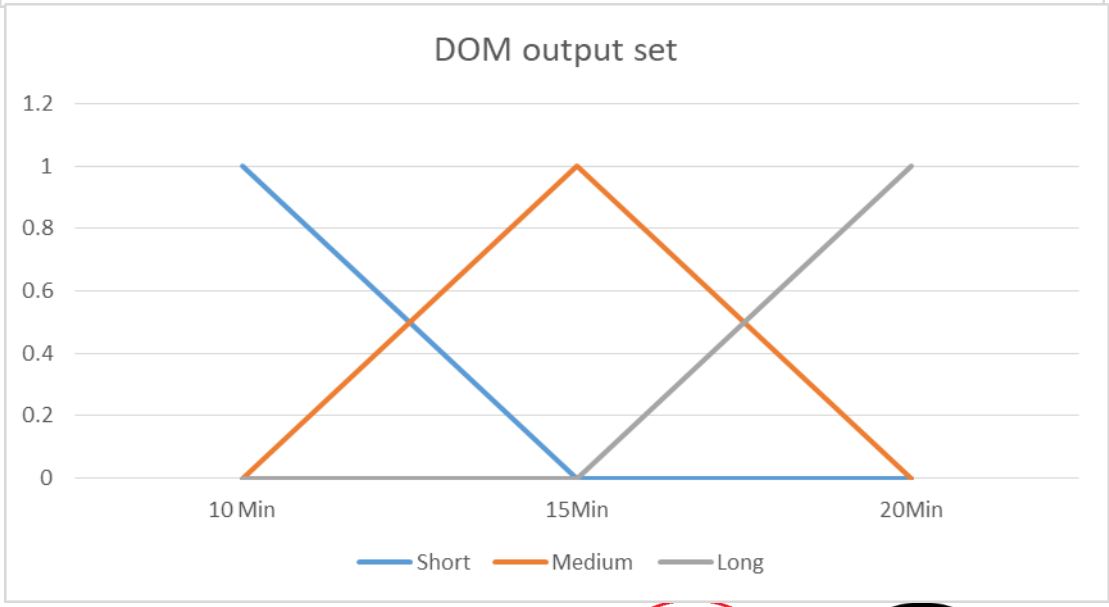
- Imitates the way of decision making in humans that involves all intermediate possibilities between digital values YES and NO.
- FLS IMPLEMENTATION
  - non-engineering applications
  - medical diagnosis systems
  - handwriting recognition applications
  - nonlinear systems
  - systems that have multiple inputs and multiple outputs
  - Almost any type of system that has inputs and outputs.

Fuzzy logic system

Smart washing machine

- Washing machine determines the washing time according to the type of dirty clothes.
  1. Define linguistic variables:
     - Type of dirty = {not greasy, greasy, high greasy}
     - Washing time = {short, medium, long}
  2. Construct membership functions





Fuzzy logic system

Smart washing machine

3. Construct knowledge base rules

No. of Rule	Input / type of dirty	Output/ washing time
1	Not greasy	Short
2	Greasy	Medium
3	High Greasy	Long

4. Obtain fuzzy value

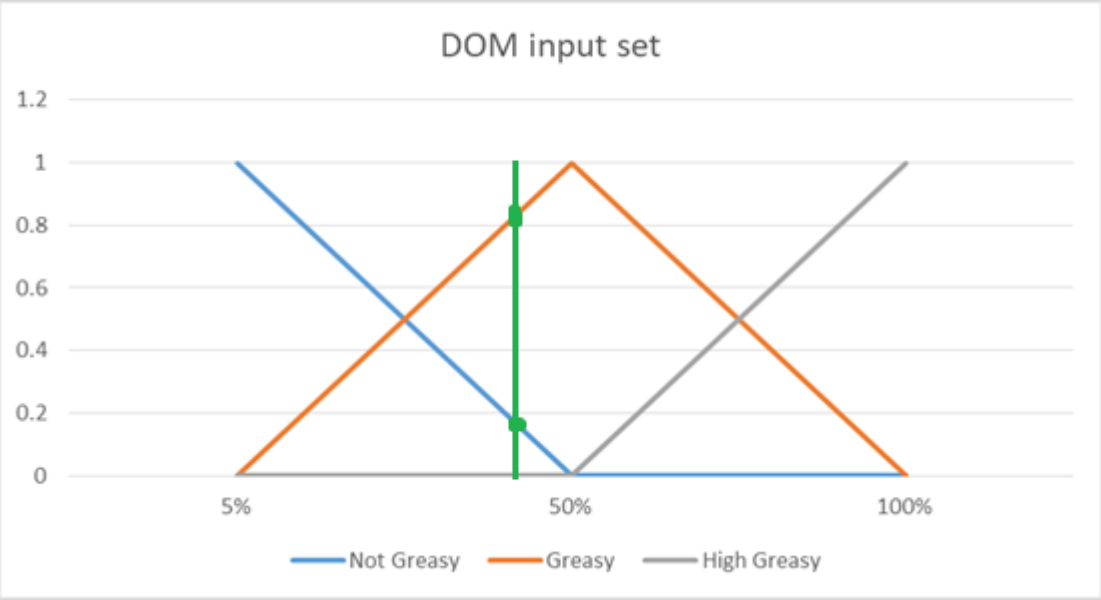
- $y3 = \frac{(y2-y1)*(x3-x1)}{(x2-x1)} + y1$
- $a = \begin{bmatrix} 5 & 50 & 42 \\ 1 & 0 & ? \end{bmatrix}$ $y3 = \frac{(0-1)*(42-5)}{(50-5)} + 1$ Y3 = 0.1778
- $a = \begin{bmatrix} 5 & 50 & 42 \\ 0 & 1 & ? \end{bmatrix}$ $y3 = \frac{(1-0)*(42-5)}{(50-5)} + 0$ Y3 = 0.822

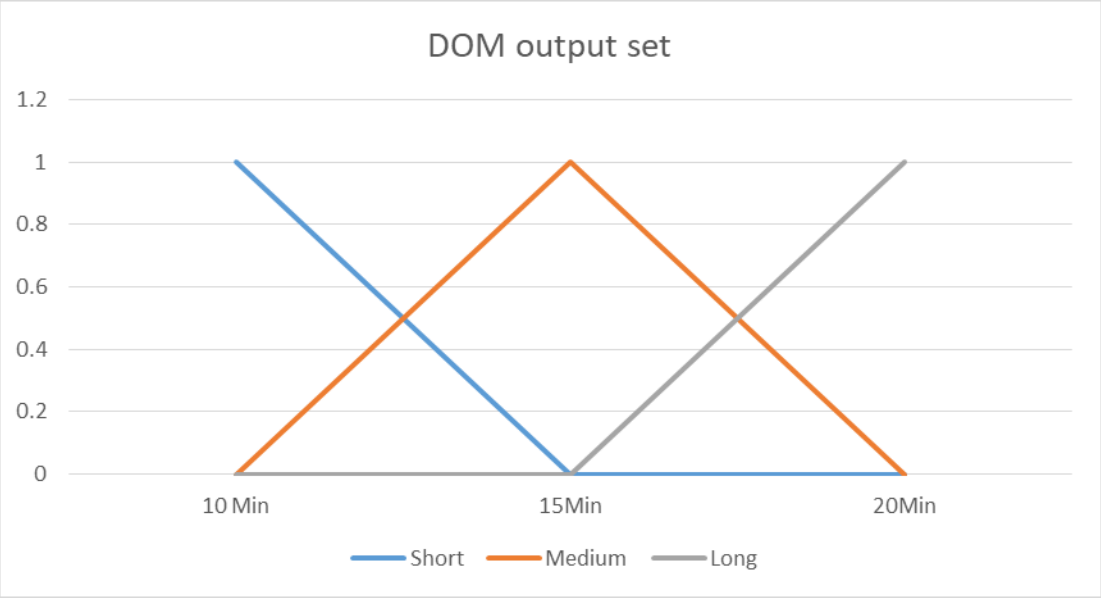
Fuzzy logic system

Smart washing machine

5. Defuzzifier

Input fuzzy set	Input DOM	Output set	Output
NG (not Greasy)	0.1778	10	1.778
G (Greasy)	0.8222	15	12.333
HG (High Greasy)	0	20	0
Crisp Output =			14.111





Thank you …

Q&A