IST346:
Internet Of Things

What is IoT?

- The internet of thing is the extension of the internet into everyday things.
  - There is nothing revolutionary about the technologies used by IoT
  - IoT is a business disruptor as it has the opportunity redefine how we do business.

Types of IoT

- Consumer
  - Smart thermostats like Nest
- Commercial
  - Pro Sports teams use data collection techniques to monitor the health of its players.
- Industrial
  - Amazon uses robots to locate items on shelves
- Infrastructure
  - Smart Cities

How is IoT different?

- How is IoT different from smart and connected products?
- While things like a washing machine which sends a txt when your clothes are dry are considered IoT, true IoT derives value from being smart and connected.
- Example:
  - If it takes longer to dry clothes than what other dryers of a similar model report, perhaps the heating element is about to fail and should be replaced?

IoT is more than the “Device”

- IT is a combination of:
  - The device
  - Software in the device and in the back end for data processing
  - The network to connect the devices to each other and the software back end
  - An external interface to interact with the data and system

Software Defined Product

- As Roomba vacuum is just a vacuum with a self propelled motor and wheels. That is the device.
- What makes a Roomba a “Roomba” is the Software Defined Product, consisting of consists of
  - The **software application** this could be on device or in the cloud, but should be be programmable and updatable
  - The **cybermodel** is a statistical model which assists the software application with decision making.
  - Software defined product – the code which interacts with the device.

Hardware Defined Product

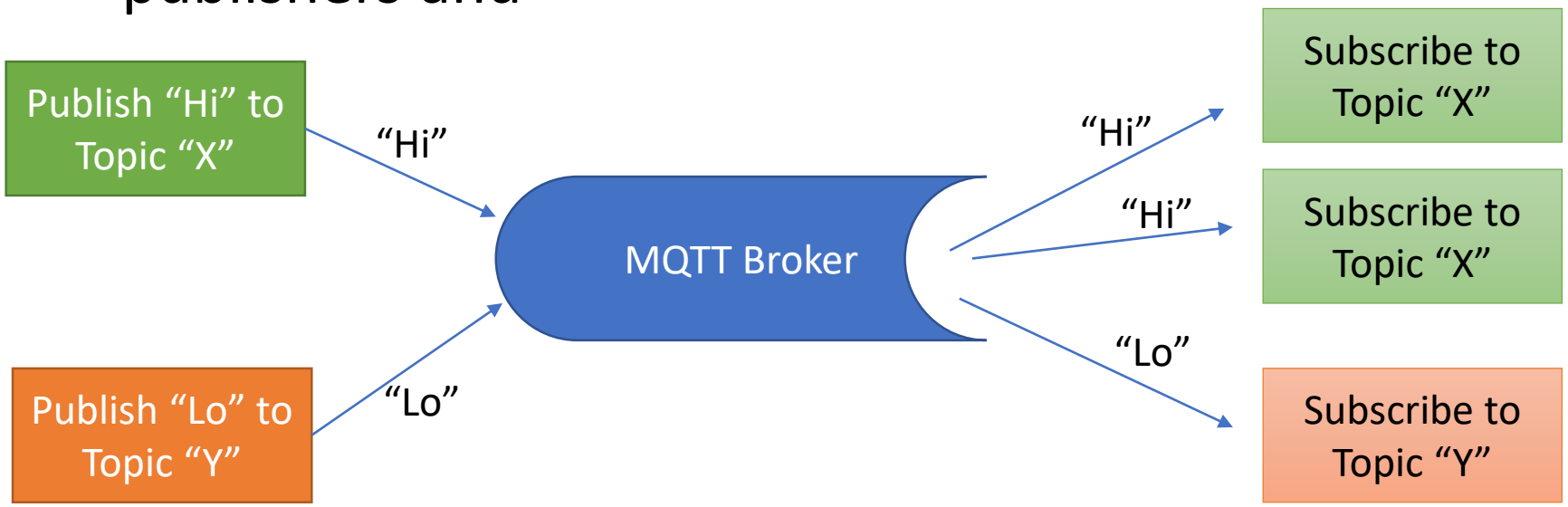
- Sensor – gathers data from environment
- Actuator – alters environment (motors, etc)
- Embedded System – Packages data and sends over the internet

Network Fabric

- Network Connectivity
- IoT protocols
- Proprietary Protocols
- Gateways to connect Proprietary Protocols to the Public Internet

MQTT

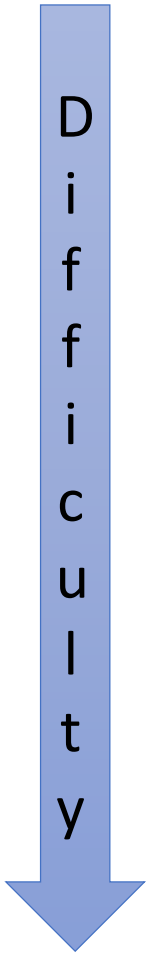
- **Message Queuing Telemetry Transport** a protocol for IoT
- Messages are categorized by topics.
- The MQTT Broker collects messages from publishers and



Data Services

- There are Web API's which can enhance our analytics
  - Weather Data
  - Geocoding
  - Product Pricing
  - Utility Rates
- The Software defined product can call these APIs to enhance our IoT analytics.

IoT Analytics



- Retrospective Analytics – What Happened?
- Diagnostic Analytics – Why did it Happen?
- Descriptive – What is happening now?
- Predictive Analytics – What will happen?
- Prescriptive Analytics – What should I do about it?

The Value of IoT

- Value Proposition – What will the IoT application do?
  - Determine whether a conference room is occupied
- Quantify the Value Proposition –
  - How can you determine if the conference room is occupied?
  - Which sensors are required?
- Value Modeling through Analytics -
  - Can you derive a cybermodel to address the value proposition?