AR - IoT Combo

Experiment #1

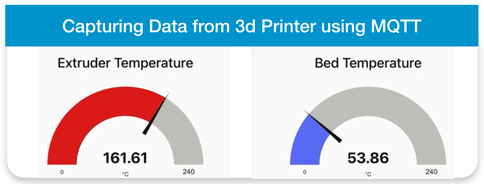
Implements the basic configuration of a micro production cell to support the current proof of concept

- 3D Printer
- Raspberry Pi
- WiFi Router
- 3D Printer API (OctoPrint)
- MQTT Server (Mosquitto)
- Node-RED

Establishes MQTT as the main protocol to support the communication among IoT devices, API's, systems, and other components

Elects two *MPC* production variables to be monitored via MQTT using json payloads interfaced by Node-RED flows and dashboard

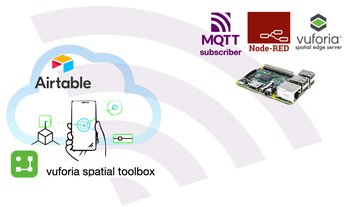
- Nozzle Extruder Temperature
- Bed Temperature



Experiment #2

Introduces new components to integrate AR & IoT

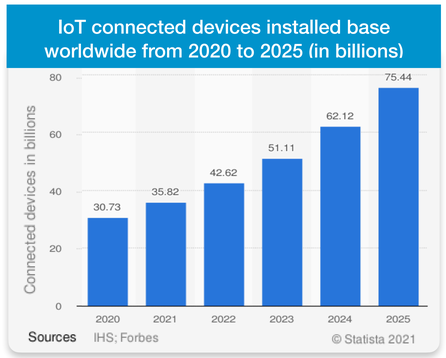
- Second Raspberry Pi
- Vuforia Spatial Server
- Cloud repository (Airtable)
- AR component (Vuforia Toolbox)



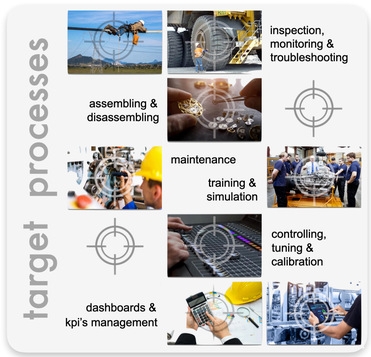
Marker-based AR interface presents the device's temperatures in real time, using a cloud-based intermediary dataset (Airtable)

The Context <Why>

- IoT is already here and growing fast
- AR is gaining traction and it can certainly be much more than just a gaming thing
- The 5G/6G latency improvements are just around the corner
- The volume of IoT devices and traffic will escalate even more
- We are going to need a functional and pragmatic way to deal and interact with such a proliferating army of "things" and data



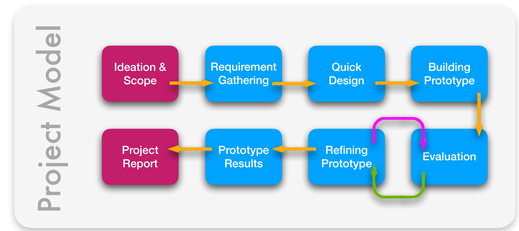
The Proposal <What>

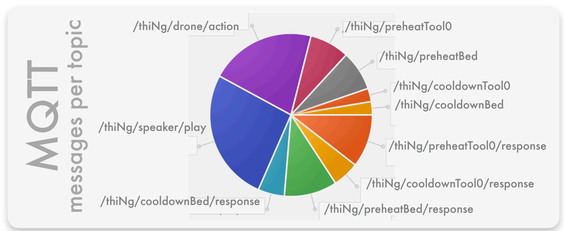


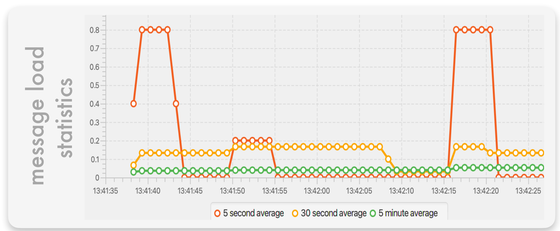
- Use AR as interface between the IoT world and the users (let's combo, eh?!)
- Support "read & write" operations (full interaction between AR apps & IoT devices)
- The integration with IoT devices and data must be as smooth as possible, exploring practices and protocols native to the IoT environment
- Permit local (on-site) and remote accesse, supporting marker-based, marker-less, 3D model-based trackers/triggers, etc.
- Focus in attending the business' "target processes"

Methodology <How>

- Design and implement a prototype environment based on a "micro production cell" (*MPC*)
- Introduce and configure IoT devices and components to support the basic *MPC* operations
- Implement Message Queue Telemetry Transport (MQTT) as the main communication/integration protocol
- Develop AR apps to integrate with the IoT environment via MQTT protocol
- Monitor/measure the message volumes and payloads integrity of MQTT publish/subscribe processes





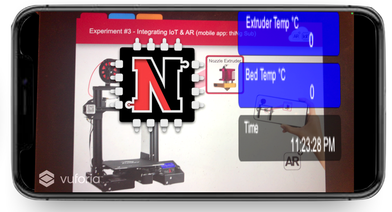


Experiment #3

Introduces new components to support the development of AR apps enabled to use MQTT publish/subscribe processes to integrate with IoT devices:

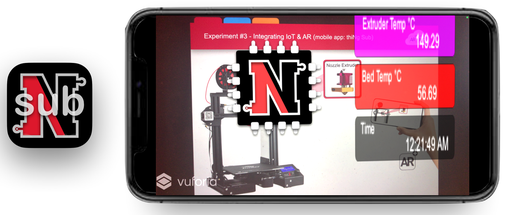
- 3D Development Framework (Unity)
- MQTT library for Unity (M2MQTT)

Implements AR interface to access and present the IoT devices' data through ***subscribe*** processes based on MQTT



Experiment #4

Implements AR interface to access, present, modify data. and control IoT devices' through the ***publish*** and ***subscribe*** processes based on MQTT



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