IOT Conceptual Model Development for the collection and processing of environmental data at a general level.

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Introduction

IDS 6383 - Hardware - Prototyping for M&S Research introduced students to various topics like:

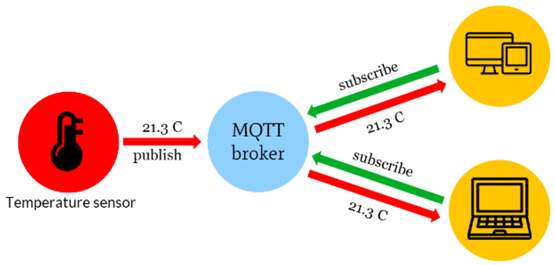
- 3D Printing
- 3D Design
- Electronics and Circuit Building
- Printed Circuit Board Design
- IOT Protocols (MQTT & IFTTT)

Course Goals:

- Build a micro-controller based project implementing purpose-built electronic circuit board designs and custom 3D-printed models.
- Data will be collected using IOT protocols by way of Wi-Fi connection
- Design projects based on research goals

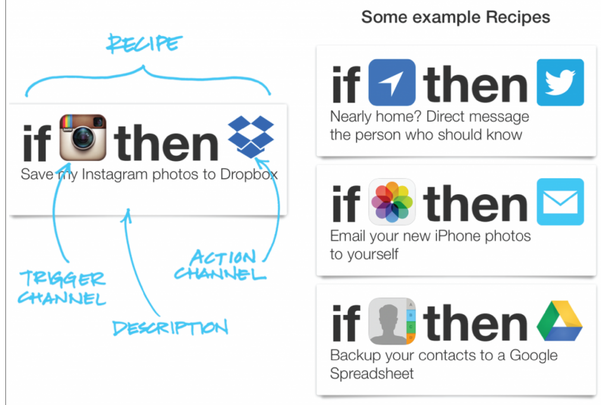
IOT/ MQTT/IFTTT

The Internet of things (IoT) is the extension of Internet connectivity into physical devices and everyday objects [1].

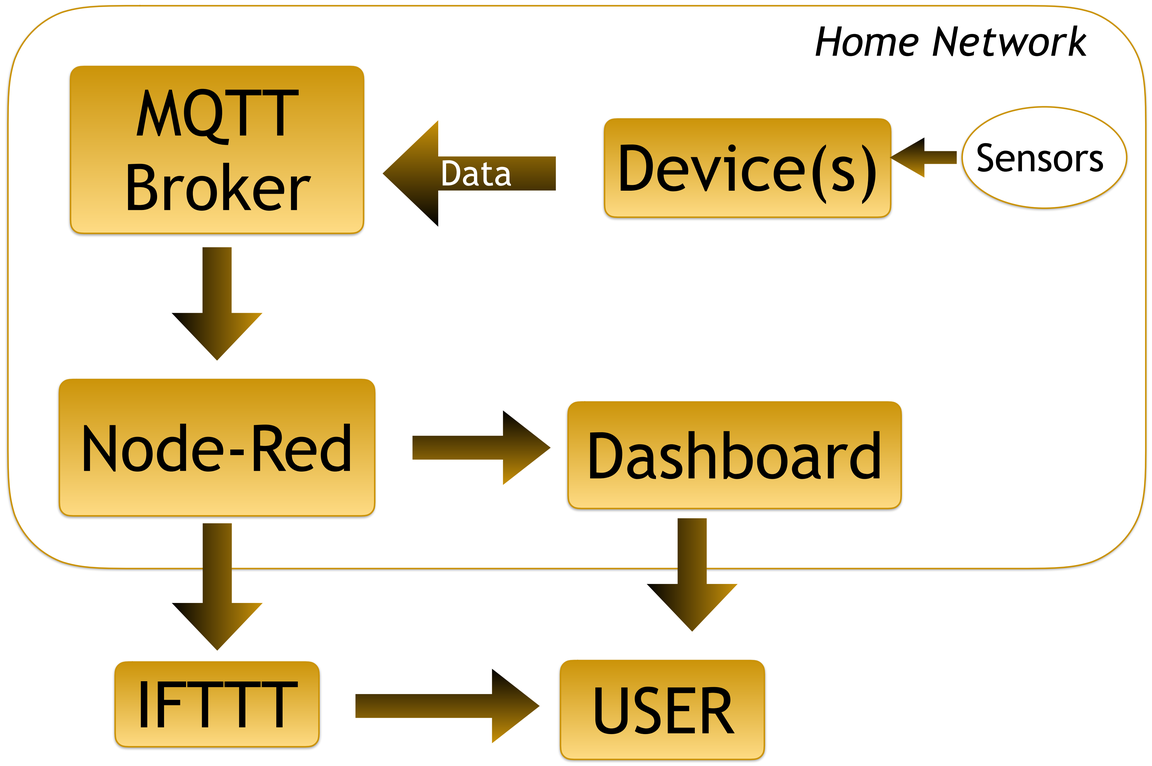


Schematic data flow from sensor (machine) to devise (machine)

IFTTT- If This Then That, is a free web-based service to create chains of simple conditional statements, called applets. [2]



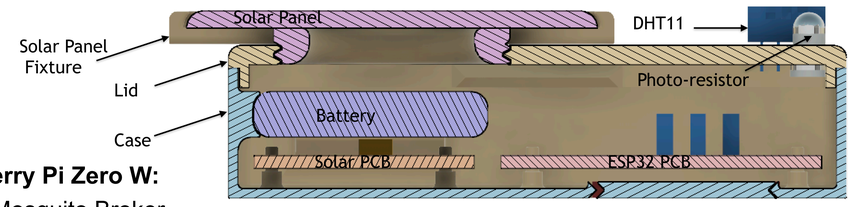
Concept Model



3D Printing Prototyping

Solar Device Housing - The Otto:

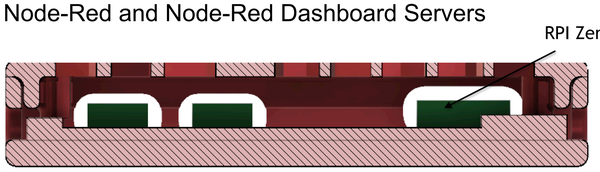
- 5V Solar Cell
- 3.7V 2000 mah Battery
- 2 custom PCB's
  - ESP32 unit - Logs the data and sends via MQTT
  - Solar unit - Sends 3.7V to ESP32 Unit while charging the battery via solar panel

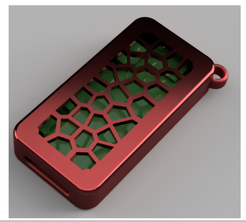


Raspberry Pi Zero W:

MQTT Mosquito Broker

Node-Red and Node-Red Dashboard Servers





Hardware

Micro-Controllers:

Raspberry Pi Zero: MQTT Broker & Node Red Server

Esp32 - Wroom - 32: Sending data via wifi

Sensors:

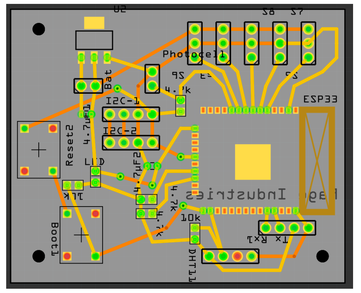
Capacitive Touch Soil Sensor

DHT11 Temperature and Soil Sensor

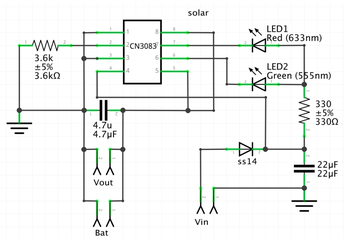
LED Photo-resistor

Custom Electronic Design:

ESP32 Board



Solar Battery Charging Circuit Schematic



Conclusion/Future Work

Utilizing MQTT for research purposes is a valuable tool for any trans-discipline researcher. MQTT allows for unique data collection using the common core components. This technology allows for re-usability and recycling of hardware for the next project if the hardware has been designed accordingly. The proposed concept systems can serve as an exemplar for developing one's custom data logging system. The current concept is certainly the starting point for this research. Future work will consist of processing the collected data using machine learning techniques in real time for live classifications as needed by the team or project.