# Internships – Problem Definitions

## CS & IT Branches

This document outlines the problem definitions for the Internships being conducted at CopperCloud IOTech starting June 2020.

**Note:** More details on these use cases will be provided once the internship begins, and NDA (non-disclosure agreement) is in place.

**Problem Definitions:**

| # | Problem Space | Solution Space | Expected Learning Outcomes |
|---|---|---|---|
| 1 | **Domain:** Computer Vision<br><br>**Problem Statement:**<br>Detect when a particular text/pane/button is visible on PC screen, and generate alerts & event-logging when it is detected.<br><br>**Business use case:**<br>This is required to integrate older generation CNC machines with new generation IoT-based alerts system in automated manufacturing units, where machines are not attended continuously by operators. | 1. Use CV (Computer Vision) – Template Matching, preferably with Python<br><br>2. Aggregate the solution into a **re-usable library**, which can be utilized across other similar problem spaces.<br><br>3. Deploy the code to a Raspberry Pi or a Pi Zero for deployment on CNC machines<br><br>4. Recommended platforms (but open to different suggestions):<br>• OpenCV, YoLo, PyTorch, etc with Python<br>• Deployment platform: Raspberry Pi or Pi Zero | 1. **Image recognition** using a set of given templates<br><br>2. Deployment of **CV solution on minimal hardware** (Pi or Pi Zero)<br><br>3. Communicate between Edge layer (Cam + Pi) and IoT platform on AWS using **MQTT and JSON protocols**<br><br>4. **Agile methodology** for executing a project |

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| 2 | **Domain:** User Interface<br><br>**Problem statement:**<br>Develop a PWA (Progressive Web App) framework to allow rapid development of mobile apps which are agnostic to mobile platform, browser or OS. This would also allow seamless upgrades of apps without the end user needing to install any updates.<br><br>**Note:** PWAs are the next generation of mobile apps that are now supported by all major mobile platforms. These can be run as a website (over browser) or as a mobile app on a wide range of platforms **(Write-Once-Run-Anywhere)**. | 1. Develop PWA that can be deployed over a simple web server (which is **cloud-agnostic**) and can be rendered on a host of mobile as well as browser platforms<br><br>2. Integrate the PWA with an IoT Solution to give end-user access to the data captured by the IoT Infrastructure<br><br>3. Convert this PWA into a **re-usable framework** which can be used to develop other similar PWAs<br><br>4. Use the **Agile methodology** to execute this project | 1. New generation of mobile apps (**PWA**), and the drivers for this technology<br><br>2. Integrate the PWA with an **IoT solution**<br><br>3. Architectural concepts such as **Service Workers, Distributed Federated Architecture**, **Hybrid Messaging Protocols** between PWA and IoT<br><br>4. **Agile methodology** for executing a project |