Application Note: EZ-Ap 105

Increase Plant Efficiency with EZLogix IIoT's MQTT protocol for Preventative Maintenance and Productivity Monitoring

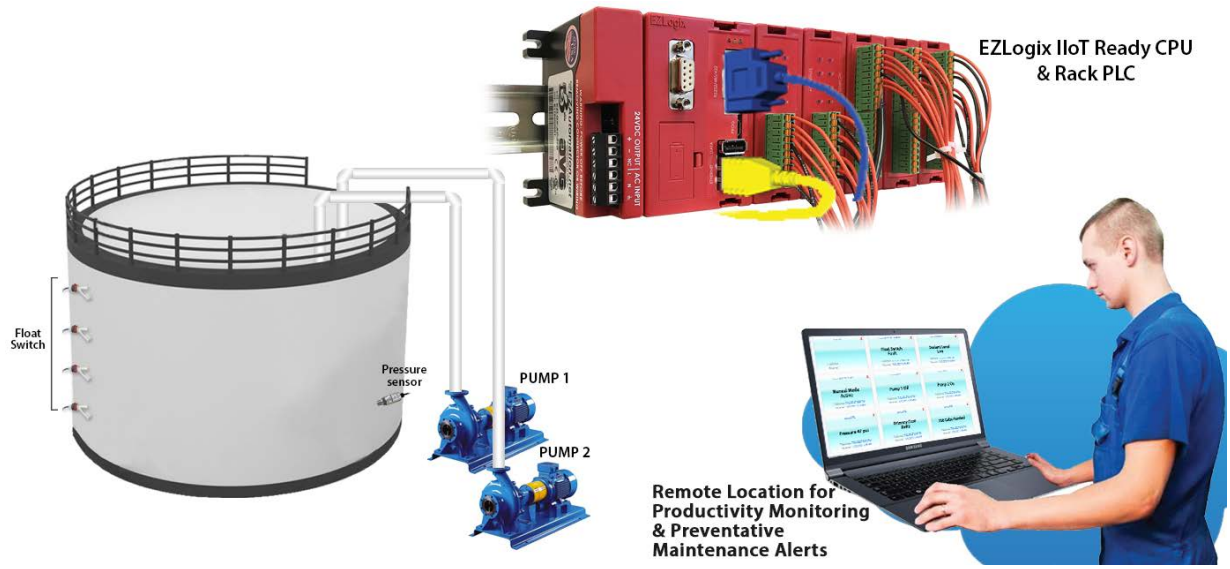
The Industrial Internet of Things (IIoT) focuses on the interconnectivity and utilization of powerful data in a manufacturing environment. IIoT enables the acquisition and accessibility of important plant data at far greater speeds, security and reliability. IIoT incorporates machine learning and big data technology, harnessing the sensor data, machine-to-machine communication and automation technologies that have existed in industrial settings for years. The driving philosophy behind the IIoT is that smart machines are better than humans at accurately, consistently capturing and communicating data.

The driving force behind IIoT's data communication is the industry accepted MQTT protocol. EZLogix built in MQTT protocol support, acts as a "bridge" between existing operational technologies within a plant, for example factory machines, and plant database networks, so valuable data can be shared reliably and securely for productivity monitoring and preventative maintenance.

The EZLogix PLC can be used to control the machine or simply interface with existing PLC technology as an edge-gateway device for less than $250, but most importantly is used to communicate critical data for operational improvements. In this application note, we use the EZLogix to control tank levels, log critical machine data and send it to designated plant personnel over the MQTT protocol using the FREE EZIIoT Utility and EZLogix Designer Pro programming software. The EZTouch HMI is used simply as an operator interface for manual control of the tank, but is not required for the productivity monitoring application over the MQTT protocol.

For more information on the benefits and capability of EZLogix IIoT ready PLC, please contact EZAutomation's IIoT specialist, Vikram Kumar at vikram@avg.net or call-in to 630-660-5681.

SYSTEM DIAGRAM



This application note uses the EZTouch HMI, EZLogix PLC and Free EZIIoT Utility. The EZTouch HMI is used simply as an operator interface to the EZLogix PLC for manual control. The EZLogix PLC is used to monitor and control tank levels using various discrete and analog I/O modules. The built-in IIoT MQTT function block within the Free EZLogix Designer Pro programming software is used to send the logged data to various plant personnel. In the IIoT world, the recipients of data are known as "subscribers". The device that stores and pushes the data, is known as the "publisher", in this case the EZLogix. The data is sent using the secure MQTT protocol to a "broker" or cloud service. Finally, the data itself is known as "topics". The Free EZIIoT Utility is designed to provide a simple "dashboard" of all critical "topics" in real-time that can be accessed anywhere in the world to approved "subscribers".

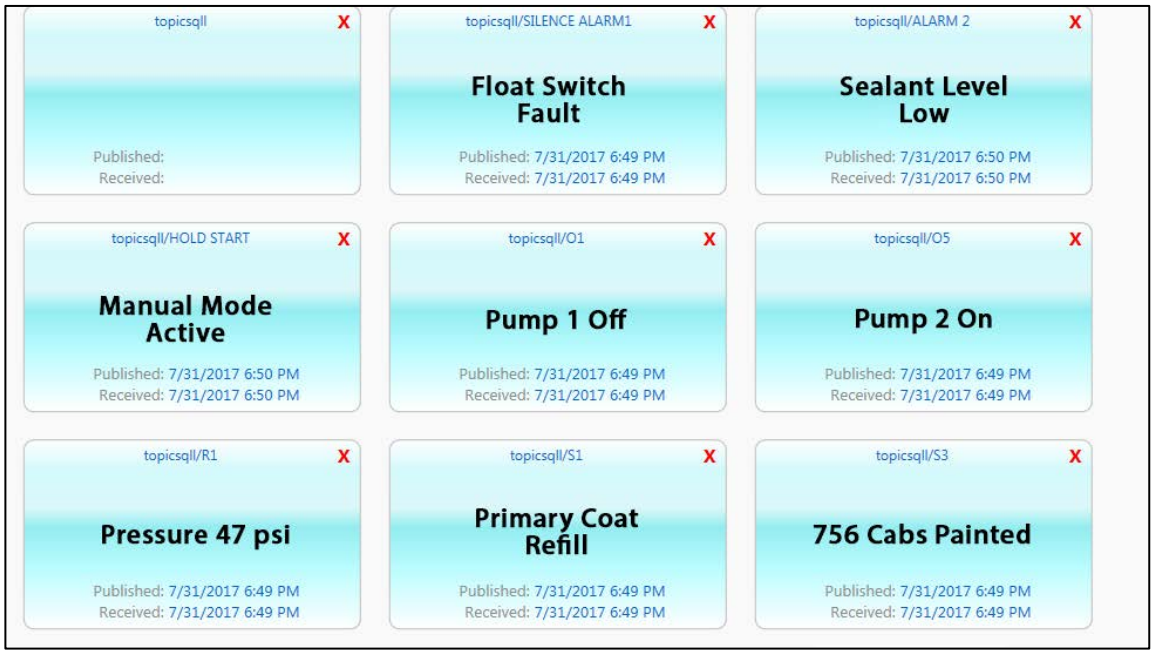
For detailed set-up guides and manuals on EZLogix IIoT ready CPU, please visit www.ezautomation.net/ezlogix/ezlogix-iiot.htm "Indepth Tech Docs" tab.

Specifically for this simple tank level application, the EZLogix PLC is controlling two pumps using AC outputs to independently turn on to fill the tank when it is low. One analog input is tied to a pressure sensor that is monitoring liquid levels, and four digital inputs are tied to float switches to indicate the various liquid levels defined. In this application, we use EZLogix built-in scaling function to read the pressure sensor value of 0 to 4095 to indicate 0 to 500 psi.

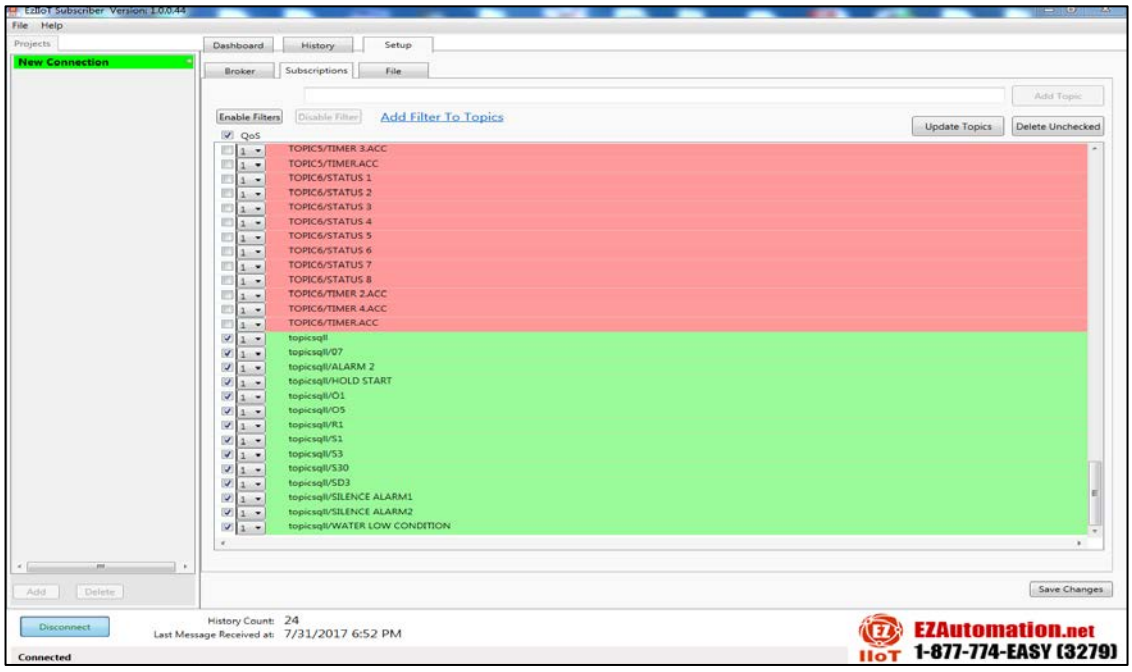
In this application note, we have two alarms which are sent over the MQTT protocol to the "subscriber" that can be viewed in real-time with the EZIIoT utility. The two alarms indicate low tank levels and malfunctioning float switches. In both cases, the user can take the critical data to either refill the tank level with the appropriate substance or fix the float switch if required. This will ensure consistent production output of the tank. Further preventative maintenance instructions can be defined and sent to "maintenance subscribers" to clean the tank when appropriate.

Setup used for this simple application include the following hardware:
EZLGX-CPU-1UE (EZLogix CPU with USB Programming, Data logging, and IIoT MQTT Protocol) $149
EZLGX-AC-03B (3 Base Modular Rack, AC Power Input) $99
EZLGX-IO-4ACI4ACO (4 AC Inputs, 4 AC Outputs Module) $49
EZLGX-IO-8ANI4ANOV (8 Analog Inputs, 4 Analog Outputs, 0-10V module) $199
EZLogix Designer Pro Programming Software and Simulator: FREE

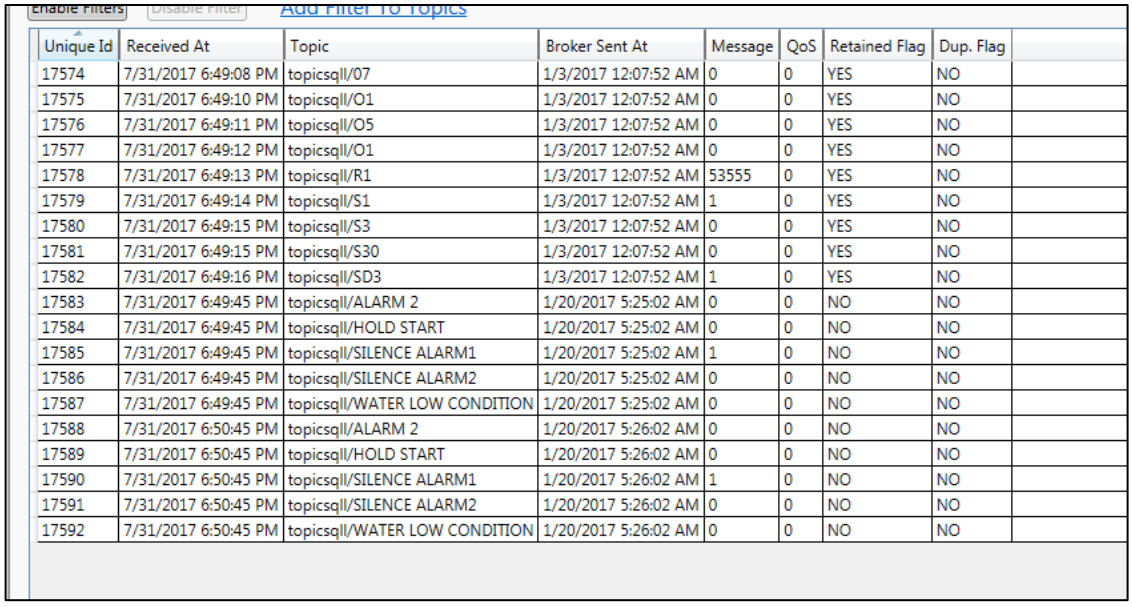
A screen shot of the EZIIoT Utility Dashboard shows various Topics & Alarms



A screen shot of the EZIIoT Utility Setup of Topics



A screen shot of the EZIIoT Utility History of Topics



Unique Id	Received At	Topic	Broker Sent At	Message	QoS	Retained Flag	Dup. Flag
17574	7/31/2017 6:49:08 PM	topicsqll/07	1/3/2017 12:07:52 AM	0	0	YES	NO
17575	7/31/2017 6:49:10 PM	topicsqll/O1	1/3/2017 12:07:52 AM	0	0	YES	NO
17576	7/31/2017 6:49:11 PM	topicsqll/O5	1/3/2017 12:07:52 AM	0	0	YES	NO
17577	7/31/2017 6:49:12 PM	topicsqll/O1	1/3/2017 12:07:52 AM	0	0	YES	NO
17578	7/31/2017 6:49:13 PM	topicsqll/R1	1/3/2017 12:07:52 AM	53555	0	YES	NO
17579	7/31/2017 6:49:14 PM	topicsqll/S1	1/3/2017 12:07:52 AM	1	0	YES	NO
17580	7/31/2017 6:49:15 PM	topicsqll/S3	1/3/2017 12:07:52 AM	0	0	YES	NO
17581	7/31/2017 6:49:15 PM	topicsqll/S30	1/3/2017 12:07:52 AM	0	0	YES	NO
17582	7/31/2017 6:49:16 PM	topicsqll/SD3	1/3/2017 12:07:52 AM	1	0	YES	NO
17583	7/31/2017 6:49:45 PM	topicsqll/ALARM 2	1/20/2017 5:25:02 AM	0	0	NO	NO
17584	7/31/2017 6:49:45 PM	topicsqll/HOLD START	1/20/2017 5:25:02 AM	0	0	NO	NO
17585	7/31/2017 6:49:45 PM	topicsqll/SILENCE ALARM1	1/20/2017 5:25:02 AM	1	0	NO	NO
17586	7/31/2017 6:49:45 PM	topicsqll/SILENCE ALARM2	1/20/2017 5:25:02 AM	0	0	NO	NO
17587	7/31/2017 6:49:45 PM	topicsqll/WATER LOW CONDITION	1/20/2017 5:25:02 AM	0	0	NO	NO
17588	7/31/2017 6:50:45 PM	topicsqll/ALARM 2	1/20/2017 5:26:02 AM	0	0	NO	NO
17589	7/31/2017 6:50:45 PM	topicsqll/HOLD START	1/20/2017 5:26:02 AM	0	0	NO	NO
17590	7/31/2017 6:50:45 PM	topicsqll/SILENCE ALARM1	1/20/2017 5:26:02 AM	1	0	NO	NO
17591	7/31/2017 6:50:45 PM	topicsqll/SILENCE ALARM2	1/20/2017 5:26:02 AM	0	0	NO	NO
17592	7/31/2017 6:50:45 PM	topicsqll/WATER LOW CONDITION	1/20/2017 5:26:02 AM	0	0	NO	NO