ThinkPalm's Footprints in the

IoT Arena

ThinkPalm

ThinkPalm leverages mobile, device and cloud components of IoT with four cutting-edge solutions.

The rapidly increasing popularity of IoT across the globe has changed consumer demand and modes of operation of businesses remarkably. IDC MarketScape predicts the Internet of Things market to grow from $655.8 billion in 2014 to $1.7 trillion in 2020 at a compound annual growth rate of 16.9%. McKinsey and company's study states the annual value of IoT apps will be equivalent to about 11% of the world's economy in 2025!

With the trend continuing to gain momentum, businesses – big and small, are utilizing the technology to reach the next-generation of customers.

ThinkPalm is in the forefront of this revolution with four out-of-the-box solutions – IIoT Decision Support System Using Predix, Connected Device-Self-Injection App, Robot Motion Controlling App and UPnP IoT, leveraging the fundamental components of IoT – mobile, devices and cloud services.

IIoT Decision Support System Using Predix

BUSINESS NEED

The client required an intelligent solution capable of remote data collection from connected devices on-board, real-time analysis and predictive diagnostics, to improve operational efficiency, safety on-board and to reduce downtime.

CHALLENGES

- Bandwidth constraints with respect to vessels in transit
- Costs associated with platform components, services and features when scaling-up
- Limited on-board features and functionalities of Predix while offline
- Restriction to work within the Predix Development Environment such as Predix-defined frameworks and infrastructure

TECHNOLOGIES

Predix, Advanced Message Queuing Protocol (AMQP), UAA Security, Time Series, Cloud Big Data Storage and Data Analysis

THINKPALM SOLUTION

The solution, catering to the maritime industry, is an ambitious IIoT project developed for a B2B Technology company operating in IoT, Ship ERP and Big Data science. A decision support system using GE Predix platform, the solution enables remote monitoring and troubleshooting, real-time view of data points on-board ships and condition-based predictive maintenance for shore-based personnel.

The smart solution automates data capture from a wide variety of connected devices on-board through a central server and data acquisition units and eventually passes it to the cloud. A profile-based access allows users to access the relevant data live, irrespective of their physical location, using dedicated workstations. Using the system,

crew receives real-time recommendations on how to improve the vessel's operational performance and fuel consumption.The solution focuses on enabling the processing and transmission of data collected from various devices to the cloud, for remote monitoring and diagnostics. The Vessel Server contains the Predix machine installed with two custom-made adapters; one for the live data (for remote monitoring) and the other for historical data (for diagnostics).

The first Predix machine adapter fetches the real-time data, processes and optimizes it according to the configuration data for the vessel, and pushes the optimized data to the cloud. The second adapter collects the on-demand diagnostics data and pushes it to the cloud storage to make it available for the UI applications for visualization and further actions. The communication between vessel and cloud is through Predix services, which uses secure service end points. The UI application at the vessel side helps in local monitoring and analytics of the machineries.

The web applications at the cloud end have UI functions for registering companies, vessels and end users. Vessel wise configuration of machine data is also possible via cloud application. The machine data is pushed and applied to the vessels with the help of communication services available at the Vessel Server. The cloud UI will display the status of all the vessels registered using which the remote users can perform monitoring of the vessels and diagnostics.

PREDIX PLATFORM

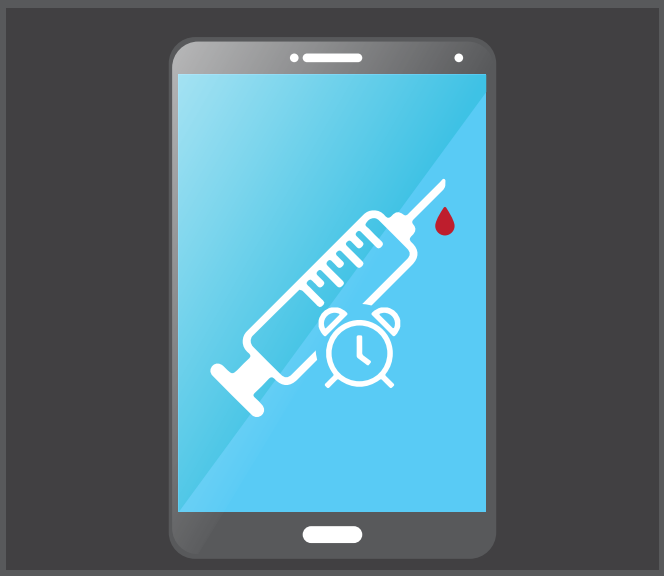
At the core of the smart solution is the Predix IIoT platform that enables remote data collection from various acquisition units, together with deployment of applications that monitor, manage, and control connected devices. The platform equips our solution with remote control and real-time monitoring functions, and easy integration with consumers' smartphones and other devices.

FEATURES

- Live remote monitoring, troubleshooting and technical support
- Decision support system and data analytics
- Edge computing for real-time analytics
- Digital Twin for data ingestion, modeling, trend study and record keeping
- Historical data access stored in cloud
- Access-based user dashboard
- Third party integration
- Scalable, easy to use, multiple deployment options
- Data security
- Pluggable cloud services

BENEFITS

The solution is a breakthrough for ship owners and managers through significant reduction in operational costs, enhanced operational efficiency, heightened safety and end-to-end cargo delivery tracking across all harsh conditions.



Connected Device - Self-Injection App

BUSINESS NEED

Our client's electronic auto injector, with a reusable injection device and a disposable cassette, required an iOS smartphone application that permits the app user to interface with the auto injector for various data requests. The application was required to help the user configure a treatment plan, receive automated reminders to avoid missing shots and track improvements without consultation.

CHALLENGES

The absence of injectors and cassettes for development and testing.

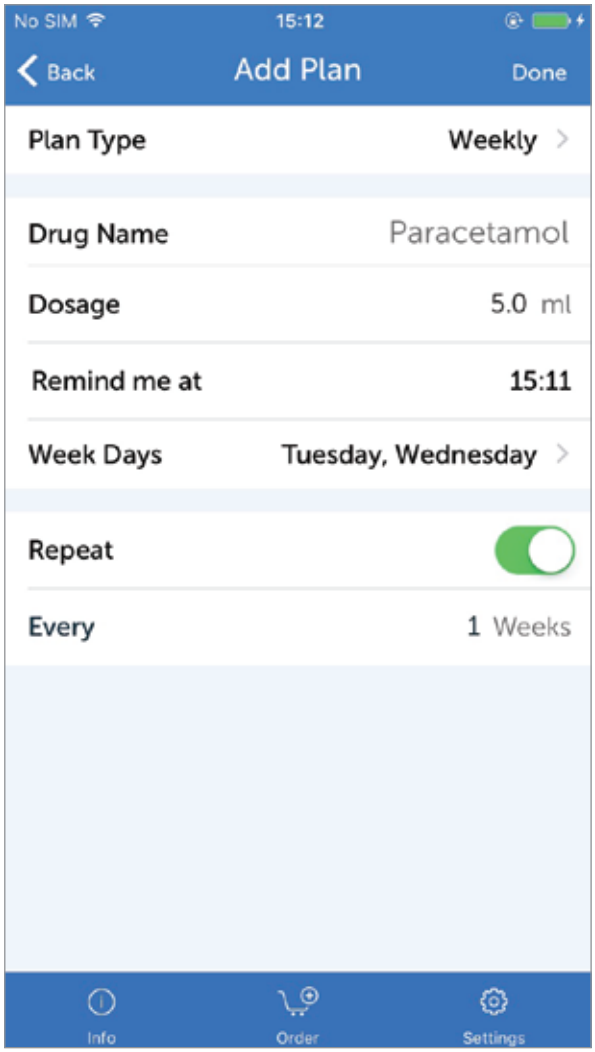
TECHNOLOGIES

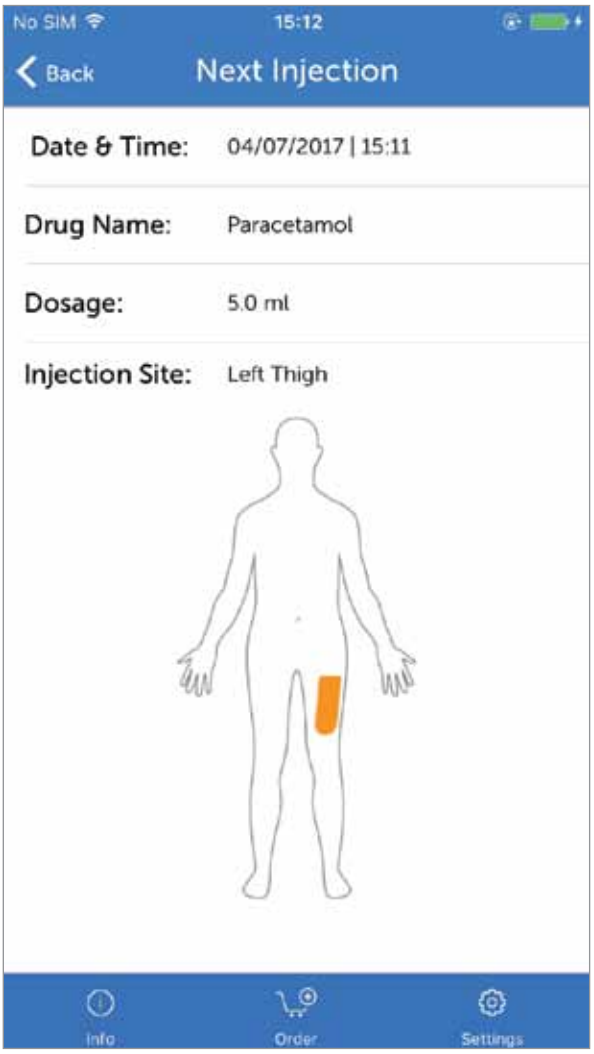
Swift 3.0, Realm Swift DB, CoreBluetoothKit

THINKPALM SOLUTION

The iOS smartphone application employing Objective-C was developed for a world class producer of disposable medical devices and components for the OEM market. It interfaces with electronic auto injectors for administration of injections as per schedule without missing a single shot. Multiple injectors can be configured with the application for one-on-one mapping, specific to the injector. The app interfaces with a cloud component to back up the injector details. Treatment plans comprising drug name, dosage and injection site can be configured on a daily/weekly/monthly basis. Automatic reminders with the drug name and dosage are sent by the application at the stipulated time. Additional reminders will be initiated from the cloud if user does not respond to an injection reminder. The quantity of medicine left in the injector will be maintained in the cloud and be helpful to prompt reminders.

Data exchange between the app and the injector is realized using Bluetooth protocol. Data will be synced continuously in both directions; application to injector and injector to application according to defined connectivity protocol. Injector will inform the application about various statuses using push notification over Bluetooth. The app provides details such as the status of the injection taken and injection logs, fetched from the injector. Users can order new cassettes from online pharmacies, rate symptoms post injections and view graphical data to track improvements based on their drug dosage and symptom ratings. "Help" and “Instructions” sections help users understand common injector issues and use the application with ease.





BENEFITS

The application automates the complete process of self-injection encompassing ordering cassettes, sending timely reminders to the user based on the treatment plan, tracking the progress achieved and more at the click of a button!

ROBOT MOTION CONTROLLING APPLICATION

BUSINESS NEED

The customer required a robust and cost effective iOS application with a simple interface to control robots from remote locations.

TECHNOLOGIES

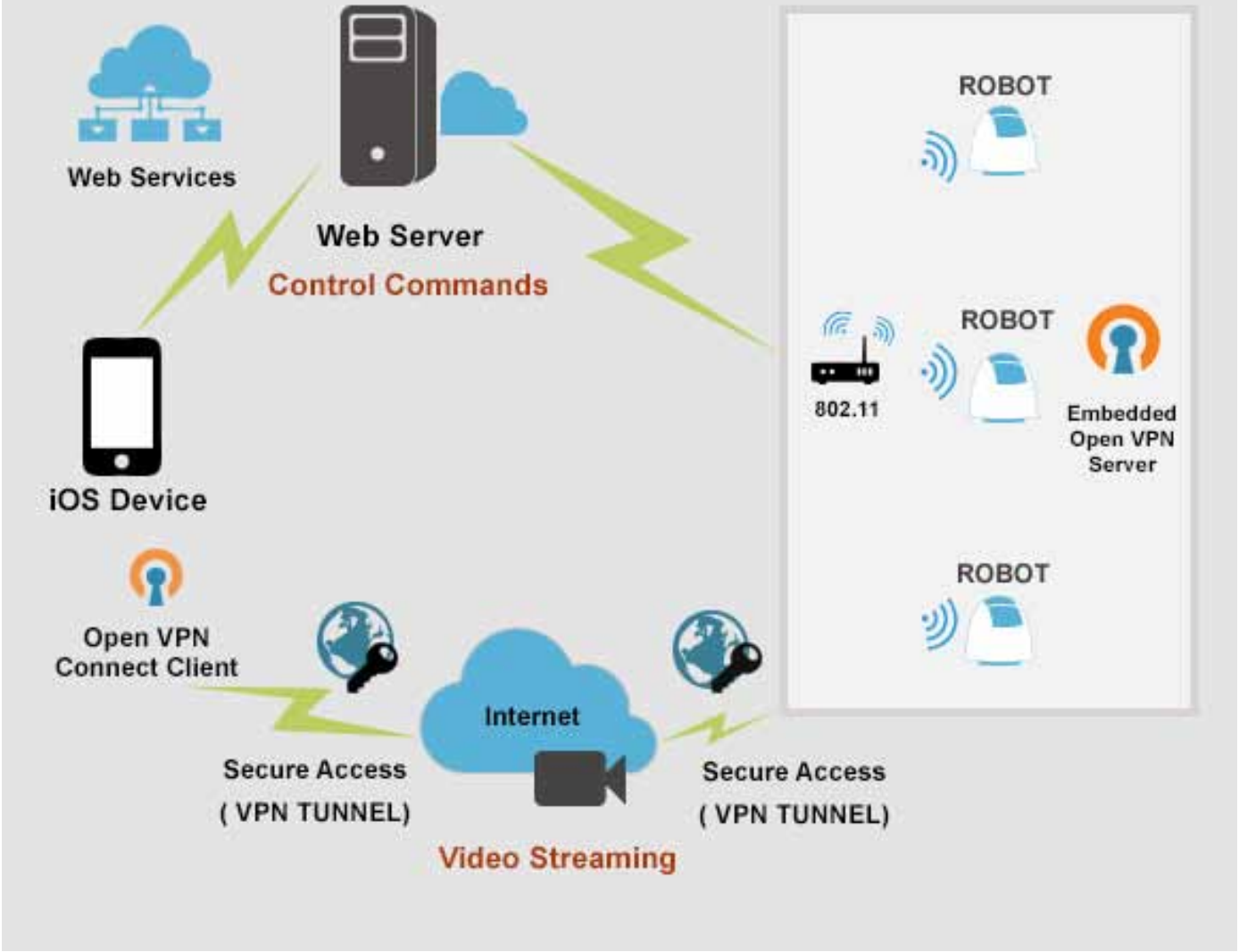
Objective-C, RTSP, VPN

THINKPALM SOLUTION

ThinkPalm developed an iOS robot motion controlling application supported across iPhones and iPads running iOS versions 8.0 and above, to take over the body control of robots. Functionalities such as new user registration, login, password recovery, device list creation for a user ID, configuration of robots and Wi-Fi settings of each robot were incorporated.

The application, with a simple UI, will authenticate with the central web server and retrieve the list of robots on successful authentication. Once the user sets the Wi-Fi for the device and requests a connection, the app communicates with it via the central server and takes over the body control of the robot. Live video streams of the device are received over RSTP. Commands such as move, park, slow, change direction (left, right, front, back) to the device can be executed by tapping buttons on the app screen or through voice commands over UDP. Viewing of the temperature and the percentage of battery remaining in the robot are enabled as well for the user to track the device status.

ARCHITECTURAL DIAGRAM



BENEFITS

The iOS app enables the user to monitor and control multiple robots from remote locations in real time. The app also helps the company test their devices, identify shortcomings and bring about functional improvements on a regular basis. Significant savings in time, cost and effort can be achieved with the user friendly app, improving operational efficiency.

UPnP IoT

BUSINESS NEED

UPnP technology in the Internet of Things arena, creates new opportunities by connecting consumer devices beyond its original focus “Home” to “Work”, “Car” and “Industry” over LAN and WAN. The established framework provides the necessary discovery and service layers for every component, with an embedded sensor and artificial intelligence, and realizes network, device and service interoperability.

TECHNOLOGIES

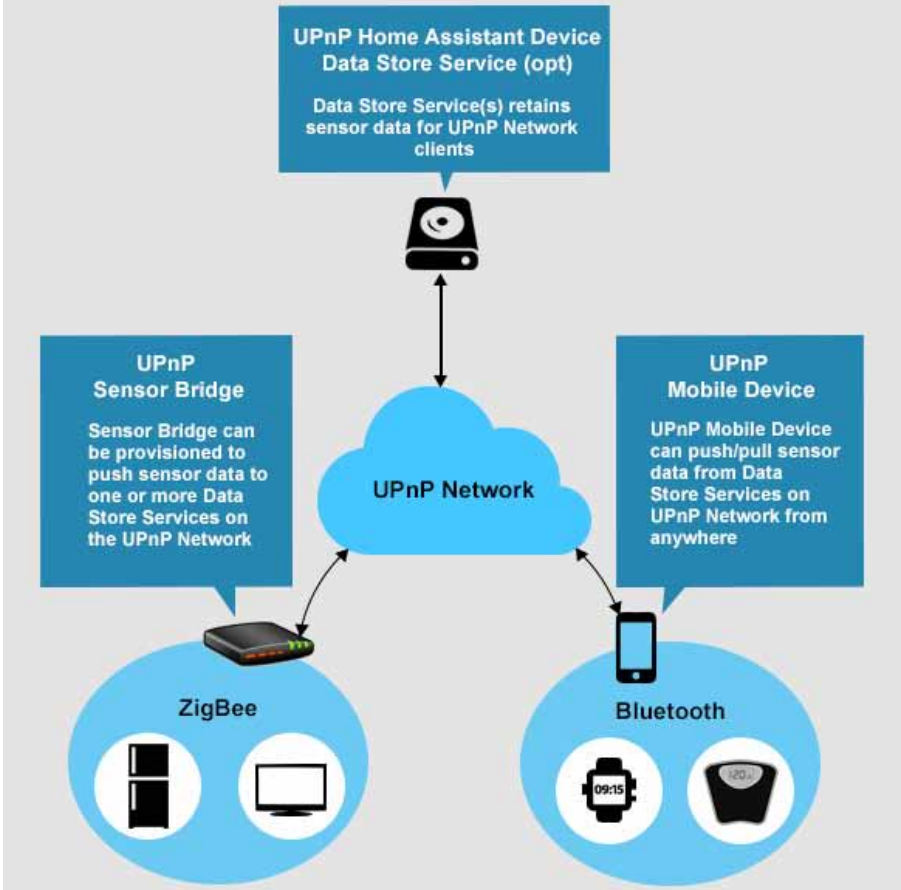
XMPP, UPnP+, IPv4, HDMI, XML, SSDP

THINKPALM SOLUTION

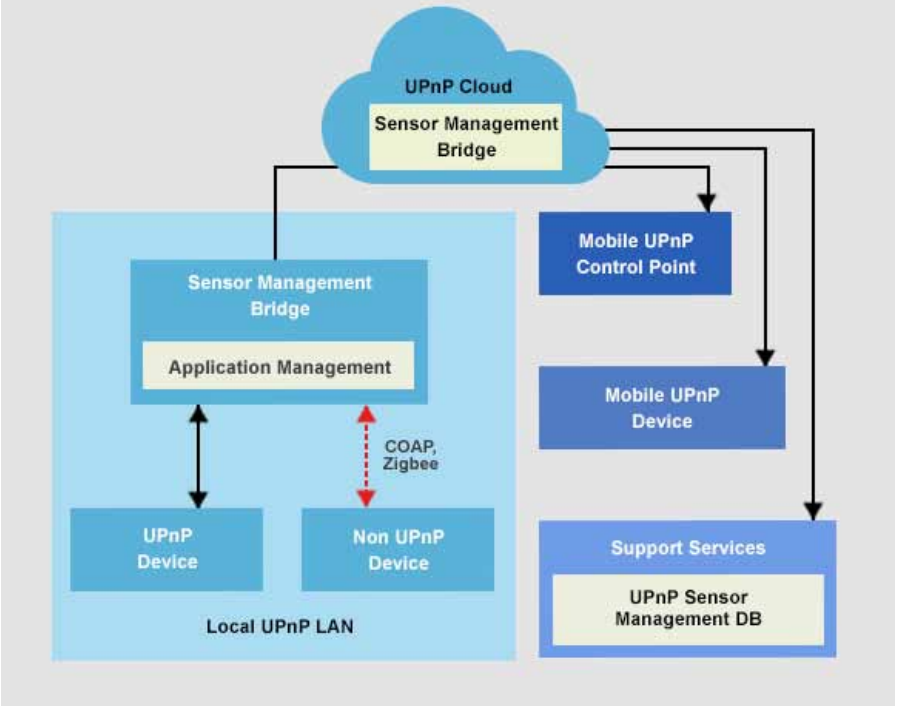
The solution, owned by ThinkPalm is capable of connecting billions of deployed devices such as smart TVs, gateways, mobile devices, game consoles, PCs, security cameras, sensor devices and more, that can be viewed and controlled from anywhere, provided they are connected to the cloud. Information can be shared with the UPnP control points and the shared data can be controlled and secured. The device sensor and actuator data can be aggregated in the local sensor network.

UPnP frameworks connect the local network, individual UPnP devices and control points to the UPnP cloud. Non-UPnP devices are connected to sensor management devices through protocols such as Bluetooth, ZigBee and employ web services such as HTTP, COAP, REST, XMPP, MQTT. SOAP, GENA, XML and SSDP services are supported in UPnP 2.0 devices. The framework is managed by means of an Android mobile application to view UPnP enabled TV data, security cameras and more from mobile/cloud.

UPnP CONNECTION SCENARIO



UPnP FRAMEWORK



The common UPnP frameworks available are MUPnP and GUPnP. Control points are XMPP based in cloud, CLING in Android and GUPNP, MUPnP in LAN. The cloud framework implementation is based on XMPP, that uses Pub and Presence.

BENEFITS

With the number of connected devices expected to soar to 30 billion by 2020 and IoT adding $1.9 trillion to the economy, as predicted by Garter, the popularity of UPnP protocol will rise significantly in the years to come. Features such as auto-configuration of devices and the capability to connect devices across LAN and WAN will add new dimensions to the Internet of Things. UPnP+ realizes remote cloud access, tighter security and more.