Contact: info@TempusFlow.Com

TempusFlow
Anytime, Anywhere, Anyvalve, Anyobject...

"White Paper"

TempusFlow™ Overview Exclusive/Initial Public Release

Date: 11/2026

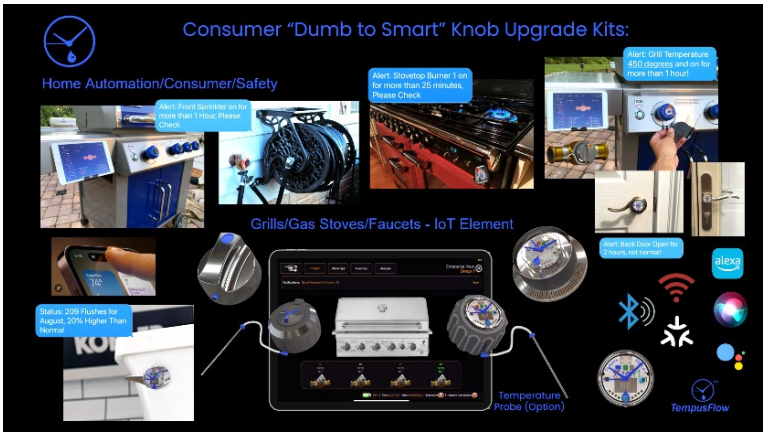
https://www.tempusflow.com/

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There is a 'New Tracker in Town…A new "Unique Technology" for an "Un-Tapped" Market, now addressed by the TempusFlow™ Family of 3D trackers/sensors. Think of TempusFlow as a tracker/tag (like an AirTag, Galaxy SmartTag 2…), but instead of tracking Geo-Location only, TempusFlow tracks the precise 3D position of things/objects, like a valve or objects, prescribed behavior/safety positioning. TempusFlow(s) impact on low-cost valve/object timing/flow smart 3D positional tracking, physical security and tamper detection, for efficient distribution of product, process or waste management is new and unique. Get measurements or just position/timing of any object/valve, with easy IoT (Internet of Things) 'open systems architecture, system of systems compatibility.

TempusFlow™
"We Track Things! Not People!"

"In a rapidly digitalizing world, manual water valves remain foundational components in global infrastructure, water management initiatives, and sustainability programs. While high-tech smart cities and Industrial Internet of Things (IIoT) platforms capture most headlines, global engineering sectors and public utilities continue to rely on manual mechanical infrastructure for critical fail-safes, cost control, safety and resource optimization". Annually, "The global market for manual valves in water systems—such as butterfly valves, which are projected to grow to **$5.0 billion by 2033**—is being continuously reshaped by several key international trends and sustainability frameworks". (ref. Google.AI Mode.2026). Based on market data for 2026, the overall global plumbing valve market is valued at approximately **$48 billion to $50 billion - $38 billion in US alone**. The existing valve upgrade market, uniquely addressed by TempusFlow, has yet to be determined, but we think it might be big, lol...



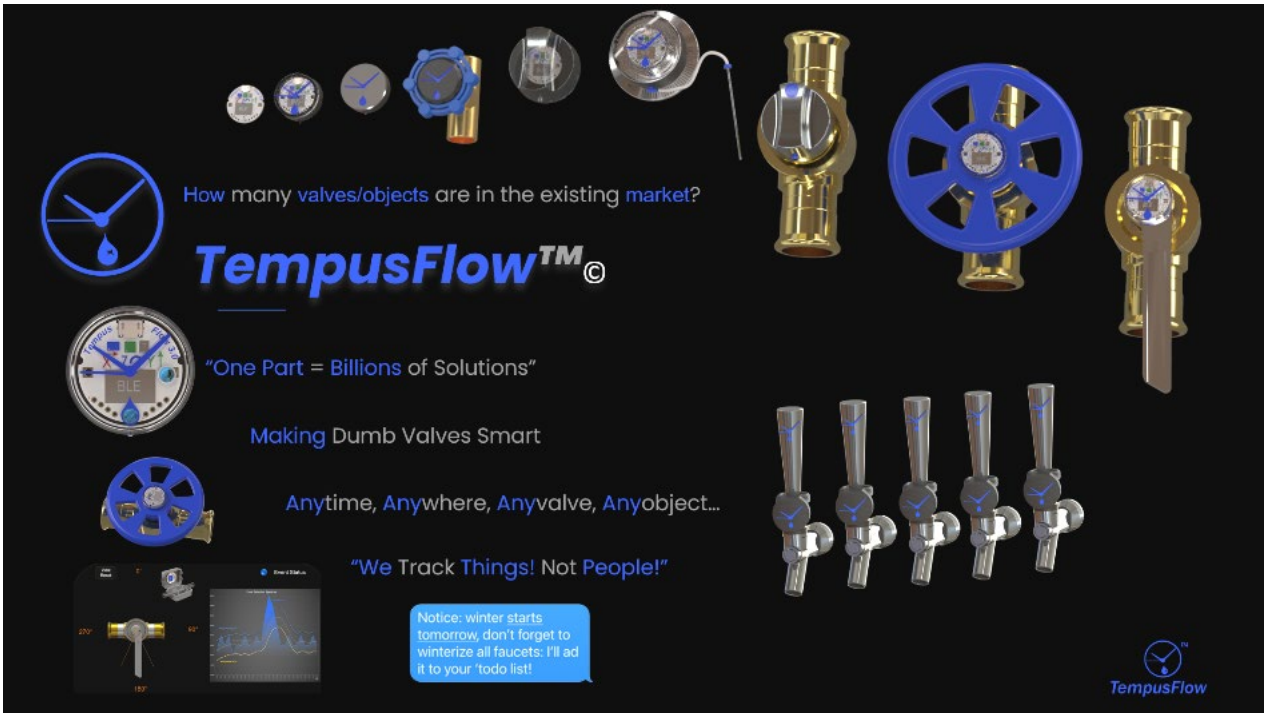
The average US home has **20+ valves** (ref. Google.AI Mode.2026), **5-10** could/should be monitored for safety, lower cost and better usage of our refined/limited natural resources. The tracking of, and waste of product, is vital for efficient use of energy, consumables, product point of sale and agricultural yield. An important step in the entire ECO process, is being able to measure & analyze product distribution/flow volume, to include @ the "Point Of Pour" or "Point Of Waste". As Lord Kelvin (Sir William Thomson, Circa 1880-

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ish) said; “if you cannot measure it, you cannot improve it” (ref. his actual quote was much longer, as he was a verbose individual, but point the same).

The flow of material through a valve/tap can be simply broken down into the pressure of the flow of product through a known orifice size and calculated as the amount of product/motion over time, or a timed flow rate (TempusFlow). Most “Industrial Smart Valves” today cost about $2,500 plus another $1500+ for the plumbing and installation (don’t even get me started on DoD/Government upgrade costs/timelines…). A key focused market in the overall object/valve tracking is the Home Automation and Application Developer/IoT/Early Adopter Market.

Most “Smart Valves” today are based upon some type of physical measurement sensor & an On/Off Solenoid (needing external power/wiring/maintenance) that is placed in the flow of the actual product moving through the valve orifice; Paddle Wheel, Propeller, Laminar Flow, Ultrasonic, Pressure Differential sensors vs. TempusFlow™ that does ‘not touch the underlying product or any need to change the existing valve body or current plumbing, and is therefore compatible with just about any existing movement/product based ‘dumb valve (most of the valves worldwide & multi-billions existing and coming on-line valves). Whether distributing fresh milk or the most caustic chemical/waste, there is no need to change the existing valve body/plumbing, merely add the TempusFlow device to the handle/tap or embedded into the handle casework/knob for environmental or security protection/detection. But what is different…



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TempusFlow™ is a family of **Non-Invasive** Flow sensor and offers many unique advantages such as:





- No New Plumbing or Valve Body replacement Required.
- Retrofit to Any Existing Motion "Dumb Valves", by adding the TempusFlow device to any handle/tap.
- ~1/10th the cost of traditional "Smart/Green Valve" Tech.
- TempusFlow™ does not touch the actual product and therefore it is not subject to clogging, nor is it a factor in the cleaning process or safety profile of the underlying materials being distributed. From; food grade/fresh milk/water to extremely caustic chemicals; whether a gas, fluid, or dry bulk material; it can accurately measure flow, without coming in contact with the underlying products distribution/control.
- Efficient Portable/Mobile/Fixed/Battery Operated & Remote valve flow measurement system (can work on and correct for moving platforms such as Trucks, Maritime Vessels, Portable Systems…with a geo/heading feed).
- TempusFlow™ can measure actual yield of product delivered at the "Point Of Pour," especially when correlated with a "Point Of Sale" or "Point of Distribution system".
- TempusFlow™ is just another tracker type tool in the sensor/tag toolbox, focusing on home automation, legacy plumbing infrastructure, upgrades & an ultra-low-cost transition, to future integrated smart/cost effective/IoT systems. As such, it is designed to share open information (simple BLE Pairing/Characteristics) and coexist with other existing smart valve management, process automation, IoT & Edge/App.AI.SI systems such as; SCADA, AWS IoT, IFTTT, IBM Watson, Microsoft® Azure, Machine Learning, Agents, Cloud…and also adds value to other "Smart(er) Valves/Devices.

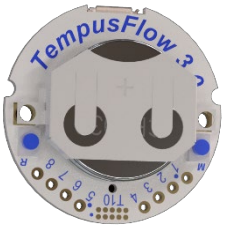


TempusFlow™ is a 3-Dimensional Flow Measurement Sensor System. It uses Real-Time 3D tracking of the valve handles physical position, correlated to Orifice Size or Object and Timed Flow, on a valve handle/object "Event", otherwise it is in deep sleep. When we first started this project, there were a couple of promising technologies both emerging commercially and in the academia space, that we knew would become mature during the time of development. Most notably, the miniaturization and sophistication of Ultra-Low Power Integrated 3D IMU tracking devices and the push for resiliency/multiple connect/beacon mode/secure/mesh type BLE (Bluetooth Low Energy) devices/protocols. This, along with our ground up proprietary Embedded Fusion Engine, Fully Controlled PCB, algorithms, filtering, and real-world adaptation (embedded secret sauce), has now made TempusFlow™ ready for primetime.



Technology Partner Opportunities –

We are openly/actively looking for technology partners, integrators, OEM's, independent, gig contractors, early adopters/makers… for the outgrowth and application/integration licensee/partners. There are opportunities for Application Developers, BLE to Wifi to IoT comms, Agentic.AI.SI Development, Agriculture Integrators, Water Management, Waste Management, Infrastructure Security, National Security/Force Protection (DoW) and obviously Home Automation/Object Position Tracking. If you would like to have a conversation about channel/tech



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development opportunities, leave us a note about your interest level and also, contact us directly at info@tempusflow.com…

TempusFlow™ 101 – What is it?

In its simplest form TempusFlow is a device like an Apple AirTag, Galaxy SmartTag 2… or any other property tag/track/find device. But, instead of Geo-Location, we are solely focused on the orientation of an object, such as a position of a valve handle, in its own relative 3D Space/Environment. Positional tracking systems ("tags") using integrated "Tri-Axis/IMU's". Accelerometers, Gyrometers & Magnetometers (Perhaps an available GPS/Heading signal) have been revolutionized over the past 10 years. They have improved with better accuracy, smaller size, lower power consumption, better radios and better technical/software support @ a lower cost. Their uses for UAV's, medical devices and wearable sensors/smart phones, combined with some heavy math/sophisticated, fusion engines/algorithms and relative positioning, can accurately track physical devices with incredible precision. Integrated tracking modules available today that have the computing/comms power for the Edge.AI.SI and are capable of running the firmware & storing the in-flux data, really started showing up about 5-8 years ago (notably; ST Micro systems Sys On Chip families and Texas Instrument "Sensortag Family",...). It is incredible and somewhat magical to see the Real-Time tracking of an inanimate object in data/visual form with no mirrors, special camera positioning, controlled environments/lighting, obliqued/obscure angles, games or other tricks involved. All the while, these modules can use power in uMicro/nano-amps, versus milli-amps while active, and can run off of a battery cell for years, versus weeks or months. They remain in a deep sleep, ready to come alive when someone touches or even comes near the valve/object. The devices can also wake up periodically to report health status/ensure comms connections. Of course, on the comms side of "Bluetooth everything & 5G direct, on the horizon," all of the tech started to coalesce, enabling this new form of derived measurements in the IoT world. 3D positioning of a valve, object or tap handle can now be efficiently measured, tracked, used and logged in real-time, for further post-processing and analysis, at a gateway/enterprise/IoT node/server, with Zero Plumbing Changes. Meaning that when we add an "Event" gate, a timer, filters, custom fusion engine, characterization, proximity detection, drift correction and relative calibration factors to our family of integrated devices sensor/embedded firmware, we can accurately calculate flow/behavior, based upon any valve/object position, drive pressure (even gravity), orifice size (calculated, calibrated, defined or learned) and the timing of the handle on/off (or percent "on"/multi-turn) position, thus flow can be measured accurately and change can be monitored. Process efficiency, markedly improved (Obvious or Covert).

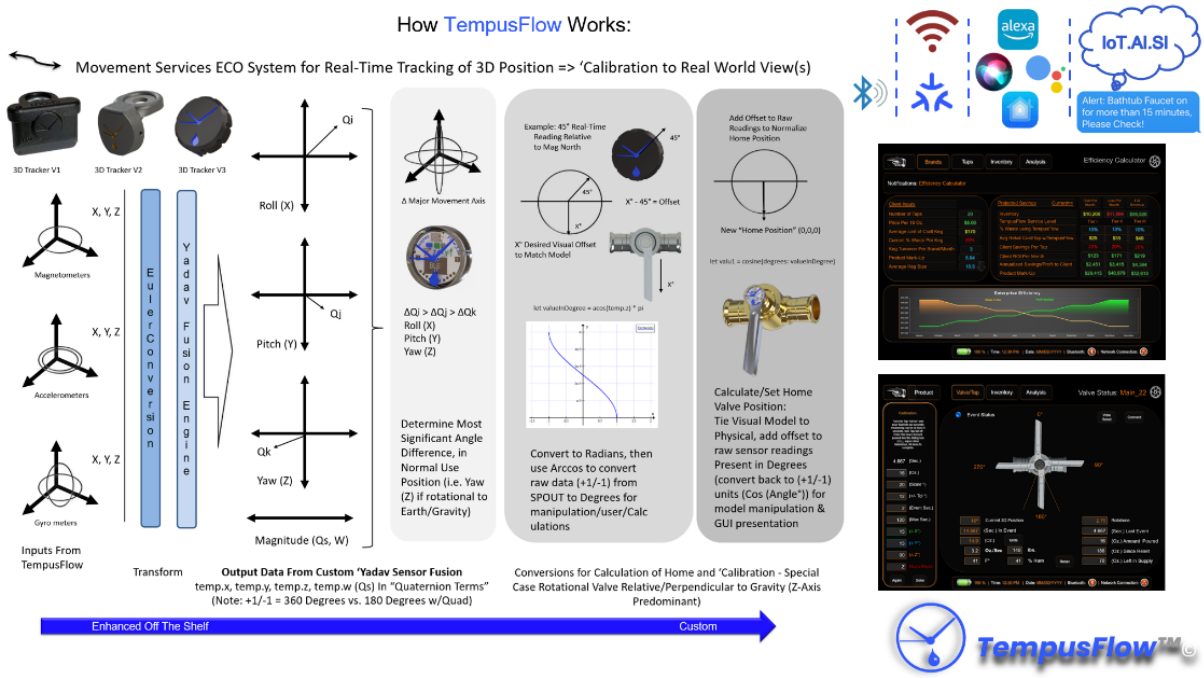


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TempusFlow™ 202 – How does it work?



The current size and thickness of available tracker modules is about 3-4 Quarters stacked, so the shape and sizes are suitable for just about any object/valve or tap set-up. From "Consumer/Home Automation" residential to "Commercial" buildings and campuses or large Oil & Gas "Industrial", simple casework/handle design adapts or covertly embeds the 3D Tracker device to the valve, tap or flush/control handle. Add to this, they are light weight (F=MA) and they are perfect for harsh rugged environments, including temperature extremes (yes, they have Temp and Press sensors onboard, available to the user/app, as part of the decision process) and can also operate typ. between -40 (C°/F°) to ~100° C°). The community of developers and investment in the related technologies (especially BLE and low power radios) has enabled TempusFlow™ to reach a technology maturity level, ready for this initial release and real-world applications starting late 2026/early 2027. The abridged processing pipeline goes something like this; Raw Accel, Gyro, Mag come from the integrated IMU chips onboard and are manipulated in Euler angle terms, then run through

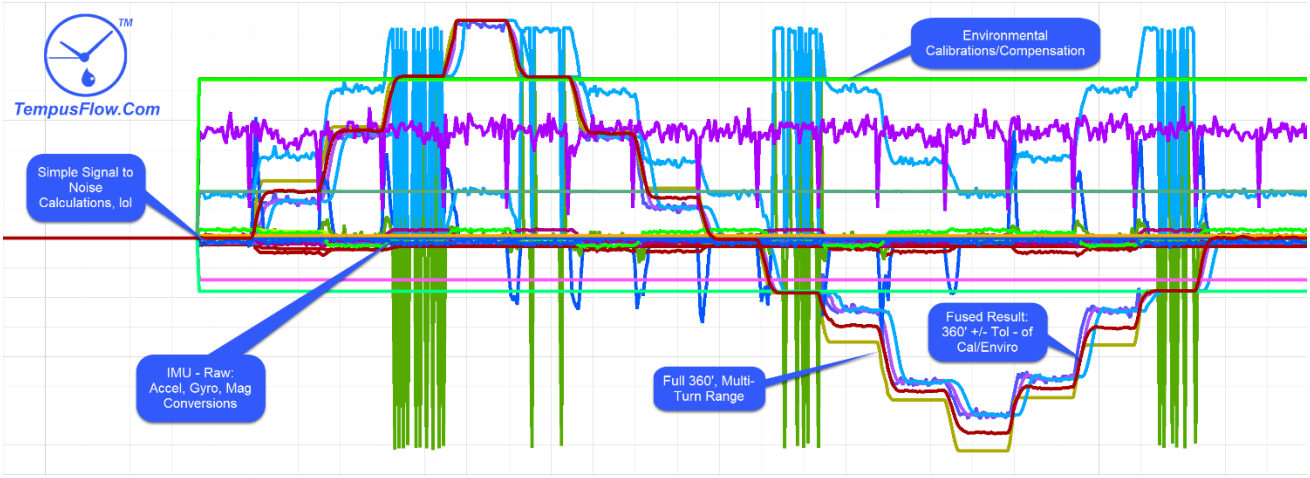






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our custom ‘Yadav Fusion Engine. We found that all of the available/open fusion engines, fundamentally based on a derivative of Sebastian O. H. Madgwick concept (“An efficient orientation filter for inertial and inertial/magnetic sensor arrays”. PhD thesis. University of Bristol, Dec. 2010 and open code contributions), where great and sophisticated. However, that was not a good characteristic/use case for our applications. Most IMU Fusion Engines are receiving x, y, z in real-time and making closed loop corrections, like gyroscopic and propeller direction movements for a UAV stability, or other quick response movement/correction loops. Our problem set was fundamentally different, we have a static object that sometimes moves, in a fixed (but relative 3D) axis orientation to real-world/magnetic positioning **24/7/365*xYears**. This led us to develop our own custom (SAFE- Single Axis Fusion Engine), an embedded and optimized single purpose algorithm for dumb valve/object/handle or prescribed path tracking and status reporting.



The raw/fused sensor data for the most part, at this point is looking like +/-1 imaginary (x, y, z) with a 0 – 1 real component (Quaternion Terms) and Roll, Pitch, Yaw in Euler angle terms. Calibrated for Valve hard/soft environmental conditions and prescribed ‘normal movements, real world heading (does not change unless mobile/w heading of valve known). From here you/we wanted to calculate and use the real-world/environmental calibration factors for the actual valve handle position/event threshold and display message/user information in degrees (3Dimensional scaled/corrected) so we basically convert to Radians & Degrees in 360°/Rotational terms and manipulate in degrees using simple trigonometry on large arrays of sensor data to calculate/update 3D positioning and deliver as simple BLE Characteristics, for further processing/use in higher level systems.

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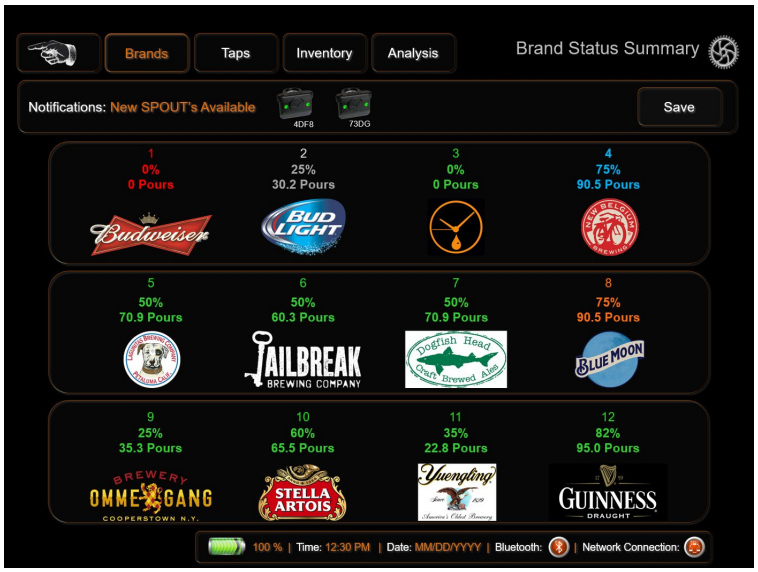
This results in the usable part; a fixed, in real-world 3D space visual data model, that has absolute (pretty excellent) sensor & multi-rotational/position accuracy; plus/minus less than a degree or so (depending on lots of things), in any orientation. It is a device sensor that can resolve an object, handle or tap position (or anything really) relative to its prescribed motion (On/Off/Prescribes Path) and filter out or eliminate other real-world positional changes or anomalies/tampering/scheduled movement/magnetic declination/drift or malicious activity... All the while, it still knows exactly what the handle/object is doing, relative to control of the orifice/opening **(24/7/365*X)** ready to report an “Event” to the next level IoT system.

This scaled and accurate 3D representation is then calibrated to the 3D user data/model views to place it in real-world, relative terms (correlate actual handle/body position (Hardware) to GUI Data Model representation to On/Off/Scale presentation => Flow/Timed Rate). Ready for ‘ValVue Add’ of further computation, reporting and Edge.AI.SI stuff… Of course, from a camera or analysis view, the user can visualize the object in any relative 3D position, or this can be used for viewing the entire valve (including its rotational handle/faucet component) in its real-world 3D position (as if mounted on a mobile or moveable platform (e.g., Ships, Trucks, Portable Generators, Pumps…). Then the real-world motion components, filtered out of the primary purpose; a flow measurement sensor based upon position of the control handle; relative to flow/valve body.

TempusFlow™ 313 – A brief history of real-world application:

When TempusFlow™ was first conceived, we understood the multiple large-scale applications and industries that could benefit from this novel 3D tracker technology. So, as engineers, we decided that Draft Beer Management (30-50 Beers/Kegs on Tap, 7-8 mixed drinks, wine…) and a Beer Tap Handle was the best place to start (we may or may not have been in a bar at the time, I don’t remember;)…!

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Even though we knew the "Industrial Valve" and Home Automation markets were much larger and easier to implement, we chose Beer (did I mention, we are just engineers).

"**Automation Costs:** High valve counts increase infrastructure costs. Farmers often spend **$200–$500 per valve annually** on labor for manual operation and maintenance. Automation via solenoid-controlled valves can reduce this labor but increases initial capital investment" (Gemini.AI.2026). Honestly, to think about the billions of "Dumb Valves" in the world and the applications for the underlying 3D Object Tracking Tech in manufacturing, buildings/infrastructure, industrial, oil/gas, process automation, mobile/remote, military applications, it made my head hurt.



Anyhow, COVID hit, bars closed and in January 2020, so we began pivoting back to the Industrial/Home Automation Valve/Object tracking market.

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The Draft Beer/Wine/Coffee/Mixed… Drink Management project was technically much more challenging than just a valve or handle position in a factory or field environment. A standard Beer tap handle only moves about 15-17°. Additionally, Bars/Restaurants/Hotels/Casino's/Stadiums are an extremely hostile environment at the "Point Of Pour". They work with a limited supply vessel (Keg) and they are distributing an expensive product, priced @ ~$.50/Oz.+ and sometimes operate in scarce supply for popular, craft beers. So, the product quality (Age, Temp, Pressure, Gas Mixtures, Cleanliness…), yield, pour accuracy, waste, abuse, theft, training, employee turnover and fraud all had to be part of the system design. Did you know ~20% of the beer in a fresh keg, never gets processed through the POS (Point of Sale) system. What other distribution of product would accept a 20% loss in 'direct profit, if a solution existed, especially @ ~$.50/Oz? The individual taps themselves can be used hundreds of times a night or not touched for days, weeks or months. Management of which product/beer is on which tap, how much is on hand, how much should be ordered, what beer is most profitable, which is a loss leader, when does the system need to be cleaned/sanitized…made monitoring and process control of this product market a perfect test & development environment.

After years of full-stack/hardware development, full-stack control. We are looking for Early Adopters, Leading Channel Supply Partners/Developers in: Residential, Municipal, Agriculture, Industrial, Manufacturing, Security & Military, Oil/Gas/Chemical Processing, Restaurant/Bars/Hotel Chains, General Plumbing Supply and Early Adopters/Influencers. We are also looking for Tech Partners, Valve Manufacturers, Edge.IoT/Edge.Agent.AI.SI/Machine Learning solution providers, App Developers, Home Automation Integrators/Suppliers, Irrigation/Agricultural Experts, Large General Plumbing Distributors and Private/Accredited Investors/Groups for licensing/franchise/exclusive opportunities. Our Patent/Monopoly is very broad and covers the 3D tracking, flow calculation and wireless communication of any type of 'manually moving dumb valve handle/object. If you are a leader within the valve/liquid/gas/dry-bulk product distribution/or large-scale processing/manufacture/integrated solutions provider, but only work in the machining/casting/injection/mechanical plumbing world, this is a great technology for upgrading/cutting teeth/diversify, any of those existing products to Smart and add great ValVue to your existing product offerings/capabilities/fielded product. Feel free to contact info@TempusFlow.Com for further information/interest, please make a pledge of some level, as it will help in building momentum, thanks…TempusFlow has been self-funded by the founder(s) and this is our first public release of product for sale and/or outside investor invitation.

DESIGNED ENGINEERED ASSEMBLED IN THE USA Making Dumb Objects Smart

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