

Background story

There were the time people looking for retrofit valve controller which can be installed on existing valve without cutting the pipe, their main objective is to shut off their valve by app when they travel, or with a proper smarthome set up, pair with water detectors they can stop the water damage automatically when leaks are detected, so there were solutions but they all have common design, hence they also shared common problems, the major problem is that these valve actuators are mounted by metal “hoop ring hose clamp” on the pipe from one end, such design cannot be mounted secure enough due to it’s nature, and motor also not strong enough to deal with some tough valves, the dilemma is: the more force applied to drive the valve handle will create the same amount of counter force against the hose clamp mounting on the pipe, as a result, over some open and close actions, the counter force can make the clamp drifted, subsequently the pivot of the actuator hand will off from the pivot of the valve caused stuck. So all these me-too devices has no choice but to make a trade-off, the drive shall be strong enough to move the handle but not too strong to loosen the clamp grip.....turned out, these valve were not able to drive tougher valve and still has a lot of problem from loosen clamp and caused malfunctioning sooner or later. We also got a comment from veteran engineer that those cheap \$40 units use SS band clamps which on copper is BAD for galvanic corrosion.

In mid of 2016, The founder of Ubitech Limited, C. K. Sze (aka CK) a HKer designed a new mechanic for real tool free retrofit installation for ball valves, and it tend to solve all the known problems from those me-too units, as it’s has 2 clamp grips on both end of the pipe which can split & balance the counter force and allow real tool-less and super easy to install, with the tricky designed transmission fork, this balance mechanic can adapt to big varieties of ball valves from ½” to 1-¼ ” pipes (38 different valves tested), and can self-align the pivot between actuator and valve by each drive action, suggesting a easy to install and permanently reliable installation can be achieved, such balance and self- aligned mechanic design paved the way for much bigger torque applied to the valve handle without issue.



(3D printed prototype 2016 Dec the final claw design is not yet figured out at that time min)

An US company called Elexa in Chicago bought in this concept and funded a team lead by CK to develop a new product base on concept to stop water damage for US families, over hard working of 18 months the first generation product “Guardian” was launched in 2017 Dec.

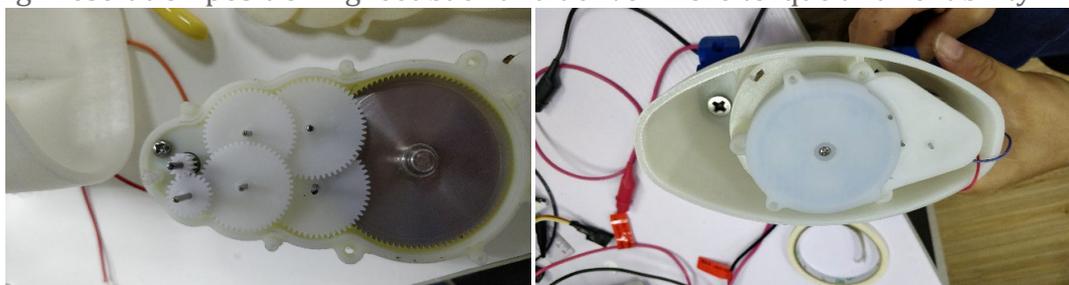
The debut of Guardian received a lot of praise but it turned out not as successful as expected, from hindsight there were numbers of reasons, first of all, the size of the Guardian is way too big and too heavy (due to time to market pressure the Guardian built with an off-the-shelf curtain motor/gear box), hence it can only fit in valves with long straight pipe on both end, however in the real world most valves are installed in a tiny and crowded space with angled pipe (aka elbows), in such case Guardian won’t install. Secondly, due to mechanic limitation (Also because the gearbox) it cannot provide needed feedback on positioning, hence the Guardian has to do “Hit-Stall-Stop” method to identify where it should stop on every open or close action, but every hit-stall action will result destructive impact to the valve, over the time, it’s possible that the integrity of the valve is compromised, Moreover, a big proportion of valves in US families are located outside the house, Guardian and also most of those generic devices are vulnerable to moisture and sunlight, they cannot be used.



(Guardians participated in CES, CEDIA, and received a lot of praise)

CK as the inventor understood all these issues and strived to create a perfect design, in 2019 spring due to some reason CK stopped the relationship of Elexa and started to create the 2nd generation on his own. The patent of the mechanic design was granted in China in the same year and petition for US patent is initiated after the subsidy was granted from HK government in 2020.

This time CK has redesigned every part including a custom gearbox with a special shape and structure to utilize all available space inside the housing to minimize the form factor of the device, this custom designed gearbox can provide high resolution positioning feedback and deliver more torque and reliability.



After 30 plus design revisions the final version was chosen in 2019 May, which can submerge in water and withstand sunlight and UV, can provide much bigger torque (max. 13N.m but limited by software to 8N.m to avoid destruction to valve and BVS itself, for a comparison Guardian is doing fixed 4 N.m, Dome is fixed 3.5N.m) with a “adaptive torque control software algorithm this new breed

will not impact the integrity of the valve over the time even up to 8N.m torque is applied, tricks included “soft start” and “soft stop” speed control, it also can deal with valves with close elbows (with a shorter span of clamps and they can be slide individually in and out on demand to fit with different valve size and pipe elbow)



(gen 1 (right) and gen 2 (left))

This new breed is named BVS (Ball Valve Servo) under a trademark of “Custos”, and it deemed satisfies all the criteria as a “ultimate DIY” solution.

- Tool less snap-on install, can be installed in a matter of seconds
- Can be deployed outdoor, 100% water proof and UV proof
- Intelligently deliver up to 8N.m torque on demand, more than double of any rivals
- Intelligently identify where to stop to avoid impacting the structure of valve.
- Compatible to popular IoT RF standards – Z-Wave and LoRaWAN, also plug-n-play Ubilink for people who don’t want to deal with gateway or App set up.
- Can detect water and temperature locally and react.
- Highly reliable mechanic, proven for 20K operation

BVS has 3 different models for different RF communication standards.

1. **Z-Wave**, it's the latest Z-Wave member in Z-Wave eco-system with all the latest techs, Z-Wave is the biggest smarthome eco-system used by many tier-1 brands and operators, such as Ring, Alarm.com, AT&T, ADT (aka Pulse), Nexia, Smartthings etc. for home owners if they have Z- Wave system installed, the Z-Wave BVS (Model BVSZWU for US/CA market, BVSZWE for EU market) is the "snap on" solution.

2. **LoRaWAN**, it's a newer long range communication technology mainly used by industrial applications on metropolitan scale, to name a few, Comcast is one of the key network operator base on LoRaWAN, and IoT- in-a-Box is also a end-to-end solution provider base on LoRaWAN technology, Custos models BVSLWU (for US/CA) and BVSLWE (for EU) are compatible with these platforms.

3. **Ubilink**, it's a proprietary implementation of LoRaWAN technology specifically aimed to family scoped application, Ubilink support simple set up without any gateway or controllers, but can scale up to gateway centric deployment to expand the capability to cover full-blown smarthome application.

About Ubitech Ltd.

HQ based in Hong Kong, Ubitech is an international team of hardware engineers, software developers, product designers and marketers. We were challenged by the big need for effective leak DAMAGE prevention solutions on one hand but super low installation numbers in real-world houses and homes on the other hand.

We identified several reasons for this gap: First and foremost, this is the need to hire a professional plumber and cutting pipes. Hence, our common goal is to provide the best water leak damage protection possible but all with super-easy installation. The insider language for this is 'non-intrusive' and 'non-invasive'.

For further information please visit Ubitech website, <http://ubitech.hk>