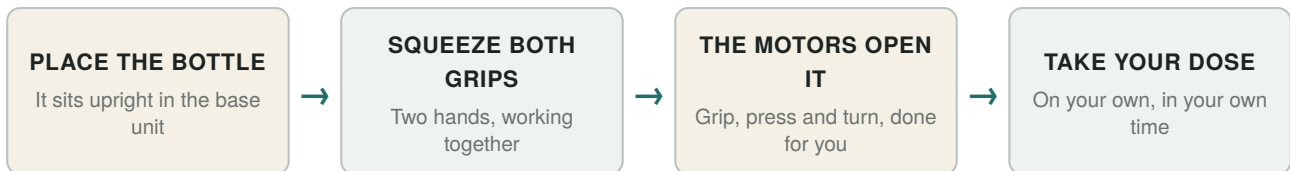


SWAYAM

OPEN IT YOURSELF, AGAIN

A child-resistant, motorised opener for pharmaceutical bottles, built for hands that can no longer manage the press-and-turn — keeping the bottle child-safe while giving the user back their independence

By your own hand



No grip strength required; the cap stays child-resistant; nothing electronic.

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Executive summary

Child-resistant closures are, by design, hard to open. The standard press-and-turn cap demands that a person push down firmly while twisting at the same time, a combination chosen precisely because it defeats a small child. It also defeats a great many adults. For people living with arthritis, with reduced grip strength, with tremor, or with the after-effects of a stroke, the cap that guards the medicine becomes a daily barrier to the medicine itself.

The responses available today each fall short. Passive jar openers and grip aids still require the user to supply the force, so they do not help a person whose strength is genuinely insufficient. Automated openers exist but abandon child resistance, turning a safety device into an open jar. Electronic smart caps add monitoring and locking but depend on chips, batteries and apps, must be fitted to a particular container, and still do not solve the opening of an ordinary bottle.

Swayam — Sanskrit for “by oneself” — takes a different approach. It is a two-part, motorised opener that does the gripping, pressing and turning on the user’s behalf, so that almost no hand strength is needed, while keeping the bottle fully child-resistant through a different route: it will only operate when two hands work two grips together, in a coordinated action a young child cannot perform. It is built entirely from mechanical and electrical parts, with no electronics, no software and no battery beyond a single cell, and it works with the pharmaceutical bottles a person already has. This paper sets out the problem, the design of the device, the people it serves, and how it differs from what exists today. The methods described here are the subject of a patent application filed by the inventor, Srinivas Kasturi.

1. The problem

A cap designed to defeat. The press-and-turn closure is deliberately difficult. It requires sustained downward force and simultaneous rotation, a coordinated two-action movement that protects children by being hard. The difficulty is the safety feature; it cannot simply be removed without removing the protection.

The dexterity gap. A large share of the people who most depend on regular medication are precisely those least able to perform that movement. Arthritis stiffens and weakens the hands; tremor disrupts the steady twist; a stroke may leave one side unusable. For them the cap is not merely awkward but, on a bad day, impossible.

Dangerous workarounds. When the cap cannot be opened, people improvise. They ask the pharmacist to fit a non-child-resistant lid, they decant pills into unguarded pots, or they leave caps loose. Each of these defeats the very protection the closure exists to provide, in homes that may be visited by grandchildren.

The cost to dignity. Where a person cannot open their own medicine, someone else must. A daily, intimate act of self-care becomes a request for help. The loss is not only practical but personal: independence quietly erodes, one bottle at a time.

The gap in existing aids. Passive openers amplify force but still demand it. Automated openers remove the effort but also remove child resistance. Smart caps add electronics and adherence tracking but neither open an ordinary bottle nor restore strength. No existing device opens the bottle for the user *and* keeps it child-resistant *and* works with the containers people already have.

Across all of these the pattern is the same. **The safety of the cap and the ability of the user are set against each other, and today a person must usually sacrifice one to have the other.**

2. The solution

Swayam resolves the conflict between safety and ability. The motors supply the effort, so strength is no longer required; a two-handed control keeps the bottle child-resistant; and the whole device is mechanical, repairable and works with existing bottles.

2.1 Motorised, so no strength is needed

Two small electric motors do the physical work. One grips the body of the bottle in the base; the other grips the neck and the cap and performs the press-and-turn that opens the closure. The user supplies direction and consent, not force.

2.2 Two-handed, so it stays child-resistant

The device only runs when both of its grips are squeezed together, in the same direction, at the same time. This bilateral action, requiring two hands, a span between them, and the coordination to move both the same way, is the new child-resistance mechanism. It replaces the strength-based barrier of the cap with a coordination-based barrier that a young child cannot satisfy, while an adult of limited strength easily can.

2.3 A grip that is the switch

Each grip is itself the control. The whole handle rocks gently: press its upper part to open, its lower part to close, and release it to stop. A spring returns it to a neutral centre, so the device is only ever live while it is being actively and deliberately held. There is no small button or switch to find, which suits stiff or unsteady hands.

2.4 Works with the bottles you already have

Swayam grips and opens standard pharmaceutical bottles as they are. Nothing has to be decanted, and no special cap has to be fitted. The medicine stays in its proper, labelled, child-resistant container.

2.5 No electronics

There is no microchip, no circuit board, no software and no wireless connection. The control logic is achieved with ordinary switches wired in series, in the manner of a stair light operated from two ends, and the mechanism is driven by motors, gears and cams. The result is reliable, repairable, private and long-lived, with nothing to update or obsolete.

2.6 Stores itself

When not in use, the upper unit inverts and docks onto the base, held by magnets, so the two halves form a single tidy object on the counter. In this stored position the cap-gripping jaws face upward and can cradle the bottle, so the device becomes a small, self-contained medication station rather than two loose parts to be mislaid.

3. Under the hood

3.1 The base unit: holding the bottle

The base sits on a table and receives the bottle in a central well. A single motor drives, through a self-locking worm gear and a friction slip clutch, a scroll disc of the kind found in a machinist's chuck. Four jaws ride on the spiral of that disc and close together on the body of the bottle, in the manner of a camera's iris. Because the worm gear cannot be back-driven, the jaws hold their grip with the motor switched off, and the slip clutch ensures the bottle is gripped firmly but never crushed.

3.2 The top unit: gripping and opening the cap

The handheld upper unit is brought down over the cap. A single motor turns a master cam shaft carrying three cam features along its length, which act in sequence as the shaft rotates. First, a neck wrench closes on the bottle neck, forming a local frame against which force can be applied. Second, four jaws close on the cap. Third, the cap is pressed down and turned at the same time, exactly the motion a child-resistant closure requires, until it unscrews. Reversing the grip runs the sequence backwards, re-closing the bottle and releasing it. One motor performs grip, press and turn, sequenced entirely by the shape of the cams.

One motor, three actions in sequence

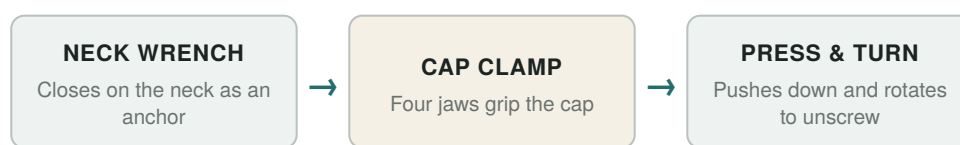


Figure 1. A cam shaft in the top unit sequences the three actions from a single rotation.

3.3 The bilateral safety circuit

The two motors are wired in series through the switches built into both grips, so that current can only flow when both grips are held in matching positions. The arrangement is the same in principle as a hallway light switched from two ends, with the difference that both switches must agree before anything moves, and the direction of the squeeze sets the direction of the motors. With either grip released to its centre position, nothing can run. This is what keeps the bottle child-resistant, achieved with no electronics at all.

3.4 Protecting the bottle and the hand

Several independent, purely mechanical safeguards prevent the device from applying harmful force. A friction slip clutch on each motor caps the torque, so the grip is firm but cannot crush. A force-sensing pivot in the jaws cuts the motor once a target grip is reached. A self-resetting fuse protects against a long stall. No single failure can let the device over-tighten or over-twist.

3.5 The storage configuration

The top unit inverts and docks to the base on magnets. In use, its grip points down to meet the user's hand; once inverted for storage, that grip points up, parallel to the base unit's grip, and the cap jaws, now uppermost, can hold a bottle by its cap. The two parts become one stable object that keeps the medication, the opener and the user's next dose together in one place.

4. Who it serves

Swayam is for the people for whom the cap, not the medicine, is the obstacle, and for those who care for them.



Figure 2. The device restores independence to the user and removes unsafe workarounds for everyone around them.

4.1 In the home

For an older person living independently, or with grandchildren visiting, Swayam means medicine that is both reachable and safe. The person opens their own bottles, on their own schedule, without having to choose between an impossible cap and an unguarded pot.

4.2 In care settings

In a care home or with a visiting carer, the device reduces the number of small, repeated tasks that depend on another person, while keeping every bottle in its proper child-resistant state. Independence for the resident and a safer environment for the household go together rather than in tension.

5. In practice

The user. Lakshmi has had rheumatoid arthritis for years and can no longer manage a press-and-turn cap. She rests her elbows on the kitchen table, takes a grip in each hand, and squeezes. The motors grip the bottle, take the cap, and unscrew it. She takes her tablet and squeezes the other way to close it. She has not asked anyone for help.

The family. Her son had been driving over each morning to open the day's bottles. Now the bottles stay child-resistant for when the grandchildren visit, and his mother opens them herself. The daily phone call is about how she is, not about the medicine.

The carer. A visiting carer who once spent part of each visit opening containers now spends it on care. Every bottle in the house remains properly closed between visits, with no loose lids or decanted pills to worry about.

The pharmacist. Asked, as so often, to fit an easy-open lid that removes child resistance, the pharmacist can instead point to a device that keeps the safe cap and still lets the patient open it. Safety and independence stop being a trade-off.

6. Design principles

- **Independence first:** the purpose is not merely to open a bottle but to let a person open their own, themselves.
- **Safe by coordination, not by strength:** child resistance is preserved through a two-handed bilateral action, so it no longer depends on the user being strong.

- **All mechanical, no electronics:** motors, gears, cams and plain switches, with nothing to program, update, connect or obsolete.
- **Works with what you have:** standard pharmaceutical bottles are opened as they are, with no decanting and no special caps.
- **Honest about the landscape:** jar openers, automated openers and smart caps already exist. The contribution here is the specific combination of motorised opening, retained child resistance, all-mechanical control and compatibility with existing bottles.

7. How this differs

The table below sets common approaches today against the design described here. It aims to be fair rather than complete, and the features of other products vary.

Dimension	Common approaches today	Swayam
Effort required	Passive aids still need the user's force	Motorised; almost no hand strength needed
Child resistance	Lost once an automated opener is used	Preserved by a two-handed bilateral action
Electronics	Smart caps need chips, batteries and apps	None; purely mechanical and electrical
The container	Smart caps replace the cap or the bottle	Works with the bottles you already have
Over-force	Often unguarded; can crush or strip	Slip clutches and force sensing, several independent safeguards
Controls	Small buttons or switches	The whole grip is the control; spring-returned to off

8. Intellectual property

The methods described in this paper, namely a two-part motorised opener that grips the bottle in a base unit and grips and opens the cap in a tethered top unit, a single-motor cam-sequenced grip-press-and-turn mechanism, a bilateral two-handed control that preserves child resistance without electronics, and several independent mechanical safeguards against over-force, are the subject of a patent application filed by Srinivas Kasturi with the United Kingdom Intellectual Property Office. This paper describes the device at the level needed to understand it; it does not grant any licence.

9. Roadmap

Phase 1, the core device. A single, well-made opener for standard pharmaceutical bottles, with the base and top units, the bilateral control, the mechanical safeguards and the docking storage.

Phase 2, range. Adjustment for a wider span of bottle and cap sizes, including supplement pots and larger containers, and finishes suited to home and care settings.

Phase 3, reach. Variants for related closures such as household and food containers, options for one-sided use after stroke, and refinements informed by occupational-therapy practice.

Dates and scope are indicative and will be confirmed as the project develops.

10. Conclusion

A child-resistant cap should keep children safe without shutting out the person it is meant to serve. Swayam holds both at once: it does the gripping, pressing and turning so that strength is no longer the price of access, and it keeps the bottle child-resistant by asking for two coordinated hands instead. Built from plain mechanical parts, working with the bottles people already own, it sets out to put the medicine back in the user's own hands — to let them, once again, do it themselves.

Appendix A: Glossary

Child-resistant closure (CRC).

A cap designed to be difficult for young children to open, typically by requiring a simultaneous press and turn.

Bilateral control.

An arrangement requiring two hands to act together before the device will operate, here providing child resistance.

Scroll disc.

A disc with a spiral groove that drives several jaws inward or outward together, as in a machinist's chuck.

Slip clutch.

A coupling that transmits force only up to a set limit and then slips, preventing over-force.

Worm gear.

A gear pair that cannot be driven backwards, so it holds its position when the motor is off.

Cam shaft.

A shaft with shaped lobes that convert a single rotation into a timed sequence of movements.

Appendix B: Important notices

This document is for information only and describes intended design and direction. It is not medical advice, nor an offer or solicitation to buy or sell any product or instrument, nor a promise of future features, availability or returns, nor legal, financial or investment advice. Any device of this kind would be subject to applicable safety and regulatory requirements before sale. Statements about future plans are forward-looking and may change. Trademarks and product names of third parties belong to their respective owners and appear here only for comparison. The methods described are the subject of a pending patent application, and nothing here grants any licence.