TIME-TURNER

CASE STUDY

ALARM CLOCK FOR THE VISUALLY IMPAIRED

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The Problem & The Opportunity

2.2 billion people worldwide live with some form of visual impairment, out of which 43 million are completely blind.

For them, setting an alarm clock is not simple.
It should be.

Existing solutions are inadequate. These solutions force users to either depend on someone else, spend a lot of money, or rely on technology that regularly lets them down.

Existing Solution	What Works	Why It Fails
Talking / Voice Alarm Clock	Low cost, no screen needed, speaks time aloud	Fails with accents, speech impediments, and noisy environments. Voice recognition is unreliable for a task this critical.
Braille Watch	Purely tactile, no sight or voice needed, elegant to use	It costs $200+, making it inaccessible to most.
Smartphone + Siri / TalkBack	Already owned by most users, highly capable	Battery dependent — often dead or charging across the room at night. Voice input still unreliable in the same ways as above.

Every current solution asks the user to compromise.
Time-Turner does not.

Who Are We Designing For?

Meet Riya,

Riya, 38
Former nurse · Lost sight in accident · Lives in Bangalore

Riya is 38 years old. She worked as a nurse for twelve years before losing her sight in a car accident three years ago. She lives with her wife, Maya, who has full vision.

After the accident, Riya was determined to rebuild her independence at home. She learned Braille within eight months, though not perfectly. She manages most of her daily tasks on her own, cooking, navigating their apartment, and managing her calendar with a screen reader.

But every morning, Maya sets Riya's alarm. Not because Riya cannot wake up on her own, but because every solution they tried had failed her in some way. Siri mishears her in their bedroom because of Riya's accent. Her talking clock woke Maya at 2 AM when Riya accidentally triggered it. A Braille watch they bought for $240 could tell her the time, but could not set an alarm at all.

Riya does not want a workaround. She wants a clock.

Who Time-Turner Works For

BLIND — BRAILLE LITERATE
Can independently set an alarm, check the time, and manage all controls without any help. This is the primary user Time-Turner was designed for.

BLIND —NO BRAILLE
Can still use Time-Turner fully independently. There is a short familiarization period at the start, learning where each control is by touch. Once learned, no outside help is needed at any point.

SIGHTED USER OR CAREGIVER
No learning curve. Works like any standard alarm clock.

MIXED HOUSEHOLD
Both people use the same device comfortably, in their own way. No separate devices, no compromises for either person. This is the most common real-world scenario Time-Turner is built for.

Time-Turner was designed for Riya. It works for everyone.

What Can Time-Turner Do?

Here is what Time-Turner does

TELLS YOU THE TIME

Press one button and the device speaks the current time aloud immediately.

An LED display shows the current time at a glance.

SET AN ALARM BY TOUCH

Move two physical dials to the desired hour and minute, flip the AM/PM switch. No sight required at any step. No help from anyone required at any step.

Same dials and switch work identically.

STOP OR SNOOZE

When the alarm rings, one button stops it and another snoozes it for 5 minutes. Both buttons are physically distinct and labelled in Braille so any user can find them without looking.

Same buttons, also labelled in printed text.

RESET THE CLOCK TIME

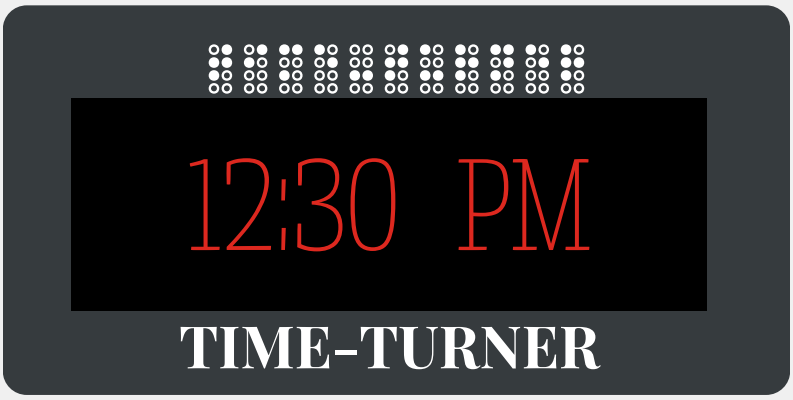
Set the dials to the correct time, hold stop and snooze together for 10 seconds. The device updates and confirms the new time aloud. No visual required at any point.

Same process, with the LED confirming the updated time visually.

TIME-TURNER: ALARM CLOCK FOR THE VISUALLY IMPAIRED

Device: Front, Bottom, Top and Side

FRONT VIEW



LED DISPLAY

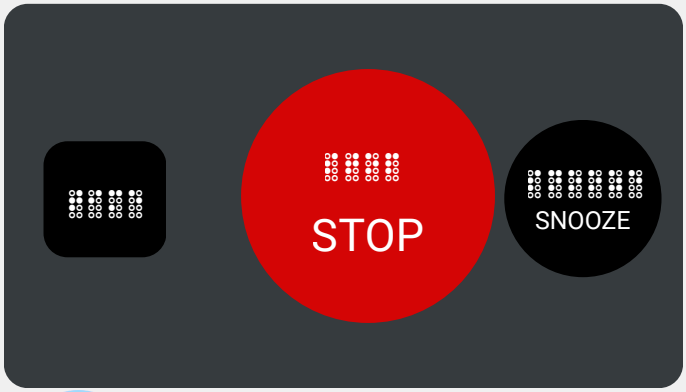
SHOWS CURRENT TIME FOR SIGHTED USERS. ALWAYS ON. NO INTERACTION NEEDED.

BOTTOM VIEW

RUBBER PADS

KEEPS THE DEVICE FIRMLY IN PLACE WHEN BUTTONS ARE PRESSED OR DIALS ARE ADJUSTED.

TOP VIEW



SPEAK TIME(LEFT)

PRESS ONCE TO HEAR THE CURRENT TIME ALOUD.

STOP (CENTRE)

PRESS WHEN ALARM IS RINGING TO STOP IT COMPLETELY.

LEFT VIEW

ALARM SWITCH

PHYSICAL TOGGLE SWITCH. FLIP UP TO ARM THE ALARM, DOWN TO DISARM. THE CURRENT STATE IS ALWAYS READABLE BY TOUCH.

SNOOZE (RIGHT)

PRESS WHEN ALARM IS RINGING TO SNOOZE FOR 5 MINUTES.

THOUGHTFUL DETAILS

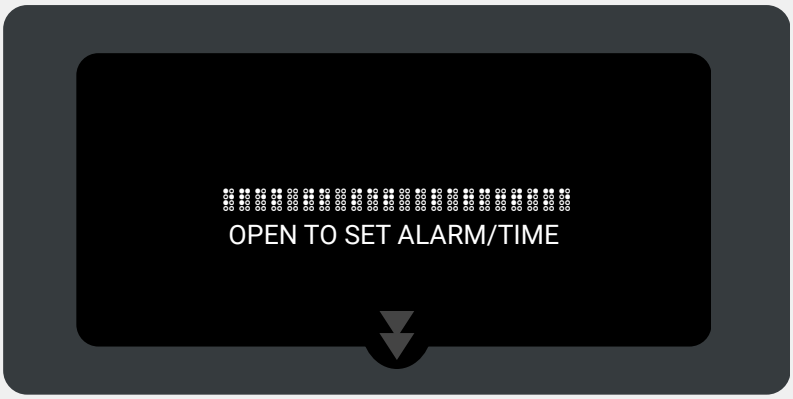
RESET CURRENT TIME HOLD STOP AND SNOOZE FOR 10 SECONDS. CURRENT TIME UPDATES TO WHATEVER THE BACK DIALS ARE SET TO.

DELIBERATELY ASYMMETRIC BUTTONS DIFFERENT SIZES AND SHAPES BY DESIGN. EACH BUTTON IS IDENTIFIABLE BY TOUCH ALONE, EVEN HALF-ASLEEP IN THE DARK.

TIME-TURNER: ALARM CLOCK FOR THE VISUALLY IMPAIRED

Device: Back

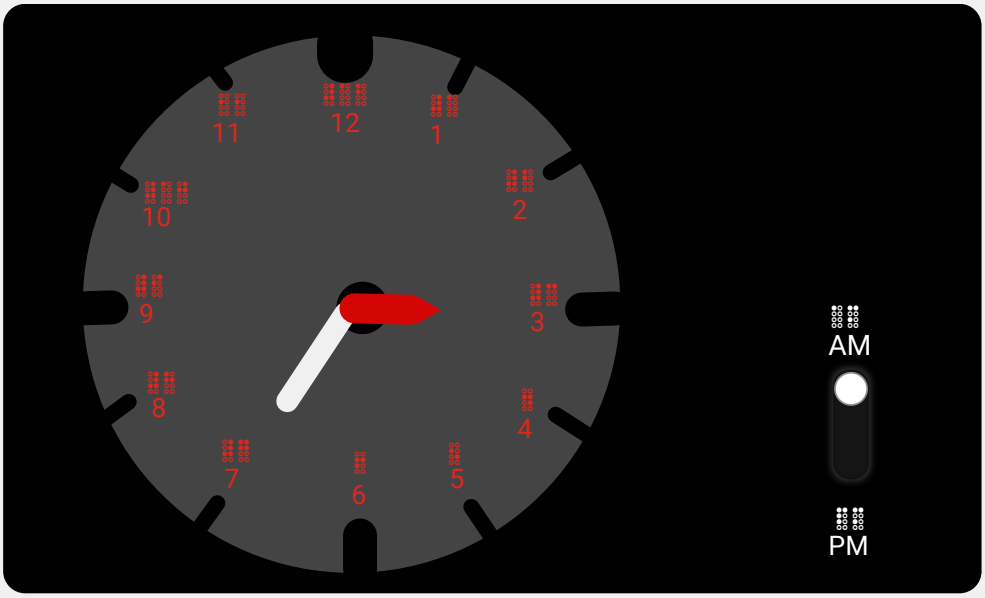
BACK VIEW (LID CLOSED)



SLIDING PROTECTIVE LID

PUSH DOWN TO OPEN, PUSH UP TO CLOSE. REQUIRES DELIBERATE FORCE AND WILL NOT OPEN FROM ACCIDENTAL CONTACT. PROTECTS THE DIAL MECHANISM FROM SHIFTING DURING SLEEP OR TRANSPORT.

BACK VIEW (LID OPEN)



AM/PM SWITCH

SMALL TOGGLE SWITCH INSIDE THE LID. DETERMINES WHEN THE ALARM FIRES. LABELLED IN BOTH BRAILLE AND PRINTED TEXT.

TACTILE MARKERS

EVERY HOUR HAS A RAISED RIDGE. 12, 3, 6 AND 9 PROTRUDE MOST. INSTANT REFERENCE POINTS, NO BRAILLE REQUIRED.

HOUR AND MINUTE NEEDLES

MOVE THE SHORT RED NEEDLE TO THE HOUR AND THE LONG WHITE NEEDLE TO THE MINUTE TO SET THE ALARM TIME.

HOLD STOP AND SNOOZE TOGETHER FOR 10 SECONDS TO USE THE CURRENT NEEDLE POSITIONS AS THE ACTUAL CLOCK TIME INSTEAD.

THOUGHTFUL DETAILS

UNLIKE A REAL CLOCK, THE HOUR NEEDLE DOES NOT NEED TO SIT BETWEEN TWO HOURS, SET IT EXACTLY ON THE HOUR.

BOTH NEEDLES CLICK AND HOLD AT EACH MARK, MOVING SMOOTHLY IN BETWEEN.

USABLE WITHOUT BRAILLE RECTANGULAR DIAL WITH ANALOG INPUT ON LEFT & AM/PM TOGGLE ON RIGHT, WITH THE 12 MARKER BEING THE THICKEST RIDGE, SO THE USER ALWAYS KNOWS THE ORIENTATION. RED NEEDLE IS SHORT AND POINTED, WHITE IS LONG AND ROUNDED, DISTINCT BY TOUCH. ONCE FAMILIAR, FULLY OPERABLE WITHOUT BRAILLE.

Why These Decisions?

Every design choice involved a trade-off. Here is what was decided, why.

DECISION	REASONING
Dials as input instead of buttons	A dial lets the user feel where they left off. A number pad gives no positional feedback and is unreadable without knowing numbers or Braille.
Toggle switch for alarm ON/OFF	Physical state is always readable by touch. A button leaves the state invisible.
No voice input	Voice fails with accents, speech impediments, and shared bedrooms. Too unreliable.
Physical device instead of a smartphone app	A phone requires unlocking, navigating, and using a touchscreen in the dark. A dedicated device is always on, always in the same place.
Deliberately asymmetric buttons	Different sizes and shapes mean each button is identifiable by touch alone, even half asleep.
Stepped resistance on needles	Clicks into each mark so the user knows they are exactly where they intended. Free-moving needles give no such confidence.
Dual audience design	An LED display costs almost nothing to add. Sighted caregivers can use the device naturally without changing anything for blind users.

No decision was made for aesthetics. Every single one was made for the user.

How Riya Uses Time-Turner?

Alarm function in use:

1. Alarm goes off Riya's 6:30 AM alarm goes off. She reaches over, feels three buttons on top of the device, identifies the large circle in the middle by touch, and presses it. The alarm stops.

2. New Alarm Maya mentioned last night they have a doctor's appointment. Riya needs to set an alarm for 8:45 AM before she falls back asleep.

3. Arm the Alarm She runs her thumb along the left side of the device, finds the toggle switch, and checks its position. It is already flipped up from last night. The alarm is armed.

4. Open the Back She flips the device over, feels the label on the lid, and slides it downward. The dial mechanism is now exposed.

5. Find North She places her fingers on the dial face. She feels multiple ridges around the edge and searches for the thickest one. She finds the 12 marker immediately. It is noticeably taller than all others. She is oriented.

6. Set the Hour Starting from 12, she counts the ridges clockwise. One, two, three, four, five, six, seven, eight. She moves the short red needle to the 8 marker. It clicks firmly into place.

7. Set the Minute She moves the long white needle. 45 minutes is three quarters of the way around the dial. She moves it toward the 9 position, feeling it click at each minute mark as she passes. It locks at 9.

8. Check AM/PM She feels for the small toggle on the right side of the dial. It is already set to AM. She leaves it as is.

9. Close and Done She slides the lid back up until it clicks shut. She sets the device back on the bedside table. Alarm is set for 8:45 AM.

The whole process took under 30 seconds. No phone. No internet.
No help from anyone.

Reset time function in use:

1. Notices Drift Maya glances at the LED display. The clock is 6 minutes behind.

2. Open Lid She slides the back lid down and reads the printed numbers on the dial face.

3. Sets Time She moves the needles to the correct current time.

4. Confirms She holds Stop and Snooze together for 10 seconds. The device says the new time aloud.

5. Done She slides the lid shut. Clock is accurate again.

Sighted or blind. The process is the same.

What Could Go Wrong?

Known risks going into the first prototype.

RISKS	WHAT WE KNOW
Dial mechanism is new hardware	Dials as input do not exist in consumer clocks. No off the shelf component available. Custom manufacturing adds cost and development time.
Protrusions increase manufacturing complexity	Raised tactile markers require precision moulding. More expensive than a flat face. The right protrusion height needs testing to confirm usability.
Stepped needle resistance is untested at scale	The click mechanism needs to hold reliably after months of daily use. Durability is unknown until prototype testing.
Non-Braille users may struggle initially	The tactile system works in theory. Whether real users pick it up fast enough is unknown until tested with actual blind users.
Speaker volume may not suit all environments	Fixed volume is a known limitation in V1. Whether it works for all users depends on pilot feedback. Adjustable volume is a consideration for V2.
Clock drift without wifi sync	Manual reset process exists but adds friction. How often drift occurs in practice is unknown until field testing.
Manufacturing cost may make D2C pricing unviable	A device this specialised costs more to produce than a standard alarm clock. B2B pricing may be the only viable model initially.

How We Get This to Market?

Roadmap

Step 1: Validate the Hardware Confirm with engineers that the dial mechanism is buildable and get a rough unit cost estimate. Explore modifying an existing digital clock rather than building from scratch. The speaker, display, and internals already exist. The dial mechanism and tactile face are the only new components.

Step 2: Talk to Buyers Early Go directly to hospitals, care homes, and blindness associations before building anything. Share the concept and the estimated cost from Step 1. Ask two things: does this solve a real problem, and would you buy it at this price. Their answer determines whether the business model is viable before a single unit is manufactured.

Step 3: Find Funding First Many governments subsidise assistive devices. Research accessibility programs in the target market before spending on manufacturing. NGOs may co-fund pilots in exchange for being early partners.

Step 4: Small Batch Pilot Produce a small number of units at a loss through a contract manufacturer. Get them into partner organizations. Collect real feedback and iterate before committing to larger production.

Step 5: B2B Launch Approach hospitals and care facilities as paying customers. One hospital order covers hundreds of units. Expand geographically across cities, states, and countries before attempting direct to consumer.

Step 6: B2C Later Direct to consumer is harder and more price sensitive. Open this channel only once B2B volume brings manufacturing cost down. Government subsidy schemes in different countries can make individual purchases viable.

What I Learned?

Here is what building it taught me.

Learning 1: Designing for constraints makes better products. Removing sight as an assumption forced every decision to be deliberate. The result works better for a sighted person reaching for an alarm half asleep than most standard clocks do. Constraints are not limitations. They are the brief.

Learning 2: The best insight came from inverting an assumption. Everyone assumes clock hands show time. The design unlocked the moment I asked what if they were an input instead. Good product thinking is often just asking a question nobody bothered to ask.

Learning 3: Voice is not universally accessible. My instinct was to reach for voice as the natural accessible interface. This project challenged that. Voice fails accents, speech impediments, and shared spaces. The most accessible interface is often the most physical one.

Learning 4: Technical depth is an asset only if you know when to use it. The instinct throughout was to go deep on internals. None of that belongs here. The technical background helps know what is feasible. The PM job is translating feasibility into user outcomes.

This is not a finished product, yet.
It is an attempt at thinking like a product manager.

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