



# Noiseless, Portable and Fully Microcontroller Based Automatic Shirodhara Panchkarma Machine

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**ABSTRACT:** Shirodhara is a classic Ayurvedic treatment, thousands of years old, in which warm oil is poured in a continuous stream across the forehead. A vessel, suspended above the client's head, is used to pour the liquid in a pattern across the forehead and onto the scalp. Shirodhara boasts many wonderful therapeutic benefits, including enhanced blood circulation to the brain, improved memory, nourished hair and scalp, sounder sleep, and a calmer body and mind. Shirodhara is one of the most effective treatments for reducing stress and nervous tension. The liquids used in shirodhara depend on what is being treated, but can include oil, milk, buttermilk, coconut water, or even plain water. Shirodhara has been used in efforts to treat a variety of conditions including sinusitis, allergies, scalp conditions, neurological disorders, memory loss, insomnia, hearing impairment, and certain types of skin conditions like psoriasis. It is embraced for the use in spas as a non-medicinal means to promote deep relaxation.[1][2]

**KEYWORDS:** Human health; Ayurveda; Temperature Sensor; ADC; AVR Atmega 16; Shirodhara; Panchkarma

## I. INTRODUCTION

In this swift moving world, the life style has changed a lot. As a coin has two sides, the modern life style also has both brighter and darker side. Modern life style has come across with new technologies and also broadens the horizon of one's knowledge. The brighter side of modern life style is mainly the development of a country. The development of technology makes it easier for people to communicate, to travel, to work and so on. While entering into the darker side, due to modern life style, the culture and tradition is fading off. The traditional food, clothes etc are slipping off from our minds. Now people are depending on fast food which makes their health in peril and debilitating. Technology also has reduced the interaction with family members. Another problem is the environmental damages like air pollution, water pollution and noise pollution. [3]

## II. RELATED WORK

It is obvious that the main purpose of education should be character-development, mental equilibrium and peace of mind. Alas, this purpose has been entirely ignored by the educationists. Today stress conditions are becoming serious issue. Stress is a natural body reaction. When something in the environment threatens a person, the body feels stress which is a way of preparing it to fight or to flee at a moment's notice. That reaction of the body was developed by our ancestors, but unfortunately in today's modern world it can also cause problems. In a developed setting where there are few physical dangers, emotional triggers are what often cause stress and there are so many of those emotional triggers. If the body constantly feels stress then that is not good. Ayurveda views health and disease in holistic terms, taking into consideration the inherent relationship between individual and cosmic spirit, individual and cosmic consciousness, energy and matter. According to the teachings of Ayurveda, every human being has four biological and spiritual

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instincts: religious, financial, pro-creative and the instinct toward freedom. Balanced good health is the foundation for the fulfilment of these instincts.

Shirodhara is a form of Ayurveda medicine that involves gently pouring liquids over the forehead. Patient/client is advised to sit on the massage table and the medicated herbal oil is poured through hair. Whole body is massaged with warm oil. Then the client is advised to lie down on the massage table in supine position (face upwards). Oil is released from the 'Dharapatra' (pot/bowl) onto the forehead. Distance between the pot and the forehead should be about 6 inches. In this treatment two persons are required, one for move the dhara pot on the forehead and other is to take the warm oil & fill in the dhara pot when oil level goes down in dhara pot.[1]

Types of Shirodhara:



- Taildhara → Use of oil (tail)
- Ksheeradhara → Use of milk.
- Takradhara → Use of buttermilk
- Jaladhara → Use of water

Traditional methodology is as follows:

- First fluid is selected according to subject's condition. Mostly oil is used. Scalp massage is given, which is followed by full body massage. As the subject lie down on massage table, the height of the Shirodhara pot is adjusted on the forehead just four fingers above the forehead. [The Shirodhara pot is earthen or stainless steel or copper one.

- Oil is warmed up to desirable temperature and poured in to the pot.

- Then therapist holds the pot keep it moving in pendulum direction.

- As the oil level in the pot gets reduced, the flow also gets reduced.

- The temperature of oil goes down or it becomes cold.

- The stream flow rhythm changes become small and slow.

- Therapist remains all the time engaged inoscillatory movements of the pot.

Fig. 1 – Traditional Shirodhara treatment

- The oil from massage table is recollected and reheated or directly added to the Shirodhara pot but due to sudden addition of the oil changes the flow again.

- It becomes more rapid and thicker and as the level of oil goes down again the speed and flow slows down in this way the therapy goes on up to required time.

- Then subject is advised to take hot shower.[1][2]

## III. SYSTEM DEVELOPMENT

### A. AVR 16

The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

The ATmega16 provides the following features: 16 Kbytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 512 bytes EEPROM, 1 Kbyte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary scan, On-chip Debugging support and

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programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC with optional differential input stage with programmable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the USART, Two-wire interface, A/D Converter, SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next External Interrupt or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except Asynchronous Timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run.[5][6]

## B. BLOCK DIAGRAM

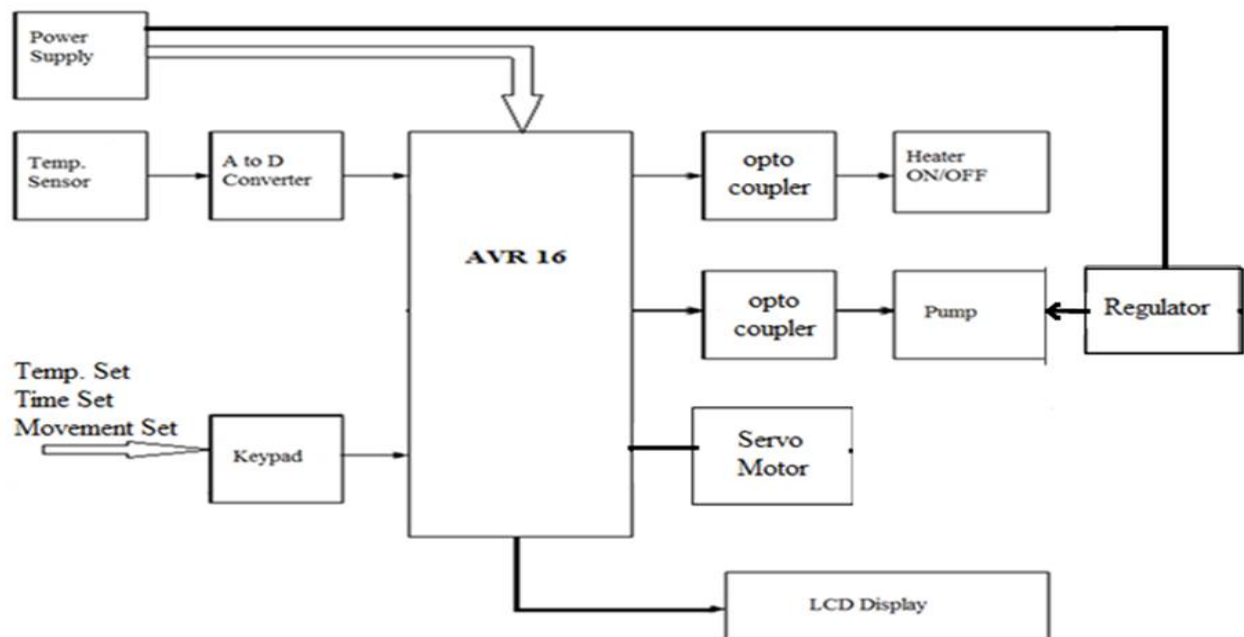


Fig 2: Block Diagram for Automatic Shirodhara Machine

## C. POWER SUPPLY

Power supply is the first and the most important part of our project. The voltage required for whole system and components are 5V and 12V. Following basic building blocks are required to generate regulated power supply. Step down transformer is the first part of regulated power supply. To step down the mains 230V A.C. we require step down transformer.

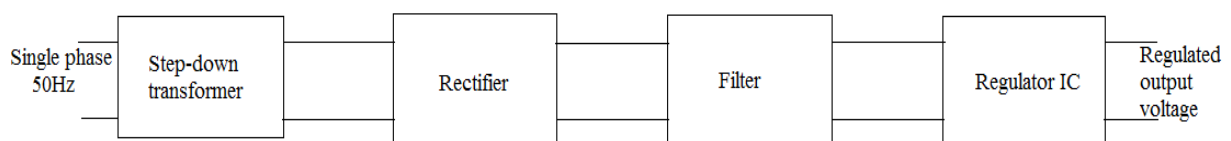


Fig 3: Block diagram for power supply



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Rectifier used in circuit is Bridge rectifier for high efficiency, low noise and low cost. Capacitors used as filters to reduce ripples. Regulator IC's are required for constant power supply such as IC7812 for 12V and IC7805 for 5V.[4]

## D. LCD DISPLAY

Various display device such as seven segment display, LCD display etc. can be interfaced with microcontroller to read the output directly. In our project we use a two line LCD display with 16 characters each. Liquid crystal Display (LCD) displays temperature of the measured element, which is calculated by the microcontroller. CMOS technology makes the device ideal for application in hand held, portable and other battery instruction with low power consumption.[7]

## E. TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade Scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4^{\circ}\text{C}$  at room temperature and  $\pm 3/4^{\circ}\text{C}$  over a full  $-55$  to  $+150^{\circ}\text{C}$  temperature range.[7]

## F. SERVO MOTOR

Power requirements: 4 to 6 VDC; Maximum current draw is 140 +/- 50mA at 6 VDC when operating in no load conditions, 15 mA when in static state Communication: Pulse-width modulation, 0.75–2.25 ms high pulse, 20 ms intervals. Operating temperature range: 14 to 122 °F (-10 to +50 °C). Holds any position between 0 and 180 degrees. 38 oz-in torque at 6 VDC. Easy to interface with any Parallax microcontroller or PWM-capable device. Simple to control with the PULSOUT command in PBASIC High-precision gear made of POM (polyacetal) resin makes for smooth operation with no backlash.[7][8]

## G. THIRD-ORDER HEADINGS

Third-order headings, as in this paragraph, are discouraged. However, if you must use them, use 12-point Times New Roman, boldface, initially capitalized, flush left, preceded by one blank line, followed by a colon and your text on the same line.

## H. OPTO-ISOLATOR

An opto-isolator, also called an optocoupler, photocoupler, or optical isolator, is a component that transfers electrical signals between two isolated circuits by using light. Opto-isolators prevent high voltages from affecting the system receiving the signal. Commercially available opto-isolators withstand input-to-output voltages up to 10 kV and voltage transients with speeds up to 10 kV/ $\mu\text{s}$ .[8]

## I. TRIAC

TRIAC, from triode for alternating current, is a generic trademark for a three terminal electronic component that conducts current in either direction when triggered. Its formal name is, bidirectional triode thyristor or bilateral triode thyristor. A thyristor is analogous to a relay in that a small voltage and current can control a much larger voltage and current. The illustration on the right shows the circuit symbol for a TRIAC where A1 is Anode 1, A2 is Anode 2, and G is Gate. Anode 1 and Anode 2 are normally termed Main Terminal 1 (MT1) and Main Terminal 2 (MT2) respectively.[8]

## J. IR SENSOR

The TSOP 1738 is a member of IR remote control receiver series. This IR sensor module consists of a PIN diode and a pre amplifier which are embedded into a single package. The output of TSOP is active low and it gives +5V in off state. When IR waves, from a source, with a centre frequency of 38 kHz incident on it, its output goes low.[7]

## K. HEATER

A simple coffee heater is used which is controlled by controller, for boiling fluid (water, oil etc.) a temperature sensor is used to sense the temperature of fluid, the value is given to controller which in turn turns heater on or off maintaining required temperature.

## L. PUMP

A water pump is used to regulate flow of fluid through the system. It pumps the warm fluid from container to top of system continuously until process stops.

## M. AVR STUDIO4

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AVR Studio is an Integrated Development Environment (IDE) for writing and debugging AVR applications in Windows 9x/ME/NT/2000/XP/VISTA environments. AVR Studio provides a project management tool, source file editor, simulator, assembler and front-end for C/C++, programming, emulation and on-chip debugging.[6]

## N. PROTEUS 8

Proteus 8 is a single application with many service modules offering different functionality (schematic capture, PCB layout, etc.). The wrapper that enables all of the various tools to communicate with each other consists of three main parts. Proteus is used for simulation purpose while developing the code for project.

- Application Framework

Proteus 8 consists of a single application (PDS.EXE). This is the framework or container which hosts all of the functionality of Proteus. ISIS, ARES, 3DV all open as tabbed windows within this framework and therefore all have access to the common database.

- Common Database

The common database contains information about parts used in the project. A part can contain both a schematic component and a PCB footprint as well both user and system properties. Shared access to this database by all application modules makes possible a huge number of new features, many of which will evolve over the course of the Version 8 lifecycle.

- Live Net list

Together with the common database the maintenance of a live netlist allows all open modules to automatically reflect changes. The most obvious example of this is wiring in ISIS producing ratsnest connections in ARES but it goes much further than that. The new Bill of Materials module contains a live viewer and the 3D Viewer and Design Explorer are also linked into the live netlist.

## IV. CIRCUIT DIAGRAM

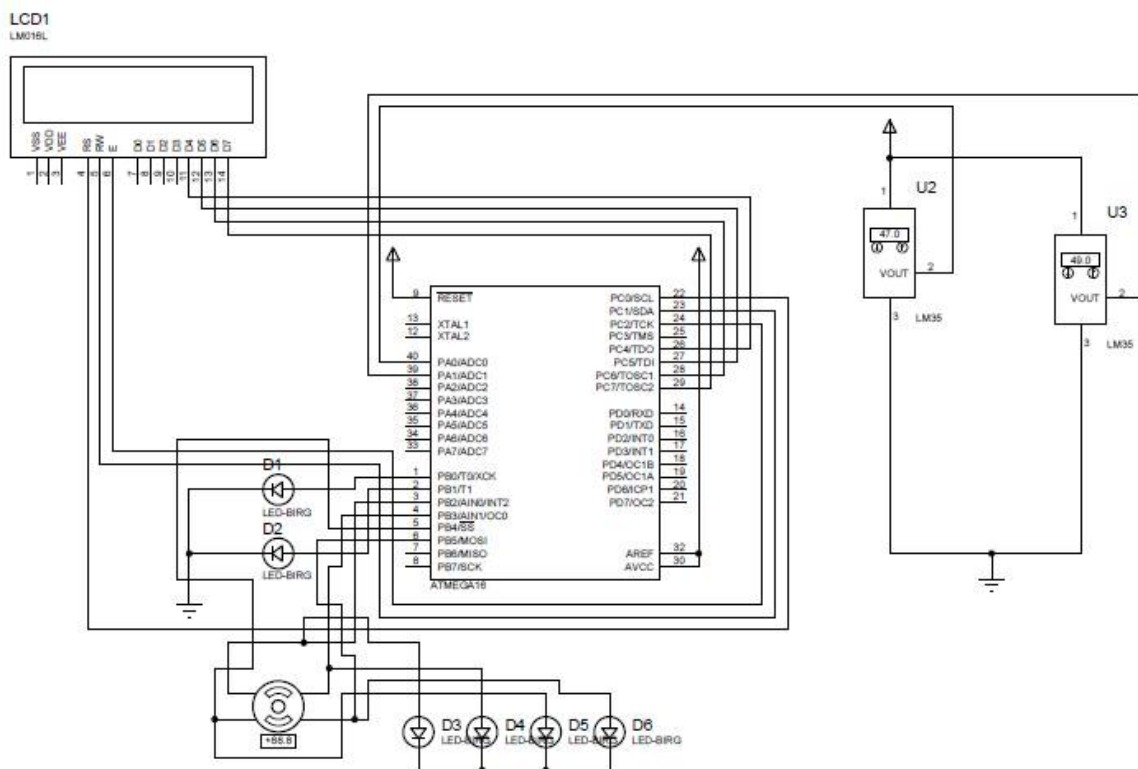


Fig.4: Circuit diagram



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## V. WORKING

- Plug pin in Mains socket
- Pour water to sufficient level
- Switch on the supply
- Display indicates message “Set the heater temperature”
- Connect body temperature sensor to the patient’s body
- Set the heater temperature by pressing switch provided

Fig.5: Setting



up temperature

- Set movement for horizontal movement of the pipe
- Set time required for the process
- When person is detected by IR sensor the machine will start
- When time is over a buzzer will make a sound and the process will end
- To repeat the process, press reset button and repeat above steps

Fig.6: Movement control

## V. ADVANTAGES

- Portable i.e. it is easy to carry.
- Easy to install, just plug and play.
- Digital timer for accuracy.
- Constant flow.
- Makes Shirodhara beneficial in a more relaxed way.
- User-friendly.



Fig.7: Movement control

## VI. APPLICATION

- Neurological diseases: Insomnia: Trouble in sleeping, memory loss.
- Meniere’s disease: Balance disorder, migraines, Hypertension, Epilepsy.
- Ear, Nose and Throat (ENT): Sinusitis: Swollen sinuses, Tinnitus: Ringing in ears, Hearing impairment.
- Dermatology: Psoriasis, replenishes skin oils, regaining luster and youthfulness. Scalp & Hair conditions: Nourishes hair and scalp, strengthens hair follicles to prevent hair loss and premature graying. Cracked feet. Burning of palm and feet.
- Others: Promotes fertility by stimulating the pituitary glands, where sexual and reproductive hormones are activated. Helps produce endorphins- neurotransmitters of the body.





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Increases immunity. Generates profound state of relaxation.

## VII. FUTURE SCOPE

To meet the increasing demands around the world and ensure sustainability of authentic Ayurveda and its therapies, this machine is useful in hospital to reduce the human effort. Now day's number of therapists is less so this machine is essential & makes Shirodhara treatment is reliable in future.

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## BIOGRAPHY



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