**CHAPTER II**

**REVIEW OF RELATED LITERATURES AND STUDIES**

This chapter shows the discussion of related literature and studies gathered by the researchers that is relevant and may further prove the ideas presented and understand the problems stated in the object. This also presents the conceptual framework to fully understand the research to be done.

**RELATED LITERATURE**

**Baby Bottles**

According to Y. Zur (2008), The general public customarily uses feeds babies using bottles that are usually made of plastic. The feeding bottles designed for feeding babies comprise an elongated container with an opening at its top, with a thread that matches a screw-on cap that ends with a nipple. The bottle, its cap and its nipple must be cleaned and sterilized after use and before re-use, especially when dealing with infants who are sensitive to disease. The present invention refers to a household appliance designed for cleaning and sterilizing baby feeding bottles after use and in preparation for re-use. The appliance, subject of the invention, provides a suitable and good solution to the above-mentioned problem of cleaning and sterilizing feeding bottles.

**Sterilizing**

According to Briggman (2013), to make child's containers germ free and sterile. Guardians and overseers need to play out a great deal of work to give milk in bottles to their newborn and toddlers. They use sterilizers to eliminate germs in the wake of washing bottles with warm soapy water. This work devours a great deal of time and makes their hands unpleasant and dry because of soap harshness and huge amount of water get utilized in this entire procedure. Commonly, guardians are getting late due to this 20-30 minutes cycle of container clean procedure. Guardians and overseers generally sterilize bottles with boiling water for 30 minutes without noticing the fact that 100 degree Celsius heat is adequate to eliminate germs and sometimes neglect to remove bottles from burner and it makes their work feverish.

**Washing**

According to F. Brenkus, C. Garrett (2001), A method of washing bottles employs a conveyor which advances the bottles intermittently from station to station. The bottle is supported inverted stationary at a first position where a first stream of fluid is directed upward under pressure directly into the open neck of the bottle to clean the interior of the bottle. At the same station a second stream of fluid is directed under pressure downward against the bottom to counter balance the force of the first stream of fluid.

# Steam Sterilization

According to the [Centers for Disease Control and Prevention](http://www.cdc.gov/) (2016), Of all the methods available for sterilization, moist heat in the form of saturated steam under pressure is the most widely used and the most dependable. Steam sterilization is nontoxic, inexpensive, rapidly microbicidal, sporicidal, and rapidly heats and penetrates fabrics. Moist heat destroys microorganisms by the irreversible coagulation and denaturation of enzymes and structural proteins. In support of this fact, it has been found that the presence of moisture significantly affects the coagulation temperature of proteins and the temperature at which microorganisms are destroyed.

**Water pressure for cleaning**

According to S.Weinmeister (2014), To design the cleaning process efficiently, one of the important parameters is the pressure of the cleaning fluid that is used. In addition to simple pressure measurement tasks in which for example peak pressures of lye, temperature controlled water or the filter pressure of the rinsing machine supply water are monitored to prevent clogging, the hydrostatic pressure, measured at the bottom of containers, is used as a measure of the filling level of process liquids. Pressure transmitters with integrated switching contacts can be used as overflow protection or to protect pumps against dry-running.

**Cleaning Apparatus**

According to J. Garcia (2012), An infant container cleaning apparatus comprising: A stabilizer having one or more arms for holding one or more infant containers; A water application assembly for applying water, one or more cleaning agents, or a combination thereof to the one or more infant containers, the assembly having one or more stems that extend upward from a base of the water application assembly into one or more openings of the respective one or more infant containers, around the respective one or more infant containers, or a combination thereof, the one or more stems having positioned thereon a plurality of outlets for spraying water, the one or more cleaning agents, or a combination thereof to the inside and outside of the respective one or more infant containers; and at least one motion controller for varying the position, movement, speed, or a combination thereof of the stabilizer during the applying of the water, the one or more cleaning agents, or a combination thereof to the respective one or more infant containers by the water application assembly.

**Raspberry Pi and LCD**

Raspberry Pi is a small and affordable computer that you can use to learn programming. You can use the Pi to drive a Liquid Crystal Display (LCD) to display all sorts of information: it could be date, time, system status, disk utilisation, MAC and IP address, etc.

The most common LCD is one based on the [Hitachi HD44780](http://www.noveldevices.co.uk/HD44780.pdf" \o "Link to HD44780 datasheet (323KB)" \t "https://projects-raspberry.com/project-2-driving-a-liquid-crystal-display/_blank) chip. This is an LCD controller and driver LSI device with embedded fonts and the ability to create custom characters. The LCD module and driver chip are supplied assembled and have a 14 or 16 pin connection to a PIC, Pi, PC, etc. This can be in a single row 1×14 or 1×16 edge connector or 2×7 or 2×8 0.1″ IDC connector. The complete assemblies are easily obtainable and many manufacturers make their own compatible LCDs so that the devices are entirely interchangeable at the control and functional level though not always with the same physical connection.

**Related Study**

**Local Studies**

According to C.V. Eusebio (2003-2004), the research was conducted to improvise Dishwasher, which can be alternative to the commercial dishwasher. In the light of the findings, it was proven that simple and discarded materials could be used in the construction of the Improvised Dishwasher. The characteristic features of the gadget are similar to the commercialized ones. When tested in the evaluation the gadget was able to pass with the standard of the targeted users.

At the end, it is concluded that the materials used in the construction of Improvised Dishwasher are economical. Simple and discarded ones can also be used. In turns of construction, the procedures were simple and basic principle of electricity was also applied. The qualities of the improvised Dish washer are good enough to pass the evaluation.

According to J.R.T. Laguador (2003), Disease is one of our enemy that is carried by bacteria and is easily by air, water or hand contacts, the own way dealing with the unseen micro organism is by heating or sterilizing the utensils. That is why the study “Improvised Kitchen Utility Sterilizer” is conducted. The finding on the said study is that it is possible to make an improvised kitchen utility sterilizer out of scrap materials and it is comparable to the commercial kitchen utility sterilizer as to cost, acceptability and efficiency.

**Foreign Studies**

According to J. Myong (2002), The present invention relates to a washing device for a baby bottle. According to the present invention, it is possible to automatically wash a bottle body, a nipple and a nipple cap of the baby bottle, and to dry and sterilize the baby bottle after washing thereof. Further, the baby bottle can be used in a convenient and sanitary manner since the baby bottle can be washed with only water, even outdoors. Furthermore, thc baby bottle can be washed stably since there is provided a fixture capable of holding a bottle body or a nipple cap of the baby bottle to prevent them from being moved when the baby bottle is washed by injecting a washing liquid under high pressure. Since nozzle tube for injecting the washing liquid toward upper, middle and lower portions of the bottle body accommodated in a baby bottle washing chamber is integrally formed, the nozzle tube can be installed in a simple manner.

According Y. Zur (2008), A household appliance designed for cleaning and sterilizing baby feeding bottles, which includes: a casing, a set of brushes, hoses that convey and spray water, a device for gripping bottles and nipples, and an operating system that includes an electric motor. The casing comprises a base unit that contains the set of brushes and a top unit that contains the appliance's operating system. The set of brushes includes a brush for bottles, a brush for nipples, and a central brush. The hose system includes a perforated pipe that serves as to spray water. The gripping device for bottles and nipples is in fact a set of coils consisting of coil-grip for bottles and coil-grips for nipples.

According to J. Garcia, F. Ramirez (2012), An infant container cleaning apparatus is disclosed, comprising a stabilizer for holding one or more infant containers. The infant container cleaning apparatus also comprises a water application assembly for applying water, one or more cleaning agents, or a combination thereof to the one or more infant containers. Still further, the cleaning apparatus comprises at least one motion controller for varying the position, movement, speed, or a combination thereof of the stabilizer during the applying of the water, the one or more cleaning agents, or a combination thereof to the respective one or more infant containers by the water application assembly.

According to H. Buchweitz (2001), A baby bottle dryer and organizer is herein described. The bottle dryer has hollow posts onto which baby bottles are placed and a blower/fan that blows drying air up into the posts, thus drying the interior of the baby bottles. The bottle dryer further has a removable tray for drying baby bottle nipples and rings/caps into which are from the blower/fan flows. The bottle dryer also has a lid and a front door to protect the baby bottles, nipples, rings/caps from dust and debris.

According to [D. Paskal](https://patents.google.com/?inventor=Darren+T.+Paskal),[G. Noss](https://patents.google.com/patent/US7179436B2/en), [W.Conley](https://patents.google.com/patent/US7179436B2/en),[R.Thomason](https://patents.google.com/?inventor=Rodger+D.+Thomason) (2004), Exemplary embodiments may include a sanitizing system and method including a chamber, a wet and dry heating system adjacent to the chamber, and a filtered air system to reduce the contaminants entering the system and to provide positive pressure to the chamber to reduce the likelihood of contaminants entering the system.

# According to E.Semans, G.Hardin, J.LePori (2013), Apparatus for washing and sanitizing articles for an infant Disclosed is a portable and self-contained washing and sanitizing apparatus. The apparatus finds particular application in washing small baby items such as bottles, nipples, teething rings or toys. The apparatus includes a container with a lid, the container housing the items to be washed; an accessory holder connected to the lid for holding infant accessories during washing operations; a water reservoir for storing and collecting wash water; and a housing for interconnecting the container and reservoir.

**Conceptual Framework**

As illustrated in the diagram, the researchers will first have the knowledge in the existing washers and sterilizers, knowledge in programming, as well as gathering information on parts/ components of machine to use. Then, the researchers will plan and design the prototype. Alongside, purchasing materials to be used, the researchers will assemble the purchased materials according to the design, evaluate the effectiveness of the prototype to detect error/s.

Finally, the researchers will have successfully created a prototype of an automatic baby bottle washer and sterilizer that operate the washing and sterilizing of baby bottles. In addition to this prototype will be the user interface that allows user to choose whether they need to wash or sterilize the bottle.

Input:

* Knowledge in existing washers and sterilizers
* Background knowledge in programming
* Gathered information on parts/component of machine to use

Output:

Automatic Baby Bottle Washer and Sterilizer

Process:

* Planning and Designing
* Gathering materials
* Programming
* Assembling according to the design
* Testing and evaluating prototype