

# MENTOR

KNOWLEDGE IS MULTIPLIED IN SHARING

VOL 2 NOVEMBER 2016

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**LOW COST &  
SUSTAINABLE  
HOUSING PROJECT  
IN ABASHAWL**

**AUTOMATIC  
CONTROLLED  
WEAVING  
MACHINE**

**SEA  
DESALINATION  
BY  
REVERSE  
OSMOSIS**

**MEKSEN  
SMART  
HOME**

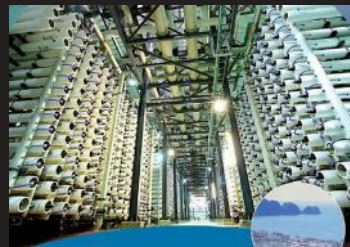
**“NOVEMBER’S QUOTE OF THE MONTH”**

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# MENTOR

KNOWLEDGE IS MULTIPLIED IN SHARING

## *message from the Editors*

Be an engineer, teacher, lawyer, movie star, have you asked yourself the reasons that made you chose the career you have today? Or, if you are still a student yet, do you know what career you want to choose for the future? Just like choosing a partner for marriage, more often picking a career is not a walk in the park; one needs to think thoroughly and make his/her decision. Beyond one's personal inclinations and preferences, external influences from parents, colleagues and the environment may interfere for good or for bad. Many people today face dilemmas concerning their choice of career. Some even regretfully wish they had taken a different path. Hence, it becomes imperative for all of us to play smart when choosing a career.

For the above stated reasons, the cover article for the second issue of MENTOR Magazine for November 2016 is dedicated for this pressing issue. Our anonymous source has sent us a thought provoking article of the topic of choosing a career. Let's read it in depth and ask ourselves why and how we find (or wish to find) ourselves in the current or future careers.

Once again, MENTOR Magazine is welcoming its readers to enjoy the exciting and revolutionary articles. All readers are encouraged to participate here through their articles, comments and every kind of contribution. EVERYONE IS WELCOME HERE!!!

*Editors*  
*November 2016*



## AUTOMATIC CONTROLLED WEAVING MACHINE

BY AMAN EYOB,  
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AND YONAS EYOB

### GENERAL INTRODUCTION

Thinking of the most precious and important thing in our life, health, the primary focus and goal of our Electrical and Electronics Engineering senior project is to prevent the health problems of the users of the Traditional Weaving Machine which most of them are our mothers and sisters, which includes serious eye and backbone problems that may lead to any other complications which may be potentially dangerous for our mothers whose life depends on the Traditional Weaving Machine.

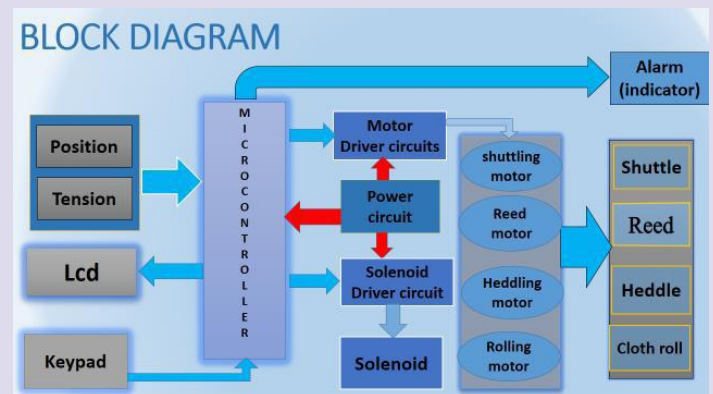
### SOURCE IDEA OF THE PROJECT

To start business with the machine, its recommended this machine needs to be automatic controlled and electrically driven for our project. We did some research on the machine and

we found out that many families' life depend it and also some health problems are caused by excessive work on the machine to make more money out of it.

### PROJECT OVERVIEW

#### GENERAL BLOCK DIAGRAM



Block diagram of our project

#### INPUT AND SENSING PART

The above block diagram is drawn according to the overview of our project. In our project we have input and sensing parts that also gives signal input to the microcontroller. The input parts include KEYPAD, which lets us enter desired parameter value and give instruction to the microcontroller. Position sensor, that tracks the position of the shuttle, and the Tension sensor, that provides an interrupting input signal to the microcontroller whenever a thread is cut, are used as an input sensor parts. In addition, input power supply is given to all voltage driven components of the machine.

#### CONTROLLING PART

The Microcontroller do all the job for controlling the operations of the machine. We used ARDUINO MEGA 2560 as a microcontroller. The microcontroller receives the input signal from the sensors and the keypad and monitors all the motors, solenoid, drive circuits and other components of the machine. To monitor all the operations, the microcontroller sends couple of control signals to the components of the ma-

chine.

## OUTPUT PART

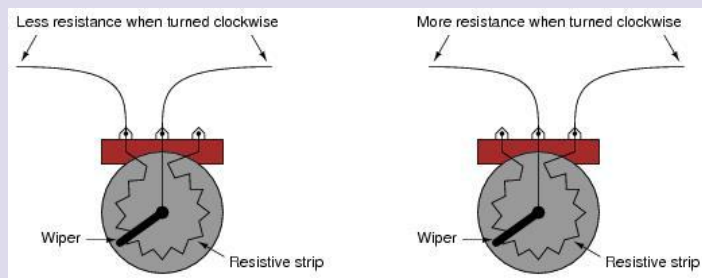
Liquid Crystal Display (LCD) gives display of the real time status of the operation and of all different parameters that the user specifies before the operations begins.

## COMPONENTS USED

### ELECTRICAL COMPONENTS

#### Potentiometer

A potentiometer is a manually adjustable electrical resistor that uses three terminals. One terminal of it is connected to a power source, and another is hooked up to a ground or resistance which serves as a neutral reference point. The third terminal slides across a strip of resistive material. Considering the above uses, in our project, we are using potentiometer to control the brightness of the LCD screen.



Potentiometer

#### Darlington Transistors

##### TIP41C and TIP42C Transistors

In our project we have used H-bridge circuit to interface motors with the controller arduino. In the circuit we prefer H-bridge built using tip41c and tip42c rather than H-bridge IC. The main reason is that our motors need high current to rotate. Since these transistors have high current rating than the IC we choose them. TIP41C is an NPN transistor whereas TIP42C is a PNP transistor.

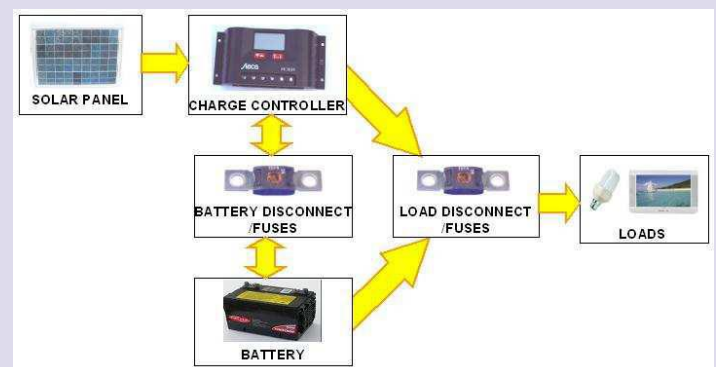
#### SENSORS (Tension Sensor)

The tension sensors, senses the tension of each warp thread tension. The tension sensors, given a positive voltage at their body, are mounted on

each warp thread so that it checks the strength or tension of each thread, so when a thread is cut the tension sensor mounted on the particular thread falls down to a negative terminal positioned below all the tension sensors, then an interrupt signal is transmitted to the arduino mega 2560 microcontroller to pause the system, then the system can be put into work again after fixing the cut thread.

### SOLAR POWER GENERATION SYSTEM COMPONENTS

As an alternative energy system and to make use of natural electric energy generation satisfying our needs to contribute some to prevent pollution and making rural area users of our project, we are employing solar electric power generation system in our project. The figure below describes the basic components needed to produce solar electric energy:



Solar power generation system

### ARDUINO MEGA 2560

In our project we are using ARDUINO MEGA 2560 as a micro-controller to control all the operations of our project.



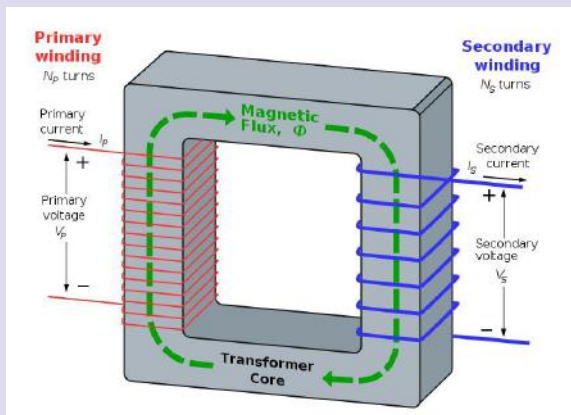
Arduino mega 2560

### TRANSFORMER

A transformer is a device which is use to convert high alternating voltage to a low alternat-

ing voltage and vice versa.

In our project, the significance of a transformer is so crucial and we make use of it. The transformer we have used in our project is 220v -12v step down AC transformer.



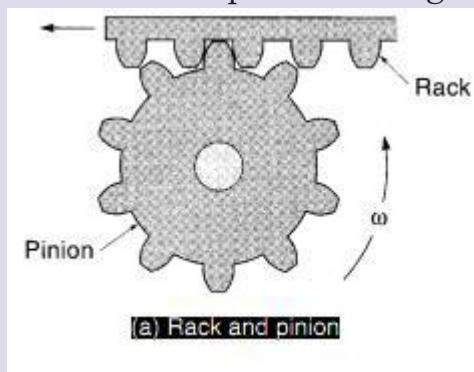
Transformer

## MECHANICAL COMPONENTS

### RACK AND PINION

Rack and pinion

We used rack and pinion arrangement to



achieve forward and reverse motion of the Reed arrangement of the system we developed. Rack and pinion gear interlock use to convert rotational motion into translational motion.

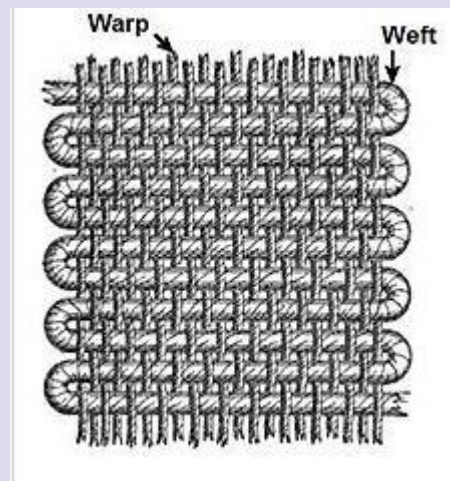
## WORKING PRINCIPLE AND CIRCUIT DIAGRAM

### GENERAL WORKING PRINCIPLE OF THE WEAVING MACHINE

In general, Weaving is a method of fabric production in which two distinct sets of yarns or threads are interlaced at right angles to form a fabric or cloth. The longitudinal threads are

called the warp and the lateral threads are the weft or filling.V

Weaving NETSELLA Traditional Dress involves using a loom to interlace two sets of threads at right angles to each other: the warp which runs longitudinally and the weft that crosses it. One warp thread is called an end and one weft thread is called a pick. The warp threads are held taut and in parallel to each other, typically in a loom.



Woven cloth

Basically weaving is pattern of steps and it can be summarized as a repetition of these three actions, also called the primary motion of the loom.

- The first move we make to start weaving is Shedding, where the ends are separated by raising or lowering heald frames (heddles) to form a clear space where the pick can pass,
- The very next move we make in the weaving process is Picking, where the weft or pick is propelled across the loom by hand, an air-jet, a rapier or a shuttle,
- Beating-up or battening comes to be the next step in the process, where the weft is pushed up against the fell of the cloth by the reed.

The Secondary motion of the loom are the:

- Let off Motion: where the warp is let off the warp beam at a regulated speed to make the filling even and of the required design



- Take up Motion: Takes up the woven fabric in a regulated manner so that the density of filling is maintained

The tertiary motions of the loom are the stop motions: to stop the loom in the event of a thread break. The two main stop motions are the

- One of the stop motions in the tertiary motions of the loom is warp stop motion, where the loom stops whenever any of the threads of the warp (an end) is cut.

- Similarly, the loom stops in another stop motion of tertiary motions of the loom, weft stop motion, whenever any of the threads of the weft (a peak) is cut.

The warp threads are separated by the heddles into two or more groups, each controlled and automatically drawn up and down by the motion of the heddles. In general cases, small patterns of movement of the heddles is controlled by “cams” which move up the heddles by means of a frame called a harness; in larger patterns the heddles are controlled by a dobby mechanism, where the healds are raised according to pegs inserted into a revolving drum.

Where a complex design is required, the healds are raised by harness cords attached to a Jacquard machine. Every time the harness (the heddles) moves up or down, an opening (shed) is made between the threads of warp, through which the pick is inserted.

Traditionally the weft thread is inserted by a shuttle. The shuttle needs accurate path through the shed to get the peak from side to side to perform the operation of weaving. A handloom weaver could propel the shuttle by throwing it from side to side with the aid of a picking stick. In our machine the peak in a shuttle is supported by a long metal that carries the shuttle from side to side at a manageable speed.

At the end of the movement range, the shuttle is recognized by a sensor that it has reached its destination then it is handed over to a shuttle receiver by the application of electromagnet,

then the metal carrier is returned to its previous position so that the reed will tighten the peak to have adjacent weft threads uniform distance between them.

## CIRCUITDIAGRAM

(See details on the next page.)

## EXPERIMENTAL RESULTS

Running the motors on doing the experiment, the machine runs smoothly and whenever any thread is cut the machine is observed to stop the operation. Or whenever any fault is found in the components the machine automatically pauses and informs the user by using an alarm then the system is again restarted on fixing the problem by the user.

Time for one cycle = 6 sec

Number of cycles to make one Netsella = 2000

Therefore the time taken to make one Netsella can be calculated by:

$$2000 * 6 \text{sec} = 12000 \text{ sec} = 3.33 \text{ Hrs.}$$

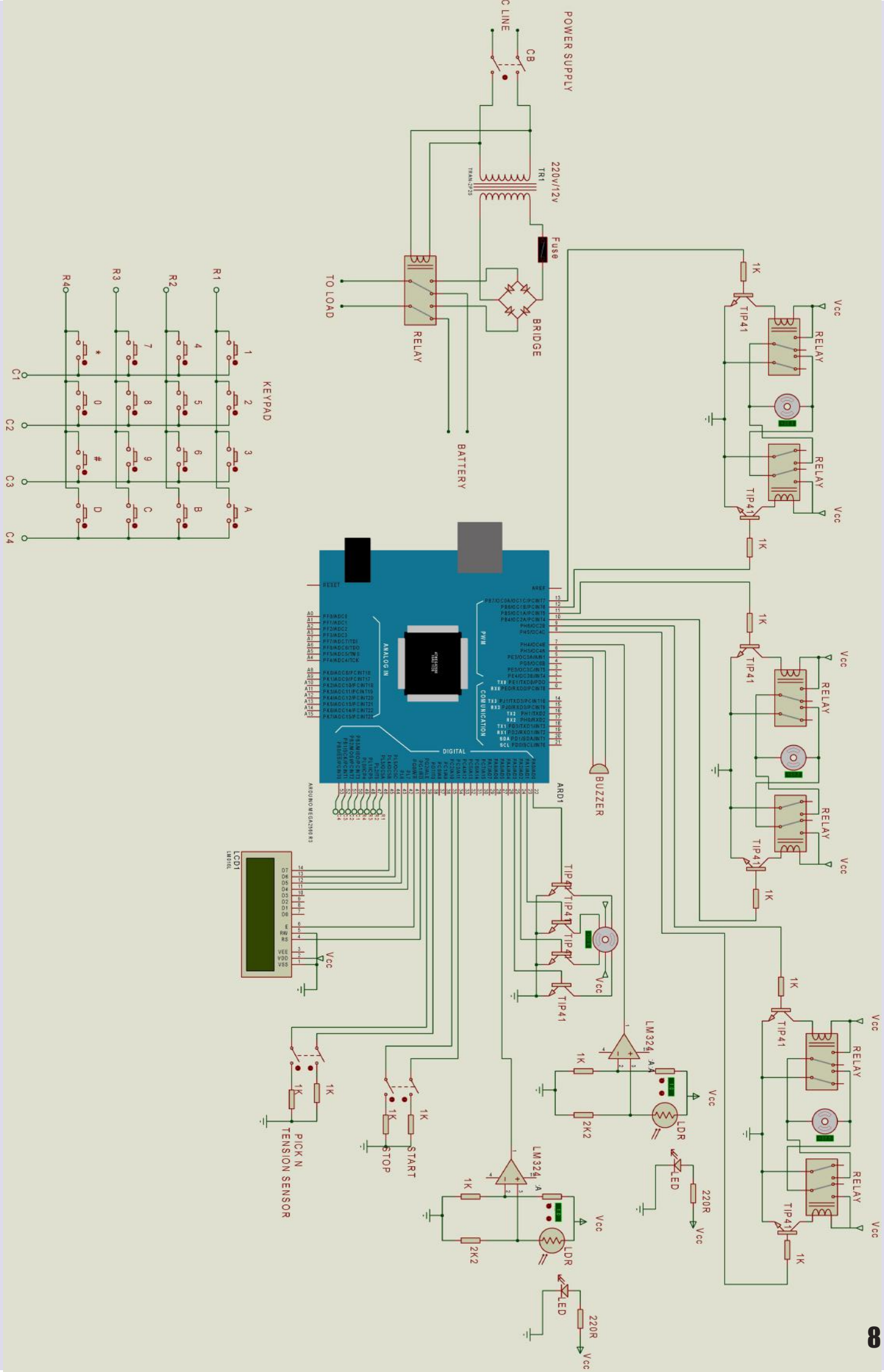
The time delay that may be lost in cut thread fixing and feeding of different color thread is estimated to be 10 minutes. Therefore the total time taken to make one product is 3.43 Hrs.

Considering the time human being work on the machine in a day, typically 8 hrs. , our machine can make 2 Netsellas.

## SOFTWARES USED

### PROTEUS DESIGN SUITE 8.1

Proteus 8 is a single application with many service modules offering different functions. it allow to draw schematic, PCB layout and simulation of electrical circuits.it support frame work for simulation of microcontroller based projects by importing the code. We used it to draw and simulate circuit of the system we devoloped .The wrapper that enables all of the various tools to communicate with each other consists of three main parts.





## 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 Netlist

Together with the common database the maintenance of a live netlist allows all open modules to automatically reflect changes.

## ARDUINO SOFTWARE

To make the arduino do some usefull work we need the arduino software IDE ,which converts the arduino langage to a langouge that can be understood by the microcontroller.The Arduino software IDE provides everything required for programming it, including a number of example programs or sketches that demonstrate how to connect it to and communicate with some common devices, such as LEDs, LCDs, and some sensors as well as motors as in our case etc.

## CONCLUSION AND FUTURE ENHANCEMENT SUMMARY AND CONCLUSION

Been through a lot of Electrical and Mechanical challenges, we have finally succeeded in making the “AUTOMATIC CONTROLLED WEAVING MACHINE” satisfactorily. The sensor we made also performs excellent in alarming the user and stopping the system whenever any thread is cut. The overall goal of this project is to save human power and enhance production rate.

Finally, we feel satisfied to see our weaving machine working and produce the NETSELLA traditional dress.

## FUTURE ENHANCEMENT AND IMPROVEMENTS

In the future, there are some sections that needs improvement. The most part that needs en-

hancement which is not fully included in our system is the complicated designs made at the finalizing edge of each NETSELLA Traditional Dress.

The mechanical system we implemented has limited us in the utilization of maximum speed of our motors to have more product at a specified timeSo in the future by interacting with some mechanical engineers we will come up with more mechanically interlocked system to have high speed of the motors and thereby have high rate of production of NETSELLA Traditional Dress.

In addition the LCD will show its information in different Eritrean languages, especially Tigrigna and additional important parameters will be displayed in the LCD.

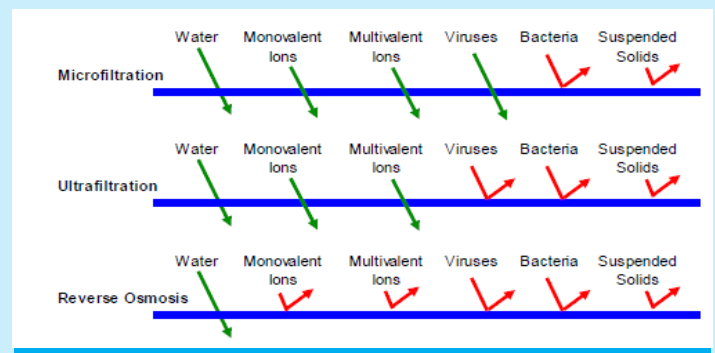
(REFERENCE: HANA training centre, NATSNET textile factory, Eritrean textile factory, AND THE INTERNET)

## SEA WATER DESALINATION BY REVERSE OSMOSIS

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ERITREA INSTITUTE OF  
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Desalination is a separation process used to reduce the dissolved salt content of saline water to a usable level. Desalination markets have greatly expanded in recent decades and they are expected to continue expanding in the coming years. There are several different techniques that can be applied for water desalination some are Reverse osmosis, Electro dialysis, Thermal desalination (evaporation, flash evaporation and low temperature thermal desalination) and Solar energy desalination.

Reverse Osmosis is an effective and proven technology to produce water that is suitable for drinking, agricultural and many industrial applications that require de-mineralized or de-ionized water. RO removes many inorganic impurities from drinking water.



Sea water desalination is a real challenge for people who lived on our planet because the total dissolved solids in sea water is very high, this results difficulty in purification techniques (desalination). Never less Eritrea in nature is located near RED SEA, the limitation of potable water, directly influence it. So we are going to focus on the economical treatment of sea water by Reverse osmosis to full fill the demand of Eritrean population (spe-



cially for people at MASSAWA city around HRGIGO).

## OBJECTIVES OF THIS PROJECT

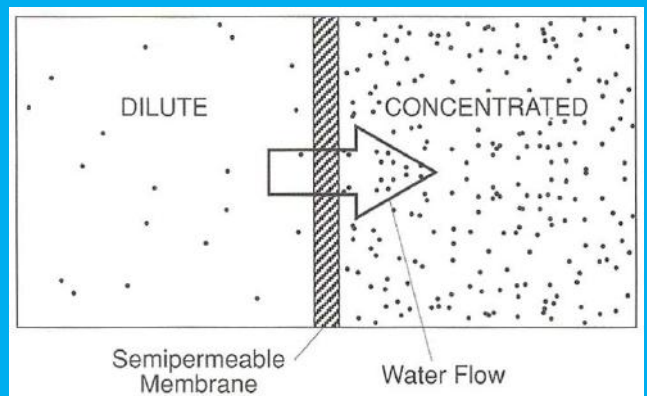
In the world there are many countries that belong to the coastal area of ocean or seawater. ERITREA is one of the countries having strategic marine resource which is the RED SEA along it. Yet the activities of ERITREA are still restricted in transport and fishing (in a small amount). Even though ERITREA is naturally gifted and rich with this abundant resource, difficulties of obtaining potable water is currently facing problem. This is due to shortage of low surface water (fresh water) availability. There are some small scale desalination plants in HIRGIGO power station to cool the engine and part of it for drinking purpose of the employees. Yet this can't satisfy the demand of portable water for Massawa. So is it possible to purify the sea water and serve for the benefit of the mass? Our mission is to see solution for the above question. Reverse osmosis desalination process is the key solution for our answer.

## EXPECTED SOLUTIONS

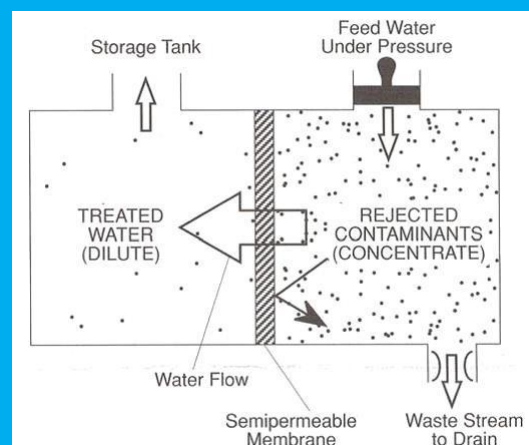
Reverse osmosis is the best operating condition to produce drinking water from sea water having salt concentration of 40,000ppm (which is fresh sea water from the source) by reducing salt concentration in to 500ppm (which is the maximum allowable value for drinking ).But from our result the concentration of the salt is reduced to about 200 ppm which is more comfort to drink this reflects how much the RO membrane works efficiently and effectively in rejecting of dissolved solids to produce pure water. The purpose of this project is to solve the scarcity of drinking water in the place part of Massawa which has about 10,000 people by supplying reliable quality and sufficient amount from RO process in economical feasible.

To understand the concept of reverse osmosis let us first see what osmosis and reverse osmosis are.

Osmosis is a natural process. When two liquids of different concentration are separated by a semi permeable membrane, the fluid has a tendency to move from low to high solute concentrations for chemical potential equilibrium.



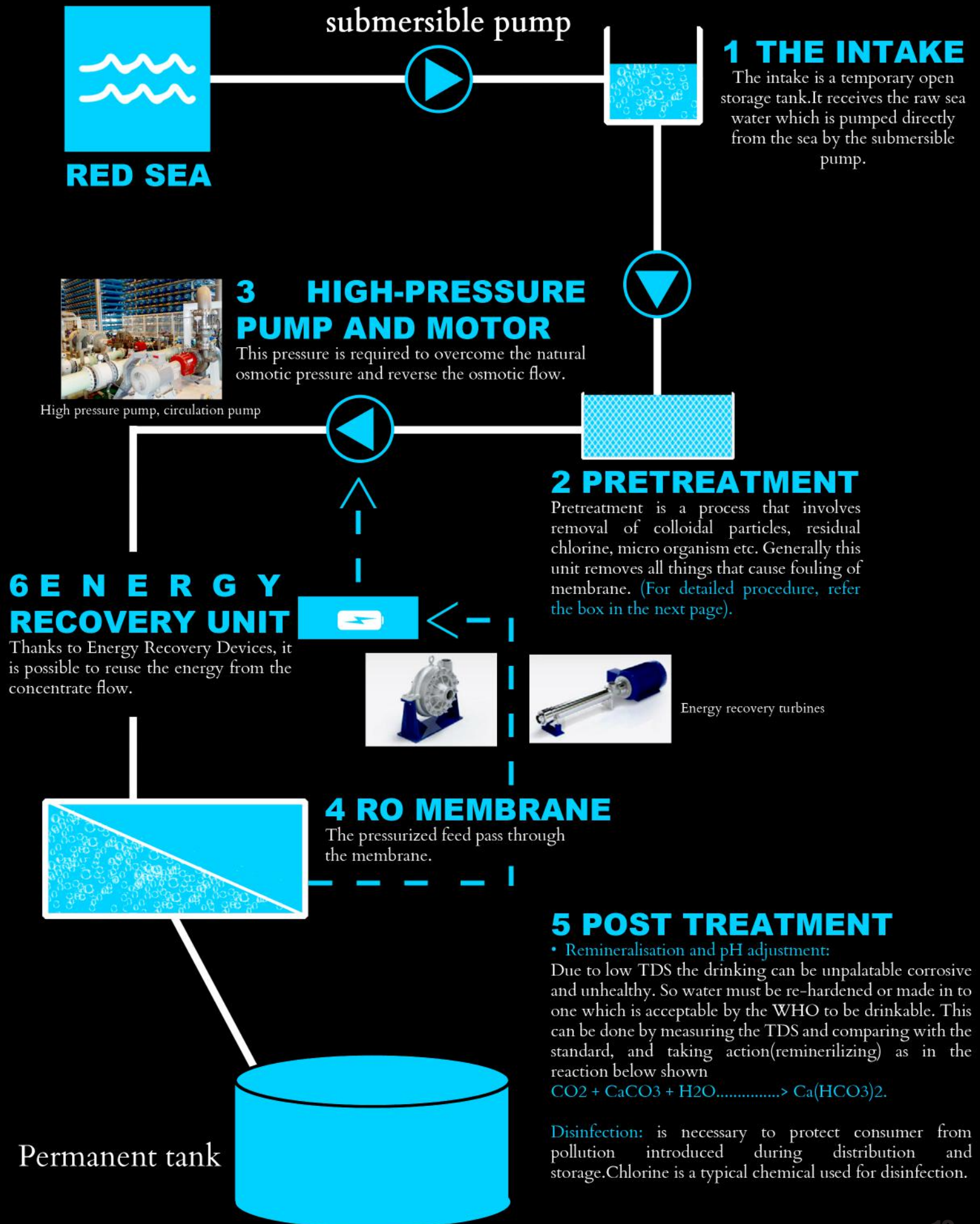
Reverse osmosis (RO): In reverse osmosis, water pressure applied to the concentrated side forces the process of osmosis into reverse.





# PROCESS FLOW

## BLOCK DIAGRAM OF RO PLANT

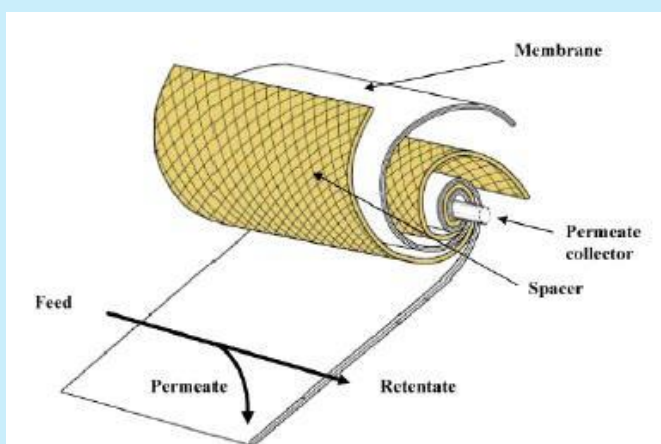
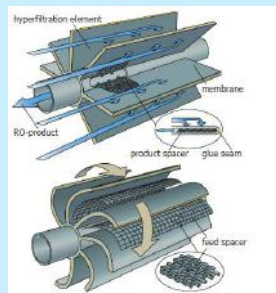


Lets see the proceduare

- **Screening of solids**
- **Chlorination:**  $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HOCl} + \text{HCl}$
- **pH Adjustment:** Needs to be done to prevent scaling  
Acids used are HCl and  $\text{H}_2\text{SO}_4$
- **Addition of Coagulants and Flocculants**
- **Sand filter:** In this section the water is sterilized to prevent the growth of bacteria and algae.
- **Multi Media Filtration (MMF)**
- **Activated carbon filter:** is most effective in removing organic contaminants from saline water. Specially for the removal of free chlorine, which can damage the RO membranes.
- **Dechlorination:** is done prior to RO stage because residual chlorine in the feed water to the reverse osmosis element damages the membrane.  
 $\text{Na}_2\text{S}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow 2\text{NaHSO}_3$ ,  $2\text{NaHSO}_3 + 2\text{HOCl} \rightarrow \text{H}_2\text{SO}_4 + 2\text{HCl} + \text{Na}_2\text{SO}_4$ .
- **Antiscalants and Scale Inhibitors**
- **Cartridge filter**

## DESIGN METHODS

Reverse osmosis is our choice because it is an efficient and effective process compared to other desalination processes. We designed a spiral wound membrane module made of composite thin-film.



Open spiral wound membrane

In additional we analyzed equipment such as positive displacement plunger pump made of stainless steel, pretreatment materials (sand filter, activated carbon filter, cartridge filter...) , energy recovery device and so on. The design calculations includes the mass balance of the disposal cake from the pre filtration and the membrane filter , the total energy balance ,the design of sand filter and membrane specifically the cost estimation are described in detailed manner. We also selected the plant site to be around HRGIGO. We took safety precautions in order to avoid negative environmental impact.

## CHALLENGES & RECOMENDATIONS

1: Primarily we have tried to produce sufficient amount of water for the whole Massawa city with RO system but due to low availability of energy source we have taken part of the city. But if the availability of energy is secured the plant can be scaled up to supply the whole city, so we believe this can be done in the near future.

2: In this project the waste to be disposed is brine. Brine can be easily treated because it is not toxic. It can simply be diluted and poured in to the sea, or salt can be harvested from it. From this it is understood that RO system is environmentally friendly. Here we recommend for a company that produces salt, namely SALINA salt production company that instead of investing money and waste time to concentrating the sea water it will be much better for them to use the concentrated brine from RO plant so that, they could be helped economically.

3: Comparatively our project seemed to be economically attractive, because the sailing cost is less than that of the governmental and privet organizations. Not only that but also the brine can be sold to be an income for the RO plant and an advantage for the SALINA salt production.

## FURTHER IMPROVEMENTS

- **Development of membranes:** To increase the efficiency and life of RO membrane with effective pretreatment of the feed water is required.
- **Development of more energy-efficient ro system:** Solar pumps have proven to be a cost-effective and dependable method for providing water in situations where water resources are spread over long distances, power lines are few or non-existent, and fuel and maintenance costs are considerable.
- **Commercialization of the reverse osmosis desalination:** Commercialization of the prototype centrifugal reverses osmosis desalination plant developed by the Canadian Department of National Defense; this process appears to be more reliable and efficient than existing technologies and to be economically attractive.
- **Design, engineering and operation of reverse osmosis systems:** New process of sea water desalination to raise conversion of feed water, brine conversion two stage RO sea water desalination system was developed. ■

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# Quote of the MONTH

**"Everybody is ignorant, only on different subjects."**

*Will Rogers*  
1879-1935



This quote reminds us the inescapable fact of the finite knowledge each one of us has. Few polymaths like Da Vinci may be an exception, but the rest of us live within the confines of our limited capacity. Whether we like it or not, everyone of us, no matter how specialized we are in our fields, are ignorant in other departments. The solution is to humbly accept the fact and try to learn from others in the fields you find yourself ignorant and return the favor by sharing your knowledge in the area of your expertise. Otherwise, 'Mr/Mrs. Know-it- all' is a bad reputation to earn.

“ Send us  
your Favourite Quotes  
and impression notes  
HERE! ”







# LOW COST & SUSTAINABLE HOUSING PROJECT USING COMPRESSED EARTH BLOCK

### INTRODUCTION

The aim of this project from the start has been to find economic and sustainable ways to provide housing projects for the urban and rural poor of our country. Through wide and extended researches we have come to a conclusion that the only way we could achieve our goals was to not look far from our own environment and exploit our own natural resources in a safe and sustainable way. Before any modern advance in construction technology humans have always used earth natural products to build their homes. In this era of irresponsible exploitation of resources and consequent pollution of our natural habitats we decided that we should look back in time and find alternative ways of building. As we searched for a material that would be cheap, sustainable, readily available and safe in the end we were amazed that all along the answer

to our questions was sitting right beneath our feet. This material covers large quantities of our world, it's cheap and affordable to almost anyone, it's easily accessible and simple to use, it's sustainable and biodegradable and to our surprise it can be used for most parts of a building. The material we are describing is of course earth.

### EARTH AS A BUILDING MATERIAL

Earth as a material has been used for thousands of years and has characterized the way of living of many ancient cultures. From the dry climate zones of Africa to the temperate areas of Europe earth has been used for homes, public buildings and religious buildings. Some of these examples exist till this day. The 12th century Mali mosque in the Sahara desert and the ancient citadel of Bam in Iraq are illustrative examples of earth technology at its best. With time and the advent of the

industrial revolution earth lost its primary position as a construction material and slowly faded away from the scene. These days earth technology is enjoying a worldwide revival as a material thanks to its sustainable qualities and suitability for building homes especially targeted to low income groups.

Although the characteristics of the material fitted perfectly our ideas of an environmental friendly and affordable house a thorough scientific investigation on the mechanical properties of the material lacked on our country. We decided to conduct a cases study that includes laboratory tests to find a suitable soil that would resist the internal and external stresses imposed to it.

## CASE STUDY AND RESULTS

The preparatory steps and laboratory tests were performed in the GEDECC laboratory facility. The samples of earth were taken from sites in and around Asmara. The samples of soil that were either excavated or sampled from the surface were subjected to field and laboratory tests. The field tests included tests such as the cohesion test, adhesion test, cutting test and smell test. All of these tests were conducted to approximately determine the soil composition so as to know if it consisted of clayey or sandy particles. These tests can to some extent explain the properties of the soil and the possible stabilizers that may be used for the production of earth blocks that can with stand the stresses of external forces.



*Field tests help to determine the characteristics of the soil in order to guess the type of soil and its possible production procedure. We can see here in the top left the smell test and at the right the cutting test.*

To examine the soil properties to their full extent laboratory tests were performed. The aim of these tests was to find out the soil physical properties in order to assess the suitability of the soil for block production. Not all soils are optimal for block production thus it's of importance that a thorough investigation be conducted to find out the qualities of the raw material. The tests that were performed were the:

- Grain size analysis test
- Sedimentation test (hydrometer test)
- Atteberg limit tests (liquid limit, plastic limit and shrinkage limit)
- Compaction or proctor test

The above soil tests were done in accordance with the standards issued by the unified soil classification system adopted by the GEDECC laboratory staff. The results obtained from each sample were critical in the production phase that followed. The results assisted in the selection of the correct type and amount of stabilizer (cement, lime, animal dung) that was used to enhance the earth block samples quality.



Laboratory tests give solid results that if adopted well in the production phase of the blocks can dramatically enhance the blocks quality and resistance to mechanical stress.

After the results of the soil tests were obtained, the production of earth blocks followed. The soil samples were sieved through a designated sieve in order to avoid big boulders of rock. The sieved soil was then batched with the se-



lected stabilizer. The composition of each element was carefully examined according to the results obtained from the soil tests. After the elements were mixed with water, samples were molded using steel and wood molds. The compaction of the blocks was made by hand ramming using the optimal compaction effort. The samples were then left to cure under the shades according to their designated time. The team managed to produce block samples in excess of thirty. Both unstabilized and stabilized sample were prepared. Stabilizers included cement and lime.

After curing was over the samples were subjected to compressive strength and capillary absorption test. Keep in mind that in order to establish the materials full mechanical characteristics other tests such as the shear, bending, abrasion tests must be included. Due to lack of available apparatus in the laboratory the team accomplished to investigate only the compressive strength and capillary absorption of the material. The minimum compressive strength requirement was set at 3 Mpa. The results that were obtained from the sites of Adisegudo, Hazhaz, Villagio and Villagio Mai bela in the range of 0.82-7.05Mpa due to difference in stabilizers and amount of it.



Compressive strength test

A minimum of three samples per soil was set in order to find the average compressive strength of the samples. As can be seen from the range of results only four types of samples reached our goals.

The total extent of our results is showcased in our full project paper.



Low cost apartment block  
designed using  
compressed earth block



3D plan section view  
of the apartments



Final 3D view of the planned block  
within Aba shawl

## LOW COST HOUSING PROJECTS

The final aim of the project is to create sustainable and affordable housing for the low income groups of Eritrea. As citizens of Asmara we decided that it was best to focus our attention to the slums of our city and use them as experimental urban laboratory where earth technology can best be implemented to solve the dire needs of the inhabitants. Aba shawl is one of these slums and as a symbol of the city's cultural identity it was the main interest for our project. The low cost house design not only insures affordability but also provides an improved environment that guarantees the well-being of the inhabitants. In addition to this a portion of the district of Aba shawl was redeveloped to make way for better street networks and harmonious environments.

## CHALLENGES AND LIMITATIONS OF THE PROJECT

The biggest challenge of the project was the case study of the compressed earth block. To conduct a thorough engineering material study, one must have the required resources to complete it. Although the team had acquired enough knowledge about the material after referring books on the subject matter, it didn't have the required resources to conduct such an expanded research. Thus the team had to rely on self-help to complete its task. The number of site visits, soil selection and extraction, sampling and transportation of material were done with hardship since there were no funds available for the costs of these activities. The lack of experience in the laboratory work area led to some mistakes which resulted in repeating some tests more than once. Although the laboratory tests were supervised by the technicians, all of the tests that were conducted were done by the team efforts. The lack of equipment's and energy supply (electricity) in the laboratory led to many delays. Tests such as those for shear, bending, abrasion and

impact were not conducted because of lack of apparatus in the laboratory. Another limitation in the project was the design of the low cost house using compressed earth block. Although many multistory buildings have been built using compressed earth block, a unified and concise building code for the material have not yet been fully developed. The design parameters were mostly gathered from experts on the matter. The book 'compressed earth block: manual of design and construction by Hubert Guillard, Thierry Joffroy, Pascal Odul, CRA Terre- EAG' provided as with most of the information regarding the material technology and general assumptions.

## CONCLUSION

The project aims to find direct solutions to the society using natural resources and vernacular architecture. Although the project's case study on compressed earth block shows successful results more type of tests are required to fully certify the material. This project represents a starting point to further expand our knowledge on this formidable material that has already shown us great outcomes. To achieve our ultimate goals of promoting sustainable housing in the rural and urban context more studies and funding are required. ■

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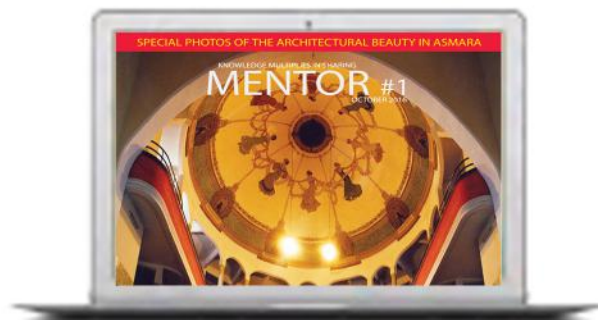


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# ዋናው ዘመናዊ?



**COVER  
ARTICLE**



እዚ ጽሑፍ፣ ሞይአም ኣብ ዘለልይሉ ዕድመ ንዝርከቡ፣ ብፍላይ ከኣ ኣብ ምዝሃም ናይ ካልኣይ ደረጃን ምጅማር ናይ ኮለጅ ትምህርቲን ዝርከቡ መንእሰያት፣ ሞያ ኣብ ዝመርጹሉ እዋን ገለ ሓገዝ እንተኾኖም ብምባል ዝተዳለወ እዩ። መንእሰያት ተማሃሮ ምስ ገዛእ ነብሶም ብጽሞና ዘዕልሉሉን ደጃይቕ ንክፈልዩ ዝግለመ እዩ። ሰናይ ንባብ፣

ናይ ሓሙሻይ ክፍሊ ተመሃሮ ዝነበርናሉ እዋንዮ። ኣብቲ እዋንቲ ናይ እንግሊዝ መምህርና ዝነበረ፣ ሓደ መዓልቲ ነቲ ልሙድ ኣስተምህሮ ኣቋሪጹ፣ “ምስ ዓበኻ/ዓበኺ እንታይ ክትከውን ትደሊ?” ትብል ዓባይ ሕቶ ኣብቲ ሰሌዳ ብፍሩይ ጸሓፊ። ኣጸቢቕና ንክንሓስብ ብዙሕ ግዜ ከይሃበ ድማ፣ ነብሲ ወክፍ ተመሃራይ ከካብ ውሽጢ ነብሱ ብምብጋስ ከይተሰከፈ ክምልሱሉ ብምምሕጻን ብብሓደ ክሓተና ጀመረ። ነቲ ሕቶ፣ ቅድሚኻ ካልእ ተመሃራይ ንዝጠቐሶ ዓይነት ሞያ ዳግማይ ምጽዋዕ ከምዘይፍቀድ ዘገድድ መምርሒ ስለዝተወሰኸ ድማ፣ ብፍላይ እቶም ካብ ማእከል ክፍሊ ንድሕሪት ወገን እንርከብ ተማሃሮ ተርታና ቀልጢፉ ከምዘይበጽሓና ብምስትብሃል ተዋጢርና ክንሓስብን ነንሕድሕድና ሕሹኽሹኽ እናበልና ክንላዘብን ኣጸቢቕ እዝከረኒ።

ኣነ ብወገነይ ተቐዳዲመ ኣብ ኣእምሮይ ሓንቲ ነገር ብምቕማጥ ካልእ ተመሃራይ ከይቅድመኒ ክጽሊ ጀመርኩ። እንተኾነ ልዕሊ ፍርቂ ካብቶም ተማሃሮ ቅድመይ ዝሕተቱ ብምንባሮም ቦቲ ሓደ፣ ቦቲ ካልእ ከኣ፣ እታ ኣብ ኣእምሮይ ዝተጠንሰት ሓሳብ ሓንቲ ካብተን ብቐዳምነት ክጥቀሳ ዝኸእላ ኢላ ዝሓሰብክወን ብምንባራ ዓቢ ስግኣት ነበረኒ። ግና እንድዕሉ፣ ኩሉቲ ዝጠቓቐ ስዎ ዝነበሩ ዓይነት ስራሓት ካብ ግምተይ ወጸኢ ደኣ ኮነ። ገለ ካብቶም ደቂ ክፍልና ተማሃሮ እሞ ከኣ፣ ደቂ ምሁራት ግዲ ኾይኖም ኣብቲ እዋንቲ ኣነ ክሓስበሎ ምን ክመርጸምንሲ ይትረፍ፣ ነስማቶም እኳ ሰሚዑዮም ዘይፈልጥ ዓይነት ሞያታት ይጽውዑ ነበሩ።

ኣብታ ህሞትቲኣ ዝተመሃርክዎ ነገር እንተኔሩ፣ ነቶም ሓምሳን ኣርባዕተን ኣብታ ክፍሊ ዝነበርና ተመሃሮ ብዘይ ጸገም ሓሓዴና ክበጽሓና ዝኸእል ዓይነት ስራሓት ከምዘሎ እዩ። ፓይሎት፣ ጆሜትራ፣ ሓኪም፣ ነዳጃይ፣ ኣላማይ፣ ቀምቃማይ፣ ፋርማሲስት፣ ሓረስታይ፣ ፈላሲት፣ መሃንድስ፣ ፈለኛሞ፣ ደራሲት፣ ሰራሕ ወርቂ፣ ሰራሕ ጫማ፣ ዳኛ፣ ደራፋይ፣ ቆናኒት፣ ኣስትሮኖመር፣ ሰክረታሪ፣ ኩዕሶ ተጸዋታይ፣ ፋግሮ..... ወዘተ። ኣብ ዝደሓረ ክፋል ዕድመይ ከም ዝተመሃርክዎ እንተኾይኑ ከኣ፣ ነቶም ሓምሳን ኣርባዕተን ተመሃሮ ሓሓደ ግዜ ጥራይ ዘይኮነስ ከክልተ ሰለስተ ግዜ ክበጽሓና ዝኸእል ዓይነት ሞያታት ምህላወ እዩ። ካልእ እንተዘይፈለጥኩስ ብውሑዱ፣ ልዕሊ ሰላሳ ዝኾኑ ዓይነታት መሃንዲሳት ክህልዉ ከምዝኸእሉ ፈሊጠ ኣለኹ። ዓይነታት ናይ ሓካይም ከኣ ኣዲኦም ትቐጽሮም። ኣሃ! ለካ እዞም ኣጸቢቕና ዘይተመሃርና ኢና ዝውዳእ ዝመሰለና እምበር፣ እቶም ናይ ብሓቂ ምሁራትሲ ንዕግበቶም ክብሉ ውሽጢ ውሽጢ እናኣተዉ ብዙሕ ዓይነት ሓደስቲ መሳኽቲ እዮም ዘውጽኡሉ።

ናብታ ናይ ሓሙሻይ ክፍሊ ግዜ ክምለስ። ነታ ዝሓሰብክዎ ሓሳብ ልዕሊ ዕስራ ዝኾኑ ተመሃሮ ከይጠቐስዎ ተዓቂባትለይ ብምጽንሓ ዝተሓጎስክዎ ሓጎስ ወሰን ኣይ

ነበርን። ተርታይ ምስበጽሓኒ ደረተይ ነፊሐ ፍሽኽታ ሓዊስ፣ “መምህር” ክብልን፣ ወዮ መምህርና ንህቢ ከም ዝነኸሶ ብዓውታ እናጨደረ ኣብ ቅድሚና ክኾልልን ሓደ ኾነ። “Excellent! Excellent! Excellent! ብጣዕሚ ጽቡቕ! ጽቡቕ ምርጫ!” ገለ ካብቲ ዝብሎ ዝነበረ እዩ። ኣነ ብወገነይ እታ ዘውጸእክዎ ቃል ነቲ መምህር ክሳዕ ክንድኡ መትንታቱ ትትንክፎ ስለዘይመሰለኒ፣ ኣብቲ መጀመርታ ብዓውታ ክሃረብ ምስ ጀመረ ስንባደን ስክፍታን እዩ ወሪሩኒ። ናእዳ ምንባሩ ጸኒሑ እዩ ተረዲኡኒ። ብድሕሪኡ መምህርና፣ እተን ዝተረፉ ደጃይቕ ናይታ ዝተዋህቦ ክፍሊ ግዜ፣ “ኣገዳስነት መምህር ኣብ ምዕባላ ሕብረተሰብን ሃገርን” ብዝብል ዛዕባ ክምድር ስለዝተወድኣ፣ ብድሕሪይ ክሕተቱ ዝነበርም ገለ ሰላሳ ዝኾኑ ተመሃሮ ከይተሓተቱ ደወል ተቓጪላ ካብ ክፍልና ወጸ። ብድሕሪታ መዓልቲ እቲኣ ሞያ ምምህርና ምስ ህይወተይ ገለ ምትእስሳር ዘለዎ ኮይኑ ክስመዓኒ ስለዝጀመረ፣ ኣብ ኣእዋኑ ንዘጋጠሙኒ መማህራን ነንሕድሕዶም እናወዳደርኩ ንዓይ ዝመስለኒ ሚዛንን ደረጃ ብቐዳትን ይዕድሎም ነበርኩ። ቦቲ ናይ እዋኑ መለክዒያይ፣ ብሓቂ ንፋዕ ኢላ ዝኣመንኩሉ መምህር ኣነ ኣብ ዘለኸዎ ክፍሊ ክኣቱ ከሎ ዝወርረኒ ዝነበረ ስምዒታት ዘይርሳዕ ዮዩ። ኣእዛይ ጸልዮ ንነብሲ ወክፍ ካብ ኣፍ መምህር ዝሞለቐት ቃል ብሃንቀውታ ክጽበ፣ ትሕዝቶ ትምህርቲ ኣብ ውሽጢ ነብሲ ኣትዩ ሓደስቲ ናይ ህይወት ሓቅታት ክረክብ ከለኹ ዝነበረ ባህታን ኣድናቓትን ዝተሓዋወሶ ጥርዝ ስምዒታት፣ ተረዲኡኒ ኣሎ ኢላ ንዝኣመንኩሉ ሓቂ መምህር ሓላሊኹ ኣደናጋሪ ጌሩ ከቐርቦ ከሎ ቁጠዕ ክለዓለንን ተንሲእካ ተክኣዮ ክመጸኒን.... ወዘተ። ገለ ካብ ናይ ተማሃራይ ዓለም ትዝታታተይ’ዮም። ብርግጽ፣ ኣብ መንጎንቲ ናይ ብሓቂ መምህር ዝብሎን ተመሃራይን ዘሎ ስነ-ኣእምሮኣዊ ሰንሰለት ካብቲ ናይ ውሉድን ወላድን ርክብ ከምዘይፍለ ኣብተን ተመሃራይ ኮይኑ ዘስተማቐርክወን ዓመታት ክርዳእ ክኢለ’የ።

ሕልምታተይ ከኣ ብኡኡ መጠን፣ ነቲ ናይ ብሓቂ መምህር ኢላ ብምስሊ ኣብ ኣእምሮይ ዘቐመጥክዎ ሰብ ንኸበቅዕ ምዝሃዎም ባህርያዊ እዩ ኔሩ። ይሓልም፣ ብመንገዲ ትምህርትን መምህርን ኣቢሉ እቲ ናይ ብሓቂ ተፈጥሮኣዊ ብቐዓት ናይ ሰባት ክንጸባረቕን ኣብ ጥቕሚ ክውዕልን። ይረኣየኒ፣ መምህር ነብሶም ምልላይ ስኢኖም ስልቻወን ትህኪትን ንዝወረርም ሰባት ተውህቦም ረኽቡ ሓድሽ ሓይልን ፍናንን ክዘርኣሎም። ዕድመ እናወሰኸኩ ብዝኸድኩ ከኣ፣ ነቶም ተራ ስምዒታት ብዓቕመይ ቁሩብ ትንተና ከእትወሎም ይፍትን እሞ፣ ንመምህር ኣብ ማእከል ናይቲ ዓውዲ ኣቐሚጥካ ኩሎም ናይ ሕብረተሰብ ድሌታት ክገሃዱ ከምዝኸእሉ እበርሃለይ። ንኣብነት ኣፍሪቃ ብዘይካ መማህራን ካልእ ዝሰኣነት ኮይኑውን ኣይስመዓንን። ናታ ናይ ገዛእ ርእሳ ማለት ኣፍሪቃውያን መማህራን ብዘይምውናና ነቲ ኩሉ ዕድላታ እናኸሰረቶ ትነብር ከምዘላ ኮይና እያ ትርደኣኒ። እዚ ከም ናይ ውልቂ ስምዒታት መጠን ቅነዕነቲን ዘይቅነዕነቲን ንምርግጋጽ ገለ መጽናዕትን ተወሳኺ ምርምርን ዘድልዮ እኳ እንተኾነ፣ ክሳብ ለይተ ሎሚ እቲ ዝዓበየ ጉዳይ ኮይኑ እስመዓኒ።

ከምዚኣም ዝኣመሰሉ ኣተሓሳስባታት ጸይረ ብዝኸድ

ክም ጉዕዞ ትምህርቲ ናይ ካልኣይ ደረጃ ትምህርተይ ሃዚመ ናብ ዩኒቨርሲቲ ዘእቱ ነጥቢ ስለዘምጸእኩ ከም ብዙሓት መዛዋይ ትምህርተይ ንምቕጻል ተተሓሒዘዮ። ናይ ቀዳማይ ዓመት ትምህርቲ ተወዲኡ፣ ክመሃሮ ዝደሊ ዓይነት ሞያ እመርጸሉ ኣብ ዝነበርኩ እዋን፣ ብዙሕ ዘይት እኳ እንተዘይኮነ ኣብዚ ዓድና ክርከቡ ካብ ዝኸለሉ ዕድላት ኣብ ዝመረጽክም ዓውደ ትምህርቲ ከእትወኒ ዝኸእል ነጥቢ ኔሩኒ። ልክዕ ንምጥጋን መንእሰያት ብጸተይ ከኣ እንታይ እብል ከምዘለኹ ኣጸቢቐም ንኸርድኡኒን፣ ኣብቲ እዋንቲ ዋላ ንዓሰርተ ተማሃሮ ጥራይ እትፍቀድ ሓንቲ ጸባብ መንገዲ እንተ ትነብር ተወዳዲረ ዘእቱ ነጥቢ ኔሩኒ ክብል ይደፍር። እቲ ክሳብ ሎሚ ሕንቅልቕንቅሊተይ ኮይኑኒ ዘሎ ነገር ግን ምስቲ ኩሉ ዕድላተይ ነቲ ናብ ሕልመይ ዝወስድ መንገዲ ስሒተዮ ምሕላፊይ እዩ። ወይ ናይ ሰብ ነገር... ምሉእ የብሉን።

እታ ሞያይ ዝመረጽኩላ መዓልቲ ልዕሊ ዓሰርተ ዓመታት ዘሕለፈት እኳ እንተኾነት ብፍጹም ክርስዓ ኣይክእልን 'የ። ነታ ዝተሞህበትኒ መምረጺት ፎርም መለኦ ከእትዋ እናኸድኩ ከለኹ ኣብ መንገዲ ሓደ ካብቶም ዝፈትዎም ኣዕሩኽተይ እረክብ። ንሱ ቅድመይ ቀጽሪ ዩኒቨርሲቲ ዝረገጸ ብምንባሩ ዝሓሸ ሓበሬታ ክህቡኒ ካብ ዝኸለሉ ዝብሎም ዝነበርኩ ሰባት'ዩ።

“Department መረጸ፣ ነዛ ወረቐት ከእትዋ እዩ ዝኸይድ ዘለኹ፣” ነታ ኣብ ኢደይ ዝነበረት ወረቐት ንኸራ እና ሃብክዎ።

ወዮ ዓርከይ ነታ ወረቐት ደጋጊሙ ድሕሪ ምርኣይ፣ “ከምዚ እንድሕሪ መረጽካ ደኣ መምህር እንዳኣልካ ክት ከውን?” ይብላኒ።

“ኢሂሞ መምህር?”

“ማለት'ሲ... መምህር ኣብዚ ዓዲ ቦታኡ ትፈልግ ኢኻ። ከምቲ ንስኻ ትደልዮ ዘለኻ ናይ ገዛእ ርእሰኻ ምርምር እናገበርካ ትምህረሉ ኩነታት ከኣ የለን። እቶም ከማኻ ዝኣመሰሉ ተማሃሮ ኣብዚ ዓዲ እንታይ ይመርጹ ከምዘለዉ ንዓኻ ዶ ጠፊኡካ?” ብምባል ስቕ ኢሊ ንኸሓስብ እኹል ግዜ ሂቡኒ።

ዓርከይ፣ ብዛዕባይን ድሌታተይን ተወሳኺ ሓበሬታ ዘድልዮ ከምዘይኮነ ስለዝፈልጥ ዝበሃል ኣይነበረን። ናብ መሬት ደኒኒ ምስ ነብሰይ ኣብ ምጉት ኣተኹ። ሓያለይ ደቓይቕ ድሕሪ ምሕሳብ ካልእ ዘይተመልኦ ወረቐት (ፎርም) ንኸደሊ ነቐልኩ። ኣብታ ዝረኽብክዋ ሓዓስ ወረቐት፣ ነቲ ተማሃሮ ብቐዳማይ ደረጃ ይመርጽዎ እዮም ዝተባህለሉ ናይ ምህንድስና ትምህርቲ፣ ካብ ሓሙሻይ ተርታ ስሒብ፡ ኣብ ቁ.1 ከምዚ ናይ ሕርቕርቕ ቐት ሽርጥ ሽርጥ ኣቢሊ ጽሒፊዮ። ነተን ኣብ ቀዳማይን ካልኣይን ደረጃ ኣስፊረየን ዝነበርኩ ከም ቀንዲ ኣዕሩኽ ተይ ዝፈትወን ፊዚክስን ማትሰን ከኣ ከይኩርያኒ ብምሰጋእ ኣድምቐ ኣቢሊ ኣብ ካልኣይን ሳልሳይን ተርታ ኣውረድኸወን። ከምኡ ደኣ ሕማቕ ቃል-ዓለም እምበር፣ እቶም ዝምድቡ ሰባት ካብታ ኣብ ቁጽሪ ሓደ ዘቐመ ጥክዋ ዓውደ ትምህርቲ ወጸኢ ናብ ካልኣይቲ ምርጫ ከውርዱኒ ከምዘይክእሉ ኣንዳዕዲዐ እፈልጥ ኔረ እዩ።

እታ ከም ሓዘንተኛ ብትዝታ ተዋሒጦ ከምሰኹላ ምሸትን፣ ምሉእ ለይቲ ከዕለብጥ ብዘይ ድቃስ ዘሕለፍ

ክዋ ለይትንውን ክርስቦን ኣይክእልንዮ። ነብሰይ ብቐዳማነት ንእትሰርዖ ነገር ንጎድኒ ገዲፈ ከባብዩይ ኣብ ቅድሚት ዘቐመጡለይ ምርጫ ብምውሳደይ፣ ውሽጠይ ምሉእ ክረምቲ ክኸሰኒ ከራሙ። ብድሕሪኡ ዘሕለፍክዎ ናይ ተማሃራይ እዋን ብምሉእ ወኒ ከምዘይተማሃርክዎ፣ ክትሕት ዝጀመረ ነጥብታተይን ክጋገ ከለኹ ዘርእዮ ዝነበርኩ ሸለልትነትን እኹል ምስክር'ዩ።

እዚ ሎሚ ሎሚ ዘዘውትሮም ዘለኹ ናይ ዓንጽ-ዓንጽ ጠባያትን ስምዒታትን እሞ ኸኣ ንባይኖም ዓይነት'ዮም። ዝኾነ ዕዮ ገዛ ክስርሓሉ ዝደሊ ተማሃራይ ንገዛይ እንተ መጸኡኒ፣ ነቲ ዝደለዮ ወዲኦ ከዩፋንዎ ይስማዕ ኣይስማዕ ብዘየገድስ ኣረድእ የምስዮ። ኣብ ጎደና ተማሃሮ ተኣኪቦም እናተኻትዑ ክኸዱ እንተራኦ ኣብ ትሕቲቲ ሽባኻ ኣጸጊዕካ ቁሩብ ግበረሎም እመጸኒ። ዓቕሚ ኣዳም ዝበጽሑን ማየም ዝሰተዩ ዝበሃሉ ሰባትን፣ ስነ-ፍልጠታዊ ኣገባብ ኣነባብራ ንጎድኒ ገዲፎም ወይ ጠፊእዎም የማን ጸጋም እናዕለበጡ ንስራሕ ክጎትዎ ክርኢ ከለኹ ዓቕለይ ኣጽብብ። ኣብቲ ቤት ጽሕፈቶም ዓጽዮ ንእሽቶ ክላስ ክፈልዮሎም ኣይጸልእን። ነብሰይ ካብ ዝኾነ ነገር ንላዕሊ ስነ-ፍልጠታዊ ነገራት ምስ ሰባት ምክፋል ደስ ከምዝብላ ብዙሕ እዋናት ፈቲኑያ እዩ። ንሱ ከኣ፡ ኣብ ቤት ትምህርትን ምስ ምምህርናን እዩ ዘሎ።

ኣብ ሞያ ንነብሱ ብልክዕ ዘይረኽባ ሰብ ኣብ ስራሕ ዓለም ፍሉጥዮ። ዘዕግቦ ነገር ስለዘይብሉ ዝርካበን እተን ዝገብረን ብገንዘብ ይልክዐንን ሰዓት ክሳብ ትኣክለሉ ክጽብ ይውዕልን። ጽቡቕ ስራሕ ክስራሕ ከሎ ብዙሕ ዕግበት ስለ ዘይፈጥረሉ ድማ ዋላ ጌጋ ዝኾነ መምርሒ ሂሳብ ግበር እንተበልካዮ ድሕር ኣይብልን። ነቲ ስራሕ ምስ ህይወቱ ኣየተኣሳስዮን። ኣነ ድማ ኣብ መንጎ እና ሰራሕኩ ከለኹ፣ “ዋላ ከይተገብረ ዘይሓድር ጽባሕ እገብሮ፣ ኣየናይ ጥዑይ መሃዶኽ ክኸፈለሉ ኢሊ እዩ?” ክብል ጀሚረ ኣለኹ። ዝኾነ ተማሃራይ እዚኣባ ኣረድኦ ኣኒ እንተይሉኒ ግን ዝገደፍኩ ገዲፈ ከምዝገብራ እፈልጥዮ። ኣብ መንጎ ምሳሕ ይኹን ድራር። ብገንዘብ ክትምኖውን ኣይደልን። እሞ ኸኣ መምህር ዘይኮንኩን ዘይበቓዕኩን ከለኹ።

ዕድመ እናወሰኸካ ምስከድካ ነቶም ዘሓጉሱኻን ዘግዕሱኻን ፍጻሜታት መበገሲኦም ብልክዕ ክትፈልጦን ክትትንትኖን ምፍታን ኣይተርፍን እዩ። ነቲ ብጌጋ ዝተሓልፈ ተመክሮ ህይወት፣ ካልኣት ኣሕዋቱን ደቁን ንኸይደግምዎ፣ “ከማይ ኣይትኹኑ” ክብል ዝደፍር ግና ኣዝዩ ሒደት እዩ። ዋላ ኣብቲ ኩሉ ሰብ ዓይኑ ዘውድቐሉ ስራሕ እናሰርሐ ንነብሱ ፈቲሹ፣ “እዚ ዝረኦ ዘሎ እቲ ልክዕ ኣነ ድዩ ኣይኮንኩን?” ብምባል፣ “ኣይ! ኣንታ እዚ ኣነ ኣይኮንኩን ካብኡ ዝሓይሽ ኣነስ ኔሩ፣ ግና ኣጥፊኦኹ” ዝብሉ ምሁራት እንተዝበዝሑስ ክንደይ ኮን ምተጠቐምናሎም። ምኽንያቱ ዝወዓለ ክነግረካ ከሎ ጽቡቕ 'ዩ።

ብዓቕመይ ካብ ዝተረዳእክዎ ገለ ካብቲ ናብ ጌጋ ይመርሓና ኣሎ ዝበልክዎ ሰንሰለታዊ ጠንቅታት ክዝክረልኩም። ሰባት ብብጃምላ ናብ ሓደ መንገዲ ክፈሱ እዕዘብ ስለዘለኹ እቲ ነገር ኣብ ውልቀይ ጥራሕ ከይኮነስ ዳርጋ ኣብ ኩልና ኮይኑ ስለዝተሰማዓኒ ብናይ ሓባር ትዕዝብቲ ክኸዶ እዩ።

ሀ. ገና ብነኣሽቱና፡ ስድራና ናብ ቤት ትምህርቲ ክል



እኩና ከለው፣ ብመንገዱ ትምህርቲ አቢልና ቁጠባዊ ጸገማቶም ክንሸፍነሎም ይምሕጸኑና። “ስለምንታይ ትመሃሩ አለኹም?” ንዝብል ሕቶ ከአ፣ “ተማሂርና ደኣ፣ ንነብስና ኪንና፣ ንስድራናን ንሕብረተ-ሰብናን ክን ከውን፣” እናበልና ንምልስ። እዚ መልሲ ብቐጥታ ምስ ንዋይ ዝተሓሳሰር እዩ። ንነብስና፣ ንስድራና፣ ንሃገርና ወርቅን ጨርቅን ክንገብርም ያኢ። ካብኡ ሓሊፍና ናብ ደረጃ፣ አፍሪቃ፣ ዓለም፣ አድማስ ብሓፈሻ ገጽና ንብዙሕ ኣይንደፍርን። ወርቅን ጨርቅን ድዩ ዘርል ዮም ዋላ ፍቕርን ሰላምንውን ብዙሕ ኣይንትንትኖን ወይ ውሁብ ንወስዶ።

ነቲ፣ “ንምንታይ ክንመሃር ንደሊ?” ዝብል ሕቶ ድሕሪቲ ልክዕ ግዜ ደኣ ኮይኑ እምበር ካልእ መልሲ ዝረኽብኩሉ እመስለኒ። ናይ ብሓቂ ክመሃር እንተኾይ ነስ፣ መጀመርታ ንነብሲ ደልዩ ክረኽባ። እንተረኽቢያ ከኣ ምስ ስድራይ፣ ሕብረተ-ሰብይ፣ ዓለመይ.....ኣብቲ ልክዕ ቦትኣ ከቐምጣ። እንተኸኢሊ ድማ ናይ አድማስ ክልሰ-ሓሳብ ክርድኡን ነዛ ደቃቕ ነብሲይ፣ እንታይነታ፣ መበገሲኣን መዕረፊኣን ብዝምልከት ኣእማኒ መልሲ ክረኽብላ። ምሳይ ዝተፈጥረ ተፈጥሮአዊ ጸዓትን ተውህቦን እንተልዩ ከኣ ምሳይ ካብ ዝቐበር ቅድሚ ምሕላፊይ ብምሉኡ ከህልኹን ከምዛ ሳምና ብዘይ ሕቃቕ ተረፍ ኣብ ኣገልግሎት ከውዕሎን ወዘተ.....ዝዓይነቱ እዩ። ንደቂ ሰባት ካብ ንነብሲኻ ምርካብን ምፍላጥን፣ ዝኸብድን ዝዓቢን ቅውም-ነገር ዶኹን ይህሉ ይኸውን?

ለ. ከምዚ እናበልና ንህይወት ምስ ቁጠባዊ ትሕዝቶታት እናነጻጸርናያ ንዓቢ’ሞ ካብኡ ዝገደደ ከኣ፣ እቶም ኣብ ቅድሚና ዘለዉ ምርጫታት ዘይፍትሓዊ ዝኾነ ደረጃታት ተዋሂብዎም ይጸንሑና። ሰብ ከከም ህርኩትነቱን ኣበርክትኡን ክረብሕ ባህርያዊ እኳ እንተኾነ፡ እቲ ህርኩት ሓኪም ወይ ህርኩት መሃንድስ ካብቲ ናይቲ ህርኩት መምህር ዝዛደ ኣበርክቶ ከም ዝገብር በዩናይ መለክዒ ስለዝተረጋገጸ ኹን ይኸውን ነንበይኖም ደረጃታት ተዋሂብዎም? ደረጃታት ምስራዕ ዘድሊ እንተድኣ ኣኮይኑኸ፣ ንኣደ ኣብ መዓልቲ ሰላሳ ዝኾኑ ዝሓመሙ ሰባት ሓኪሙ ዝውዕል ሓኪምን፣ ናይ መጻኢ ሓምሳ ጥዑያት ዜጋታት ክምልምል ዝወዓለ ሰብን ከመይ ምመደብኩምሎም? ሕማቕ ኣጋጣሚ ኮይኑ ገንዘብ እንድዩ መዐቀኒ ናይ ኩሉ ክብረታት ዘሎ፣ እስከ ብገንዘብ ክንትምኖ ንፈትን።

ገለ ካብቲ ብዙሕ እዋን ዘተሓሳስበኒ ንኣብነት፣ ኣነ ንውላደይ እቲ ክቐስሞ ዝደልዮ ፍልጠት ባዕለይ ምሂረ፣ እንተሓመመ ዝሕክምዎ ሓካይምን ከይቆርር ገዛ ዝሰርሕሉ መሃንድሳትን ግን ብገንዘብ ቆጶሪ ከምጽኡሉ እመርጽ፡ ካብ ባዕለይ ሓኪመ ናብ ዘይፈልጦምን ዘይኣምኖምን መማህራን ከፋንዎ። ከምዝርደኣኒ፣ እዞም ዘይማዕበሉ ዝበሃሉ ዘለዉ ሕብረተ-ሰባት ናይ ገዛእ ርእሶም ስርዓተ ትምህርትን ምምህርናን ክፈጥሩ ብሰንኪ ዘይምኽኣሎም እዮም መጋበርያ ናይ ካልእ ኣተሓሳስባታትን ዘይቀጥታዊ መግዛእትን ኮይኖም ዝርከቡ። ነቲ ቅድሚት ዝሰራዕ ከቐድሙ ዘይምኽኣሎም እዩ ድማ ዘይማዕበሉ ዘብሎም።

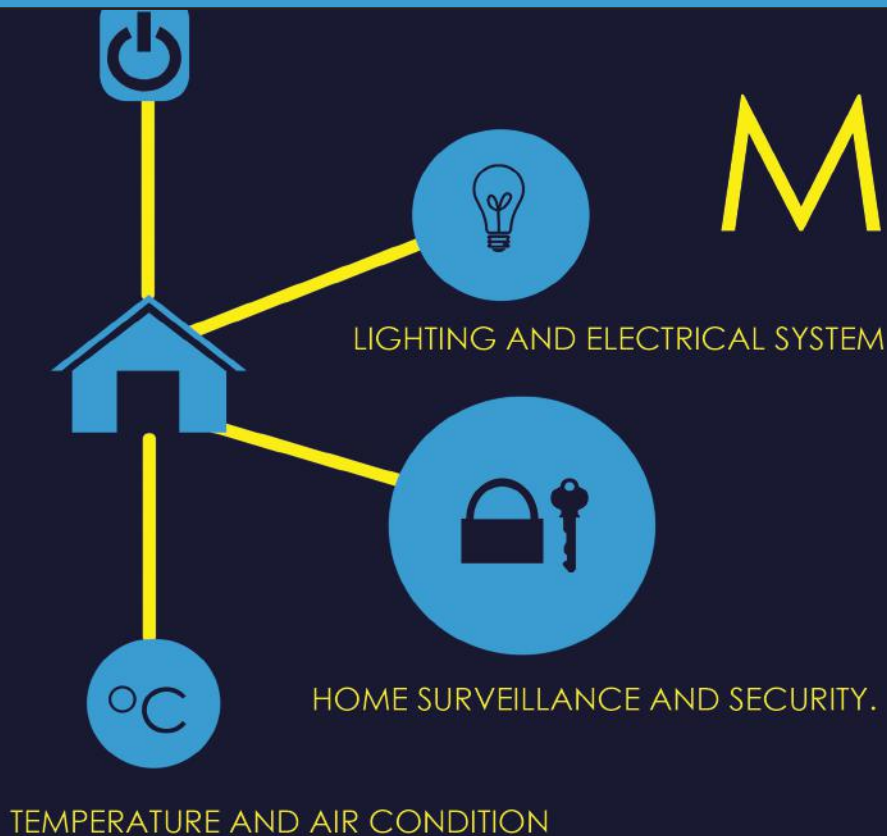
በቲ ኣባና ዘሎ ኣብነት ምጥቃም ጽቡቕ’ዩ። ነቲ እንወስዶ ሃገራዊ መልቀቂ ፈተና ከም ዘተኣማምን መለክዒ እንተወሲድናዮ፣ ኣርባዕተ ምሉእ ነጥቢ ዝረኽቡ ተማሃሮ

መማህራን ኮይኖም ንፋዓት ሓካይም፣ አመሓደርቲ፣ መሃንድሳት፣ ዳያኑ፣ ሓረስቶት ወዘተ....ክምልምልሉ ዝኽእሉ ኩነታት እንተዝህሉስ እቲ ዝብጻሕ ክንበጽሖ ዘድልዮ ግዜ ኣይምሓጸረንዶ? ምኽንያቱ ኩሎም እቶም ካልኣት መምህር እንተረኽቢዎም’ዮም ዝስስኑ።

ሐ. እቲ ኣብ ኣከባቢና ዘሎ ሃዋህው ከምዚ ልዕል ኢሊ ዝጠቐስክዎ ኮይኑ፣ ንሕና ናብ ምርጫ ኣብ እንቐርብሉ እዋን ድማ ናብ ነብስና ክንዲ ንርኢ በቲ ኣብ ዙርያና ዘሎ ግዝያዊ ነገራት ተጸሊና ንውስን ምጃንና እቲ ዝገደደ ክስተት’ዩ። ነቲ ከምዚ እንተትኸውን ኢልና ንምነዮ ነገር ባዕልና ጽዒርና ክንፈጥሮ ከም እንኽእል ዘይምእማንና ዝፈጠሮ እዩ። ነቲ ኣብ ቅድሚት እንሰርዖ ሞያ፣ ኣብኡ ኣቲና ሰሪሕና እቲ ልክዕ ቦትኡ ክነትሕዞን ክንጽዕረሉን ይበልጽ፣ ካብ ኣብ ማዕዶ ኬንና ለውጢ ክንጽብ ነብስናን ግዜናን ነጥፍእ። ኣብ ህይወት ብዘይካ ናብቲ ዝኣመንናሉ መንገዱ ምኻድ ካልእ ምርጫ የለን። ምኽንያቱ እቶም ካልኣት መንገድታት ናብ እናተንቀሳቐስካ ዘይምህላው ዝዓይነቱ ኣንፈት’ዮም ዝወስዱ።

ኣብዚ ቀረባ እዋናት ብዙሓት ኣብነታውያን ተማሃሮ ብተደጋጋሚ፣ ኣነ ሓኪም ክኸውን’የ ዝደሊ ክብሉ ይስምዑ ኣለዉ። ገሊኦም ድማ፣ “ሰብ ጌርዎ ኢሊ ዘይኮንኩስ ካብ ብቐልዓይ ኣትሒዞ ዝሓስቦ ዝነበርኩ እዩ፣” ክብሉ የራጉድዎ ኣለዉ። ኣቤት፣ ሓቆም ዶኹን ይኾኑ? እቲ መልሲ ንሶም ጥራይ ዝፈልጥዎ እኳ እንተኾነ ንኹሎም ክንኣምኖም የጸግም’ዩ። ምኽንያቱ ቅድሚኦም ከኣ ኮምፕዩተር ሳይንስ ዝመሃሩ ተሸለምቲ ዛግረ ነይሮም’ዮም። ንሶምከ ካብ ግዜ ቁልዕነቶም ኣትሒዞም ነተን ዘይነበራ ኮምፕዩተራት ከዛርብወንን ክፈናጥሕወንን ይሓልሙ ኔሮም ድዩ ክበሃል? ብዘይ ምግናን፣ ብነብሲ ዝፈተንክዎን ኣብ ብዙሓት መሳቶይ ዝተዓዘብክዎን ነገር ስለዝኾነ ኣብ ውሽጡ ምስሉይነትን ንነብሲኻ ባዕልኻ ክተደናግራ ምፍታንን ከምዘለዎ ኣይጠራጠርን’ዩ። ውጽኢት ናይ ንነብሲኻ ባዕልኻ ምድንጋር ከኣ ንነብሲኻ ምኽሳር እዩ።

ከም መደምደሚት ሓንቲ ኣብዚ ቀረባ እዋን ዝበጸሕክዎ ሓቂ ከካፍለኩም። ገንዘብ መዐቀኒ ናይቶም ዓቢይቲ ክብረታት ወድሰብ ምጃኑ ኣዝዩ ዘሕዝነኒ እኳ እንተኾነ፣ ብዛዕባኡ እየ ክጠቅስ። ኣነ፣ መምህር ኮይነ ኔረ እንተዝኸውን ብዘይካቲ ዝረኽቦ ስነ-ኣእምሮአዊ ዕግበት፣ ካብዚ ዘለኸዎ ዝተዓጸጸና እቶት ምሃለወኒ። በዚ ሕጂ ዘሎ ኣካይዳ ማለተይ እዩ። ምኽንያቱ ዕጽፊ ናይቲ ንቡር ናይ ስራሕ ሰዓታት ምሂረ’ውን ኣይምሰልቸወንን።



# MEKSEN

## SMART HOME

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When we are far away from home, we are always suspicious about our home stuff. “Did I lock my door?” or “what about my light?” those are our mind over and over, but nowadays it is a time for IOT (internet of things). Technology is playing a great role in such situations. However, for the special purpose it has to be developed by someone. Someone who is capable of inventing new things; Someone that devote his time to research on new ideas.

One of the latest innovations in IT has been the internet of things, in which the things we use in our everyday life are able to communicate with each other and with users. This new field has been implemented in lots of fascinating ways which ranges from simple smart ovens to fully automated smart homes. We have chosen to embark up on this new innovation and contribute to the growing number of applications that are being developed. Our project aims to develop a smart home in which the user can do most of the things he does just from his smart –phone or a Wi-Fi enabled laptop where ever he is, using SMS on his Phone, any Wi-Fi enabled device, or internet using a smartphone or any device connected to internet.

### OBJECTIVE OF THE SYSTEM

The purpose of this project is to be able to communicate with your home while you are away and have a security in your home with simple and easy to di hardware and software so that anybody who wishes to have secure and smart home could enjoy the work of the smart home from their smartphone using the internet access or using Wi-Fi access if he/she is near his/her home or even using SMS.

Devices may be connected through a home network to allow control by personal smartphone, and may allow remote access from the internet. Through the integration of information technologies with the home environment, systems and appliances are able to communicate in an integrated manner which results in convenience, energy, and safety benefit. The main objectives of the system are as follows:

#### 1. Security

A household security systems integrated with a home automation system can provide additional service such as remote surveillance of security cameras over the internet. With the smart home, the user can select and watch cameras live from an



internet source to their home or business. Security systems can include motion sensors that will detect any kind of unauthorized movements in the house and notify the user through the security system that is via the cell phone.

## 2. Temperature Control

The temperature control system will be used to maintain the temperature of the house at the given temperature threshold and when the temperature exceeds the given threshold it will turn on the ventilation system and maintain the temperature of the room.

## 3. Light Control

Using any smartphone that have an app we developed you can communicate with our system and will help you to control the lighting system of our home or any smart TV or any smart devices for that matter. As we said on the above this can also be done using the internet and SMS while we are away from our home.

## DISADVANTAGE OF THE EXISTING SYSTEM

Most of the current system are made to be accessed with LCD displays, though some advancement in the field has allowed the systems to be accessed remotely with high speed broadband internet connection. As high speed broadband internet connection is not widely available throughout the globe it has been a bottleneck to the development of these systems.

Another major disadvantage of the current system is that their functionality is heavily limited to surveillance and security rather than overall home automation. And though some other system exist that allow the automation and control of other home appliance, there has not been a full-fledged easy to use single home automation system that includes all the mentioned features.

Moreover most home automation systems are not easily affordable for middle class customers, as the existing systems are highly commercialized they are not available easily.

## ADVANTAGE OF THE PROPOSED SYSTEM OVER EXISTING SYSTEMS

One of the main advantages of our proposed system over the current system is that it is designed to be accessed through multiple modes of communication including Bluetooth or Wi-Fi for close proximity; and the through internet or SMS over GSM for remote notification and control. Another advantage of our system over the existing system is that it is not limited to surveillance and security, though it will also encompass those features fully. The system will integrate many home automation features like:

- Lighting and electrical system control and automation
- Temperature and air condition control and automation
- Home surveillance and security.
- Remote control and automation of most home appliance including microwaves ovens, refrigerators, door...etc.

Furthermore our system is planned to be developed with very low cost, and is aimed to be used readily available resources, except for few low cost elements, rather than to be built with high end expensive systems. This makes it appealing and affordable to most middle class customers.

# Hardware and Software

## used on the project

- Arduino microprocessor Board with full kit
- A Webcam.
- Different kinds of digital sensors
- Android studio
- An open source Android http server called OkHttp
- Arduino code editor

## Frequently Asked Questions

**Q :** What was the most challenging part of the project?

**A :** The most challenging part of the project was the implementation of the intercommunication between the different parts of the software and hardware because all of them were from different vendors and use different technologies.

**Q :** What makes the project so unique from the projects that are implemented before your project?

**A :** The other kind of projects where all focused on the broadband connection and use very expensive hardware but ours was very cheap and effective and easy to install.

