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Smart Harvesting Robot for Saltpan Workers

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Abstract*—we propose a project which helps to harvest the salt by using the robot without using manpower. Based on ATMEL328 with Arduino UNO programming an rpm motor can be controlled with driver circuit. It is a good replacement for human effort in salt pans. If we introduce this salt harvesting robot in salt pans, it will do all the work which is done by humans without any supervisions and external power supply. It is two times more efficient than humans. It works throughtwo power sources either solar power or additional battery power. It can be easily moved from one place to another place. The construction consists of gear motors, microcontroller, motor driver and solar pand. By using this robot we can avoid various skin diseases to the humans caused by sea water.This is very helpful to salt production

Index Terms—*Arduino ,Atmel 328 microcontroller, Gear motor, Harvest*

I. INTRODUCTION

Fig. Saltpan Workers Process

India is the third largest Salt producing Country in the World after China and USA with Global annual production being about 230 million tones. The growth and achievement of Salt Industry over the last 60 years has been spectacular. When India attained Independence in 1947, salt was being imported from the United Kingdom & Adens to meet its domestic requirement. But today it has not only achieved self-sufficiency in production of salt to meet its domestic requirement but also in a position of exporting surplus salt to foreign countries. The production of salt during 1947 was 1.9 million tones which have increased ten folds to record 22.18 million tons during 2011-12. So we wish to do a project to reduce the work load of the workers employed in salt production. This robot will do all the work which are done by humans without any supervisions and external power supply. It is two times more efficient than humans.

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II. PROBLEM STATEMENT

Looking at the large number of salt workers exposed to salt and facing occupational health problems like prevalence of ophthalmic symptoms, dermatological symptoms like headache, giddiness, breathlessness, muscular and joint pains.

The ophthalmic problems were most common, probably due to irritation by direct sunlight and its glare caused by salt crystals to brine as well as irritation, traumatic ulcers, dermatitis, muscular and joint pains, headache and giddiness were other more common symptoms to salt workers. There is a need for developing a mechanism for prevention of these problems to them.

According to a study conducted by the National Institute of Occupational Health in Ahmedabad, the farmers suffer from skin lesions, severe eye problems owing to intense reflections off the white surfaces, and tuberculosis. A salt worker seldom lives beyond 60 years

Fig. Saltpan Workers Process

It is a herculean task to carry the equipment over the marshy tract as no vehicle can negotiate the road in the post-monsoon season. Workers carry everything by hand, including this generator, using a corrugated sheet. But our module contains all the equipments required for salt harvesting.

III. EXISTING SYSTEM

Before the salt harvesting machines are found most salt was hand-harvested and used for human consumption and food preservation. When salt was required in mass quantities by the chemical Industries, harvesting by hand was no longer flexible and the mechanical harvester was developed. The high technological methods were designed to produce mineral rich food grade salt.

The harvester is faster than the humans and can work all day without any problem. It is more efficient and requires less maintenance. Since the harvester contain less number of components, it is inexpensive. The harvester can do all the works done by a worker in the field of salt harvesting.

IV. PROPOSED SYSTEM

This is the oldest method of salt production. It has been used since salt crystals were first noticed in trapped pools of sea water. Its use is practical only in warm climates where the evaporation rate exceeds the precipitation rate, either annually or for extended periods, and ideally, where there are steady prevailing winds. Solar salt production is, typically, the capturing of salt water in shallow ponds where the sun evaporates most of the water.

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The concentrated brine precipitates the salt which is then gathered by mechanical harvesting machines. Any impurities that may be present in the brine are drained off and discarded prior to harvesting

Fig. Existing Method of Working

Two types of ponds are used. First is the concentrating pond, where the salty water from the ocean or salt lake is concentrated. The second is called the crystallizing pond, where the salt is actually produced.

Crystallizing ponds range from to 40 to 200 acres with a foot-thick floor of salt resulting from years of depositions. During the salt-making season of four to five months, brine flows continuously through these ponds. This is a saturated brine solution, containing as much salt as it can hold, so pure salt crystallizes out of the solution as the water evaporates. Natural chemical impurities are returned to the salt water source.

V. BLOCK DIAGRAM

Microcontroller is a programmable digital processor with necessary peripherals. Both microcontrollers and microprocessors are complex sequential digital circuits meant to carry out job according to the program / instructions. Sometimes analog input/output interface makes a part of microcontroller circuit of mixed mode (both analog and digital nature).

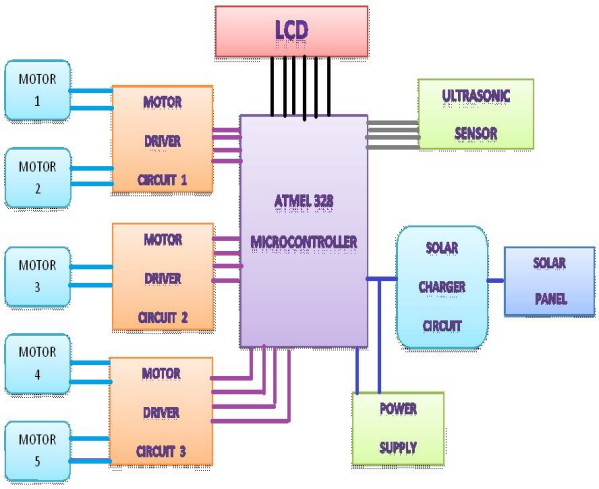

Fig. Block diagram of Atmel 328 microcontroller

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A microcontroller has required on-chip memory with associated peripherals. A microcontroller can be thought of a microprocessor with inbuilt peripherals. A microcontroller does not require much additional interfacing ICs for operation and it functions as a standalone system. The operation of a microcontroller is multipurpose, just like a Swiss knife. Microcontrollers are also called embedded controllers. A microcontroller clock speed is limited only to a few tens of MHz Microcontrollers are numerous and many of them are application specific

Fig. Arduino UNO Board

VI. DRIVER CIRCUIT

In electronics, a driver is an electrical circuit or other electronic component used to control another circuit or component, such as a high-power transistor, liquid crystal display , and numerous others.

They are usually used to regulate current flowing through a circuit or to control other factors such as other components, some devices in the circuit. The term is often used, for example, for a specialized integrated circuit that controls high-power switches in switched-mode power converters. An amplifier can also be considered a driver for loudspeakers, or a voltage regulator that keeps an attached component operating within a broad range of input voltages.

Typically the driver stage of a circuit requires different characteristics to other circuit stages. For example in a transistor power amplifier circuit, typically the driver circuit requires current gain, often the ability to discharge the following transistor bases rapidly, and low output impedance to avoid or minimize distortion.

A typical digital logic output pin can only supply tens of MA of current. Even though they might require the same voltage levels, small external devices such as high-power LEDs, motors, speakers, light bulbs, buzzers, solenoids, and relays can require hundreds of MA. Larger devices might even need several amps. To control smaller devices that use DC, a transistor-based driver circuit can be used to boost the current to the levels needed for the device. When voltage and current levels are in the correct range, the transistor acts like a high-current switch controlled by the lower current digital logic signal. A discrete BJT is sometimes used instead of a newer MOSFET transistor especially on older or low voltage circuits as shown below. On mbed, any GPIO pin could be used for the logic control input to the circuit with DigitalOut.

A. RPM motors

A Gear motor is a specific type of electrical motor that is designed to produce high torque while maintaining a low horsepower, or low speed, motor output. Gear motors can be found in many different applications, and are probably used in many devicesin your home.

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Gear motors are commonly used in devices such as can openers, garage door openers, washing machine time control knobs and even electric alarm clocks. Common commercial applications of a gear motorinclude hospital beds, commercial jacks, cranes and many other applications that are too many to list.

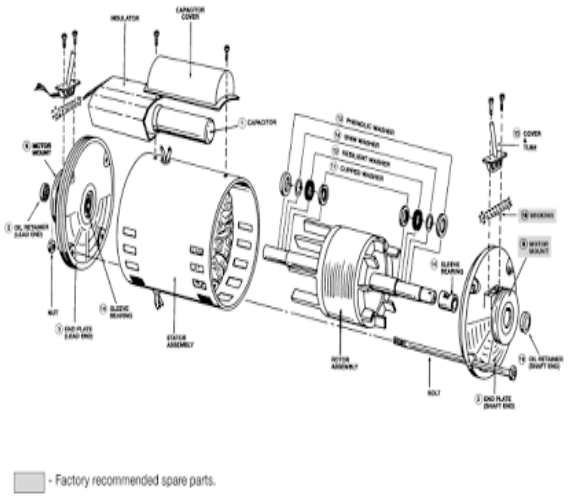

Fig. Internal Driver Circuit

A gear motor can be either an AC (alternating current) or a DC (direct current) electric motor. Most gear motors have an output of between about 1,200 to 3,600 revolutions per minute (RPMs). These types of motors also have two different speed specifications: normal speed and the stall-speed torque specifications.

Gear motors are primarily used to reduce speed in a series of gears, which in turn creates more torque. This is accomplished by an integrated series of gears or a gear box being attached to the main motor rotor and shaft via a second reduction shaft. The second

Shaft is then connected to the series of gears or gearbox to create what is known as a series of reduction gears. Generally speaking, the longer the train of reduction gears, the lower the output of the end, or final.

Gear motors are commonly used in commercial applications where a piece of equipment needs to be able to exert a high amount of force in order to move a very heavy object. Examples of these types of equipment would include a crane or lift Jack.

Gear motors used in cranes are usually specialty types that use a very low rotational output speed to create incredible amounts of torque. However, the principles of the gear motor used in a crane are exactly the same as those used in the example electric time clock. The output speed of the rotor is reduced through a series of large gears until the rotating, RPM speed, of the final gear is very low. The low RPM speed helps to create a high amount of force which can be used to lift and move the heavy objects.

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Fig. Ultrasonic sensor

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

It is important to understand that some objects might not be detected by ultrasonic sensors. This is because some objects are shaped or positioned in such a way that the sound wave bounces off the object, but are deflected away from the Ultrasonic sensor. It is also possible for the object to be too small to reflect enough of the sound wave back to the sensor to be detected. Other objects can absorb the sound wave all together (cloth, carpeting, etc), which means that there is no way for the sensor to detect them accurately. These are important factors to consider when designing and programming a robot using an ultrasonic sensor

VII. EXPERIMENTAL RESULT

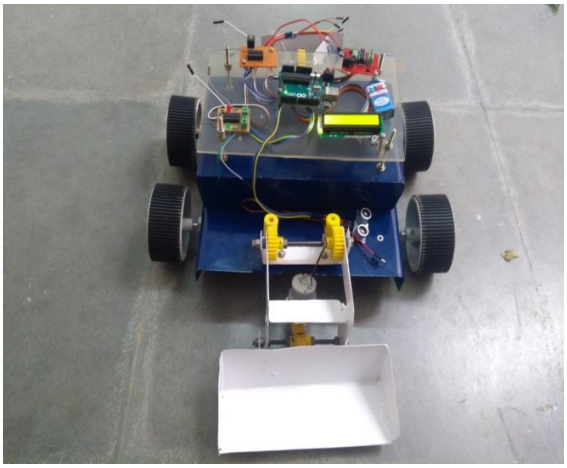

Fig. Smart Harvesting Robot

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VIII. CONCLUSION

Our harvest system plays a major role in salt production will reduce the work load of the workers employed in salt production. This helps to harvest the salt by using the robot without using manpower. It is a good replacement for human effort in salt pans. If we introduce this salt harvesting robot in salt pans, it will do all the work which are done by humans. It is two times more efficient than humans. It can be easily moved from one place to another place. It reduces the total work load by a worker and prevent them from the skin diseases.

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