



Solar Operated Water Cleaning Boat Using Arduino

Snehal Pravin Pawar, Shravani Hanmant Muttur, Supriya Sudhakar Gharse, Sonam Rajendra Shinde, Mrs. A. N. Naik

DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING, SHARAD INSTITUTE OF TECHNOLOGY

ABSTRACT:

The Design and Analysis of the River Water Cleaning Machine is the focus of this project. The operation was done in response to the current state of our national rivers, which are clogged with billions of gallons of sewage and loaded with pollutants, poisonous compounds, and debris, among other things. The Indian government has assumed care of river cleaning and has invested a significant amount of money in projects such as "Namamio" and "Gange" as well as other cities such as Ahmadabad and Varanasi. Taking this into account, this machine was created to clean the surface of river water. Almost every manufacturing process is being atomized these days in order to provide products faster. In mass production, automation plays a crucial role. We built a remote-controlled river cleaning machine for this project. The project's major goal is to reduce the amount of manpower and time required to clean the river. With the help of a motor and chain drive arrangement, we were able to automate the operation of river cleaning in this project. The following are some automation requirements. The cleaning equipment is controlled via an RF transmitter and receiver. Computers, hydraulics, pneumatics, robotics, and other forms of automation can all be used, but pneumatics is a particularly appealing medium for low-cost automation.

Keywords: Motor, solar panel, Bluetooth circuit, Conveyor, Collector, relays.

Introduction

Water covers more than two-thirds of the Earth's surface, whereas land occupies less than a third. People are putting ever-increasing pressure on the planet's water supplies as the world's population continues to expand. In a sense, human activities are "squeezing" our oceans, rivers, and other inland waters, lowering their quality. Water pollution is a result of poor water quality. Skimmer boats, or work boats for gathering and disposing of floating solid waste products in harbors and waterways, are the subject of this invention.

The invention is geared more especially to highly maneuverable watercraft equipped with mechanisms for picking up floating debris, storing the debris on the vessel, and discharging the rubbish from the vessel to a storage place, which may be ashore or another vessel, such as a barge. For the collection of floating solid trash and other debris, a variety of work boats and vessels have been proposed. These are usually built as a catamaran-style hull with two pontoons or sponsors, or as a monohull with paddle wheel or screw driver propulsion and an operator station. One or more hydraulically operated open mesh conveyors are positioned between the pontoons of a catamaran-type twin-hull vessel in one typical trash skimmer design.

Because of recent trends in our environment, the problem of flooding and climate change has become out of control. This has become a huge source of concern for the entire world, particularly emerging countries.

Water traveling through a drainage system transports waste items, the majority of which are non-biodegradable, causing flooding as well as climate change. Overflow of a water drainage system occurs when an end of the drainage system is blocked, forcing the water to find its way somewhere other than the mapped out drainage system. As a result, the running water spills over the horizontal height of the drainage system, spreading to regions alongside the drainage system, causing problems such as fences being pushed down, water logging of farm lands and residential buildings, and so on.

Impurities in water can be dangerous and cause disease. The main drainage system's function, as far as the draining system is concerned, is to collect, convey, and dispose of water through an outfall or outlet. Empty bottles, polythene bags, and papers, among other things, can be found in drainage water. It's a functioning industrial prototype of an entirely solar-powered water cleaning mechanism that can automatically gather floating debris and solid waste from the water surface and deposit it in a floating bin. It has the ability to be programmed, scaled to any size, and operated remotely.

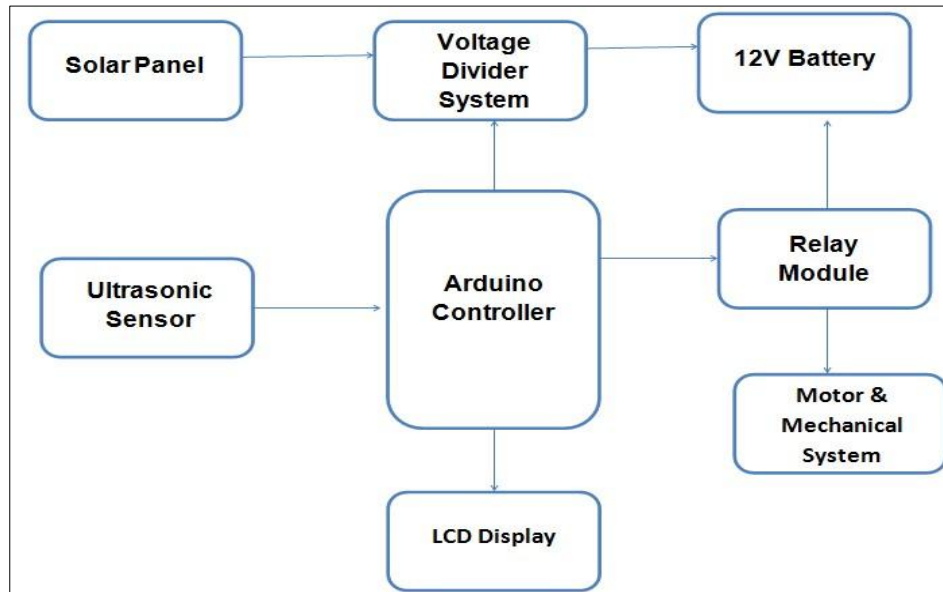
Literature survey

A review of the literature

"Garbage collecting robot on the beach utilizing wireless communication," international conference on informatics, environment, energy, and application IPCBEE; DOI IO 7763/CBEE 2014 V66.19, Sirichaiwatanasophon and Sarineeonittrakul. This article shows a wirelessly communicated waste pickup robot on the beach. The robot is built on caterpillar wheels with dimensions of 52x74x17cm and is powered by a 12v 30Ah battery

coupled to 40w solar cells. A program written in Visual Basic 2005 and running on Windows XP allows the user to control a robot. The user's command is transferred to the PIC18F4550 via Bluetooth for processing. It also has an IP camera with enhanced pan/tilt capability that sends feedback information to the human operator via an Ad-hoc system. The robot can travel at an average speed of 0.5 meters per second on the sand via wireless communication and gather waste with a side of 12.5 x 49 cm, such as glass bottles and plastic, according to the results of robot performances. Developed from Visual Basic 2005 application based on Windows XP. The command from user is sent via Bluetooth to PIC18F4550 for processing. In addition, it is also equipped with an IP camera with added pan/tilt capabilities which relay feedback information to the human operator via Ad-hoc system. The result of robot performances were found that the robot can move with an average speed of 0.5 meters per second on the sand via wireless communication and collect the garbage with side 12.5 x 49 cm for example: glass bottles and plastic, etc

Block diagram



Related work

The solar-powered water-cleaning boat shown above is entirely powered by solar energy.

The PVC is used to collect the sun energy (Photo voltaic cell). The PVC has a rating of 12V and 7.3AH, and the energy passes through the CCU (charge control unit). A diode is connected between PVC and CCU, allowing power to flow exclusively in one way from PVC to CCU. The power is then stored in a battery with a 12V and 2amp rating. CPS receives this stored energy (control power supply). The ECU (electronic charge unit) or RLU (remote charging unit) receives this controlled electricity (relay logical unit). The sensor unit and the driver circuit are connected by this unit. There are four sensors in the sensor unit. This sensor links to the PVC for the direction of the sun using an LDR (light dependant resistor). Garbage is collected from water using an IRD (infrared detector) sensor. They employ a micro switch S3 sensor to detect waste and collect it. The S4 micro switch is used to limit the motor's speed. All motors are controlled by a driver circuit. The direction of the motor is controlled by motor M1. The forward reverse of motor M2 is employed. To catch the rubbish, the M3 motor is employed as a conveyer. The flapping is accomplished with the help of the M4 motor. All four motors have a 12 volt DC rating.

COMPONENTS OF RIVER WATER CLEANING MACHINE

1. Arduino board
2. Charger circuit
3. Battery's
4. Solar Panel
5. Relays
6. Ultrasonic sensor
7. DC Motors
8. Conveyor Belt
9. Cables and Connectors

1. ARDUINO BOARD

Features of Arduino

- Microcontroller: AT mega328.
- Operating Voltage: 5V.
- Input -12VVoltage: 7
- Digital I/O Pins: 14• Analog input pins: 6.
- DC current40mA.per I/O Pin:
- DC current for 3.3V Pin: 50mA.
- Flash Memory: 32KB.
- SRAM: 2KB.
- EEPROM: 1KB.
- Clock Speed: 16MHz.

The Arduino Uno is constructed in such a way that it may be reset by software running on a connected computer, rather than requiring a physical click of the reset button before an upload. A 100 nano farad capacitor connects one of the ATmega8U2/16U2's hardware flow control lines (DTR) to the ATmega328's reset line. The reset line lowers long enough to reset the chip when this line is asserted (taken low). This functionality is used by the Arduino software to allow you to upload code by pressing the upload button in the Arduino environment. Because the reduction of DTR can be well-coordinated with the commencement of the upload, the boot loader can have a shorter timeout.

2. SOLAR PANEL

The 18V-5Watt solar panel is used in the machine.

The solar panel is generating the 18V DC supply.

Solar output is given to the DC Regulators.

The DC Regulators is regulated the voltage and it is given to the Battery.

Material: Polycrystalline Silicon

Max. output voltage : 7.2Volts

Max. Power:3W

Size:230x140mm



3. ULTRASONIC SENSOR -

It covers large range.It Does not affected by rain, sun rays, shadow, etc. Its maximum range is upto 4m-2m ,voltage is 5 DC, current is 15 mA and frequency is 40 Hz. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm .There are only four pins that you need to worry about on the HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground).

4. CONVEYOR BELT

The Polypropylene Conveyor Belt was used in the River Water Cleaning Machine. The arduino system uses a motor driver circuit to control the conveyor belt. All floating debris from the water surface is collected by the conveyor and deposited in the dustbin.

5. BATTERY

Maintenance-free Sealed Lead-acid Battery is one of the factors used to choose a battery. We utilized two batteries in the machine: 12V and 6V. (1.2Amp.) The Regulator receives 12V battery power via the Motor. Solar energy or battery charge will be used to charge the battery

6. MOTORS

The River Water Cleaning Machine is powered by three DC motors. To begin, motors are employed to control the machine's direction. The arduino system uses a driver circuit to control all DC motors. Following that, motors are employed to control the conveyor belt.

Advantages and applications

Advantages

- It is a non-conventional river cleaning system.
- It's initial & maintenance cost is low.
- Skill Worker not required driving the system.
- Environment friendly system.
- Easy in operation.

Application

- To clean lake
- To clean Small ponds
- Keep ocean water clean
- clean Rivers

Conclusion

This project creates a robot that collects trash from lakes, rivers, and ponds, among other places. The robot was equipped with wireless connection for remote control. The project we completed was really beneficial to the environment. A means of lowering manpower and thereby conveniently stabilizing the waste collecting boat using inventory.

References

- Sirichaiwatanasophon and sarineonitrakul," Garbage collection robot on the beach using wireless communication", international conference on informatics, environment, energy & application IPCBEE; DOI IO 7763/CBEE 2014 V66.19
- Reference book: Textbook on Basic Electrical Engineering by B.L Thereja .
- Reference book: Textbook on Power Electronics by M.D.Singh and Khanchand