

DEVELOPMENT OF ROBOTIC ARM FOR DANGEROUS OBJECTS DISPOSAL

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ABSTRACT:

A robotic arm is a robotic manipulator, usually programmable, with similar functions to a human arm. Humans pick things up without thinking about the steps involved. In order for a robot or a robotic arm to pick up or move something, someone has to tell it to perform several actions in a particular order from moving the arm, to rotating the “wrist” to opening and closing the “hand” or “fingers”. So, we can control each joint. . This project presents a automatic robotic arm which can be used in land mine detection to do repetitive task such as informing through buzzer, some sensors will be used to detect the obstacles, smoke, temperature if present while carrying out the task. If there is any obstacle while moving, then the obstacle is picked and placed through the Robotic Arm controlled through Mobile.

I. INTRODUCTION:

Various forms of threats, technological accidents, especially in the chemical industry and military complexes which cause major damages to humans, assets and environment, draw attention to development of new technological means to eliminate danger without the risk for human life. This determines the equipment logistic for the protection and rescue system. In line with this, the article presents the development of a robotized system for detection of chemical, biological, radiological and nuclear threats (CBRN), and for detection and neutralization of improvised explosive devices (CIED). In addition, a prototype model of a robotic vehicle is constructed. Reconnaissance, terrain and of great importance so that the operators and technicians have at their disposal an option of multiple analysis of a problem.

The basic feature of using a robotized machine is the replacement of EOD and CBRN technicians in various life-threatening situations. Citizens’ trust is of greatest and crucial importance for providing safety in such extraordinary situations. In order to meet the strict tactical and technical requirements, the robotized system comprises the stealth platform, working tools, a control console, a manipulator arm for complex actions, a CBRN detector, an additional EOD robot for terrain scouting and sample taking, an unmanned reconnaissance aircraft and a mobile command centre. The prototype model of a robotic vehicle shows that the project is both technically and economically feasible on the basis of a tracked machine with battery propulsion, the Ultra Low Profile dozer. Existing resources and experience in development of specialized machines are significant for the development of a robotized system. . Robots can also be found in military applications. A service robot is a robot which operates semi or fully autonomously to perform services useful to the wellbeing of humans and equipment, excluding manufacturing operations. Industrial robots usually consist of a jointed arm (multi-linked manipulator) and end effectors that are attached to a fixed surface (Charles, Aaron and Eduardo, 2007). Modular robots are new breeds of robots that are designed to increase the utilization of the robots by modularizing the robots. In this paper a robotic arm was developed using a Arduino UNO, programmed with IDE software with the use of a monitoring controlled by a remote controller.

II. LITERATURE SURVEY:

There are many works on land mine detection robot, monitoring using ZigBee, robots which are available in the literature. In this chapter, surveys of related works on the above fields are discussed. The authors

research on land mine detection robots, Bharath J, Automatic Land Mine Detection Robot Using Microcontroller. This paper describes the problems faced by the Land mines that are faced in 70 countries. The purpose of this paper is to eliminate the problems of land mine. The purpose of this paper is to design a robot prototype which is capable of detecting buried land mines and changing their locations, while enabling the operator to control the robot wirelessly from a distance. This technology interfaces the metal detector circuit in a robot to search the land mines. The metal detector circuit is interfaced with the robot and it is left on the required search area in order to detect the metallic components used in the landmines.

The main advantage in this project is that we can make this robot at low cost and more efficient, Michael YU. Rachkov, Lino Marques, Anibal T. De Almeida. The paper describes an advanced multi-sensor demining robot. The robot transport system is based on a simple structure using pneumatic drive elements. The robot has robust design and can carry demining equipment up to 100 kg over rough terrains. Due to the adaptive possibilities of pedipulators to obstacles, the robot can adjust the working position of the demining sensors while searching for mines. The detection block consists of a metal detector, an infrared detector, and a chemical explosive sensor. The robot is controlled by means of an on-board processor and by an operator remote station in an interactive mode. Experimental results of the transport, control, and detection systems of the robot are presented. The main disadvantage of the robot is weight factor due to the overloading of sensor. Seong Pal Kang, Junho Choi, Seung-Beum Suh, Sungchul Kang, Design of mine detection robot for Korean mine field. This paper presents the critical design constraints of mine detection robots for Korean minefield. As a part of a demining robot development project, the environment of Korean minefield was investigated, and the requirements for suitable robot design were determined. Most of landmines in Korean minefield were buried close to the demilitarized zone (DMZ) more than half of a century ago. The areas have not been urbanized at all since the Korea War, and the potential locations of the explosives by military tactics have been covered by vegetation.

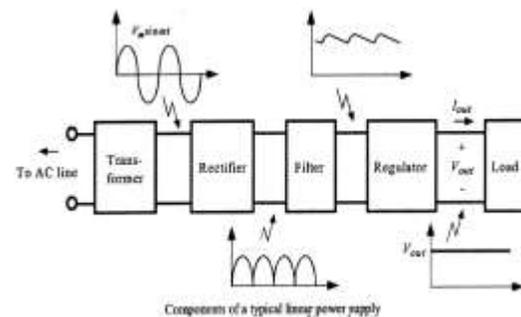
HARDWARE REQUIREMENTS:

- ❖ POWER SUPPLY
- ❖ ARDUINO UNO
- ❖ SMOKE SENSOR
- ❖ IR SENSOR
- ❖ METAL DETECTOR
- ❖ TEMPERATURE SENSOR
- ❖ BLUETOOTH
- ❖ LCD DISPLAY

III. DESCRIPTION:

POWERSUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as “Regulated D.C Power Supply”.



ARDUINO UNO:

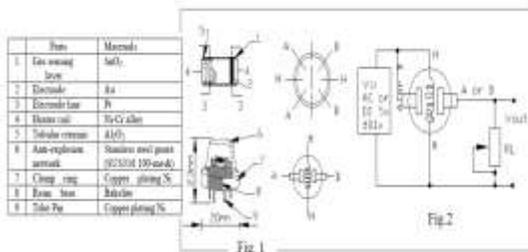
The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2

HWB line to ground, making it easier to put into DFU mode.



SMOKE SENSOR:

MQ2 flammable gas and smoke sensor detects the concentrations of combustible gas in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of flammable gas of 300 to 10,000 ppm. The sensor can operate at temperatures from -20 to 50°C and consumes less than 150 mA at 5 V. Connecting five volts across the heating (H) pins keeps the sensor hot enough to function correctly. Connecting five volts at either the A or B pins causes the sensor to emit an analog voltage on the other pins. A resistive load between the output pins and ground sets the sensitivity of the detector. Please note that the picture in the datasheet for the top configuration is wrong. Both configurations have the same pin out consistent with the bottom configuration. The resistive load should be calibrated for your particular application using the equations in the datasheet, but a good starting value for the resistor is 20 kΩ.



IR SENSOR:

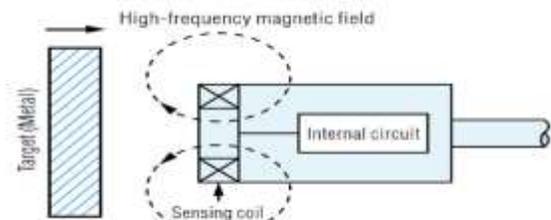
Infrared is a energy radiation with a frequency below our eyes sensitivity, so we cannot see it Even that we cannot "see" sound frequencies, we know that it exist, we can listen them. Even that we cannot see or hear infrared, we can feel it at our skin temperature sensors. When you approach your hand to fire or warm element, you will "feel" the heat, but you can't see it.

You can see the fire because it emits other types of radiation, visible to your eyes, but it also emits lots of infrared that you can only feel in your skin. Infra-Red is interesting, because it is easily generated and doesn't suffer electromagnetic interference, so it is nicely used to communication and control, but it is not perfect, some other light emissions could contains infrared as well, and that can interfere in this communication. The sun is an example, since it emits a wide spectrum or radiation.



METAL DETECTOR:

A inductive proximity sensor can detect metal targets approaching the sensor, without physical contact with the target. Inductive Proximity Sensors are roughly classified into the following three types according to the operating principle: the high-frequency oscillation type using electromagnetic induction, the magnetic type using a magnet, and the capacitance type using the change in capacitance. A high-frequency magnetic field is generated by coil L in the oscillation circuit. When a target approaches the magnetic field, an induction current (eddy current) flows in the target due to electromagnetic induction. As the target approaches the sensor, the induction current flow increases, which causes the load on the oscillation circuit to increase. Then, oscillation attenuates or stops. The sensor detects this change in the oscillation status with the amplitude detecting circuit, and outputs a detection signal.



TEMPERATURE SENSOR:

It is an IC sensor that is used to measure temperature with an output voltage linearly

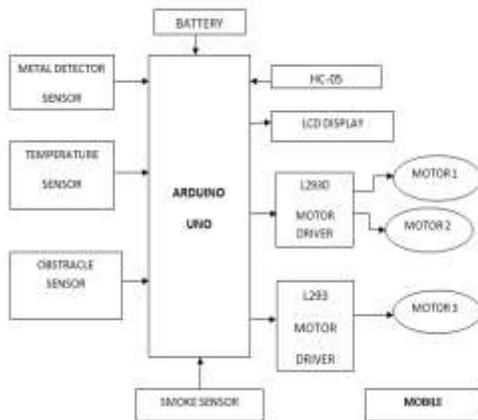


opening and closing the “hand” or “fingers”. So, we can control each joint. . This project presents a automatic robotic arm which can be used in land mine detection to do repetitive task such as informing through buzzer, some sensors will be used to detect the obstacles, smoke, temperature if present while carrying out the task. If there is any obstacle while moving, then the obstacle is picked and placed through the Robotic Arm controlled through Mobile.

CONCLUSION:

A robotic arm is implemented using arduino to pick and place objects more safely without incurring much damage. The robotic arm used here contains a soft catching gripper which safely handles the object. In the modern era time and man power are major constraints for the completion of a task. By the use of our product the industrial activities and hazardous operations can be done easily and safely in a short span of time. The use of soft catching gripper and low power wireless communication technique like Bluetooth makes our system more effective when compared to other systems. The proposed system is capable of lifting only small weights, by introducing high torque providing motor large weights can be picked. A wireless camera can also be implemented to track the movement of the vehicle and thus it can be used in defense purposes. The range is also a limitation it can be enhanced by using a wireless communication technology.

PROJECT DESCRIPTION:



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WORKING:

A robotic arm is a robotic manipulator, usually programmable, with similar functions to a human arm. Humans pick things up without thinking about the steps involved. In order for a robot or a robotic arm to pick up or move something, someone has to tell it to perform several actions in a particular order from moving the arm, to rotating the “wrist” to

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