MULTIPURPOSE ROBOT USING ATMEGA328 WITH UART PROTOCOL

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ABSTRACT

A Robot suitable for automatically extinguishing the fire during fire accidents is presented in this paper. The Robot moves in the direction with respect to the fire intensity and avoids self-destruction using calcium silicate boards shielded with, that are capable of withstanding very high temperatures. The principle used, was designed and experimented at a temperature of 300°C. The temperature sensing capability of the robot is varied by heating the Thermocouple ends to a cut-off temperature, above which the robot starts responding to the fire. The Robot finds its applications in Rescue operations during fire accidents, in closed loops such as hospitals and shopping malls, where the possibility for service men to enter the fire prone areas is very less and also during wars to perform rescue functions. The most added advantage of this Robot is that it turns ON automatically as it detects the fire within a

distance of 5-10cms, using Thermocouple, and tries to extinguish it by moving in the direction with respect to the fire intensity.

The temperature sensor provides a backup to the Thermocouple, if needed in vast circumstances, in this adding the one more feature i.e. gross cutting in multiple applications.

INTRODUCTION

With the expansion of Robotic Applications [1] , some tasks may require quick and efficient action to be performed. A Robot is a re-programmable, multifunction manipulator designed to move materials, parts, tools or special devices through variable programmed motions also be defined as an automatic device that performs functions normally ascribed to humans or a machine in the form of a human. The Robot in this paper is an Automatic Fire Extinguisher which detects and extinguishes the fire sensed by a Thermo couple. gross cutting is also used for much more variant areas. In single system implementing the more features by this expensive will be reduce.

PROPOSED SYSTEM

Fire accidents are defined as an undesirable event which emits heat, smoke or flame. Fire accident is a major form of accident and can cause a huge number of causalities because of the danger and risk involved in rescuing victims out of the fire. When firefighting units engage in such situations there is a high possibility to loss the life of fire personnel's. In everyday life, it is not feasible to always rely on human patrol for detecting and extinguishing fire at a fire accident scene. If an automated system is made to patrol the perimeter for fire accidents, then we can have an early warning system.

The proposed fire extinguishing robot works in Automatic mode. The operation of robot is monitored and controlled by Arduino nano. A IR sensors are attached to the front side of the robot, as the fire is sensed in the particular part it will automatically moves forward and will pump the water in the left and right motion the same way for the other sides also and for the front side if the fire is their it will automatically go back and pump the water. In automated mode, robot will detect the fire and move to the fire location and water will be pumped to extinguish the fire. in adding the feature of gross cutting and adding the Bluetooth module to operate it manual and automatic mode.
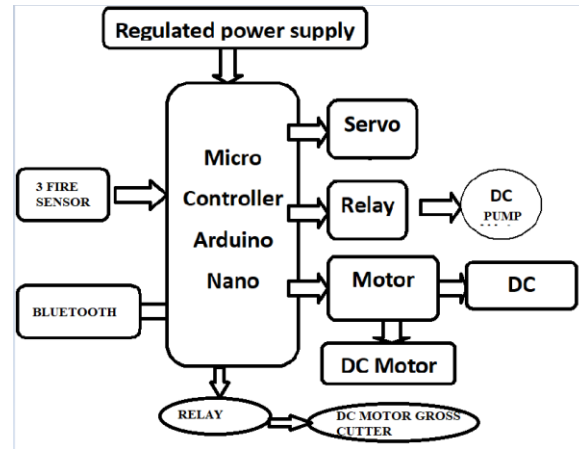
HARDWARE DESCRIPTION

fig 1.Block diagram

POWER SUPPLY

The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V.

The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

A regulator circuit removes the ripples and also retains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.
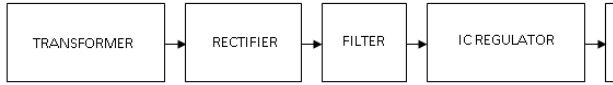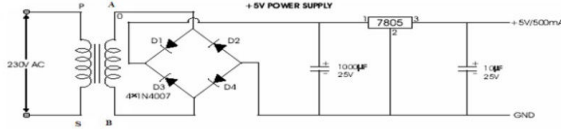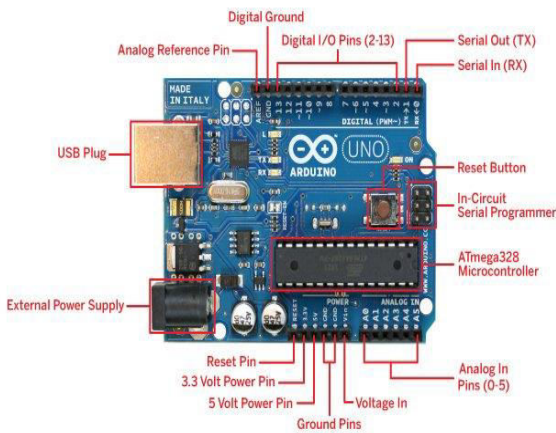
Fig 2: Block Diagram of Power Supply

Fig 3: Circuit Diagram of Power Supply

Arduino uno ATMEGA328 Microcontroller

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, 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.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

ATMEGA 328P FEATURES

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P

| |)
of which 0.5
KB used by
bootloader |
|---|---|
| SRAM | 2 KB
(ATmega328P
) |
| EEPROM | 1 KB
(ATmega328P
) |
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

An automatic fire sensor sense the unwanted presence of fire by monitoring environmental changes associated with combustion. In general, a fire alert system is classified as either automatically actuated, manually actuated, or both. Fire sensor are intended to notify the fire in the building occupants to evacuate in the event of a fire or other emergency, report the event to an off-premises location in order to summon emergency services, and to prepare the structure and associated systems to control the spread of fire and smoke.

Fig 4: Fire sensor

FIRE SENSOR

The Fire sensor, as the name suggests, is used as a simple and compact device for protection against fire. The module makes use of IR sensor and comparator to detect fire up to a range of 1-2 meters.

The device, weighing about 5 grams, can be easily mounted on the device body. It gives a high output on detecting fire. This output can then be used to take the requisite action. An on-board LED is also provided for visual indication.

Feature

- Typical Maximum Range :2 m .
- Indicator LED with 3 pin easy interface connector.
- Operating Voltage 5v

SERVO MOTOR

A **servomotor** (or **servo motor**) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration.[1] It consists of a suitable motor coupled to a sensor for

position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

Servomotors are not a specific class of motor, although the term *servomotor* is often used to refer to a motor suitable for use in a closed-loop control system

BLUETOOTH

Bluetooth is a global wireless communication standard that connects devices together over a certain distance. Think headset and phone, speaker and PC, basketball to smartphone and more. It is built into billions of products on the market today and connects the Internet of Things (IoT). If you haven't heard of the IoT.

Fig 5. Bluetooth Module HC05

RELAY

A relay is an electromechanical switch, which perform ON and OFF

operations without any human interaction. General representation of double contact relay is shown in fig. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

Fig 6. Relay

DC MOTOR

A DC Motor in simple words is a device that converts direct current (electrical energy) into mechanical energy. It's of vital importance for the industry today.

Gear DC Motor

Geared DC motors can be defined as an extension of DC motor. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the

minor and major details that make the gear head and hence the working of geared DC motor.

Fig 7. Motor

- Operating Voltage : 3 ~ 6V
- Operating Current : 130 ~ 220mA
- Flow Rate : 80 ~ 120 L/H
- Maximum Lift : 40 ~ 110 mm
- Continuous Working Life : 500 hours
- Driving Mode : DC, Magnetic Driving
- Material : Engineering Plastic
- Outlet Outside Diameter : 7.5 mm
- Outlet Inside Diameter : 5 mm

Fig 8. Relay

WATER PUMP

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

SPECIFICATIONS:

L293D DRIVER CIRCUIT

L293D IC generally comes as a standard 16-pin DIP (dual-in line package). This motor driver IC can simultaneously control two small motors in either direction; forward and reverse with just 4 microcontroller pins (if you do not use enable pins).
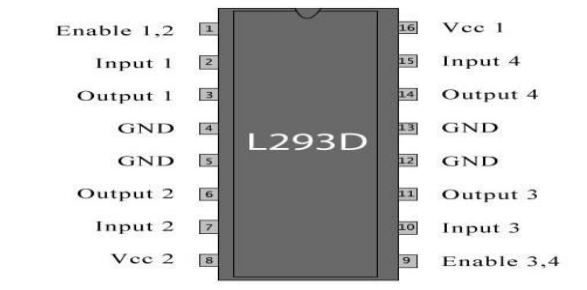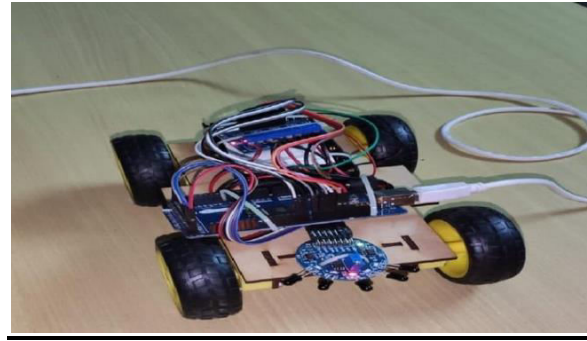

Fig 9 L293D pinout

Fig.10.Intialization of robot

CONCLUSION

This section gives a concise summary with applications related to the proposed system described above. The system used an IC741 as both Amplifier and Comparator with Thermocouple and water pump, to pump out the water automatically when the robot is in fire. The Robot's movement is predicted using obstacle avoider

FUTURE WORK

The aim in future would be to implement this system and its principle on a Humanoid Robot to avoid human loss during vast fire accidents and wars, wh ere the human rescue operations cannot be performed.

REFERENCES

1) J. Casper and R. Murphy, "Human-robot interaction during the robot assisted urban

WORKING METHODOLOGY

In this using the fire sensor to detect the fire in three side then the submersible pump is trigger on to exhaust then fire in multiple areas, and in this using the Bluetooth to turn on manually submersible pump and gross cutter motor .in this using then solar panel to charge rechargeable battery for reuse the battery for the system, here mainly two application are implemented

1)fire exhausted
2)grass cutting .

RESULTS

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2) M. Micire, "Analysis of robotic platforms used at the world trade center disaster," Ph.D. dissertation, MS thesis, Department of Computer Science and Engineering, University of South Florida, 2002.

3) C. Breazeal, Designing Sociable Robots. The MIT Press, Cambridge, MA, 2002