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ROBOTIC BOMB DETECTION AND DISPOSAL APPLICATION USING ARDINO

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ABSTRACT:
Countless number of news items dealing with injured trained personnel or military people who loses their lives during defusing bombs appears daily in newspapers around the world. Here a robotic arm is designed to detect and dispose a bomb which is located around the range of 100m with safety and to provide a security for the bomb disposal squad against risks. The designed robot is manually controlled by the user through Personal Computer (PC).The buzzer alarm when the sensor detects a metal. The metal is examined with the help of checks whether it is a bomb or not. If the detected metal is a bomb then the user controls the robot through mobile app and disposes the bomb using LASER. Arduino Mega board, DC motors, Buzzer, LASER forms a part of designed robot. Initially setup is simulated using proteus software and then entire hardware setup is controlled through personal computer.

I. INTRODUCTION

Now-a-days the need for military robots has increased enormously. Thus competent robots begin to evolve. A part of Robotic platform such as remotely operated vehicles performs hazardous activities in civilian and military environment. Developing and employing such robots could substitute humans by performing many dangerous functions. The information about the observed environment is passed to the human operator. The machine is controlled by the human operator through teleoperation.For both military and police forces it is a greatest menace to hold explosive devices. Recent developments have yielded new interest in bomb disposal robots and techniques. The aim is to disarm the device with little human contact. The bomb must be safely disarmed without being exploded. The bomb should be detonated in a safe area ensuring nothing around in that area. Here electrically powered and distantly controlled robot is designed to locate, handle and destroy hazardous objects.

II.LITERATURE SURVEY

Paper [1] discusses use of robot for bomb detection and disposal for aid to risky military fields. The robot consists of robots arm, Arduino microcontroller, metal sensor, buzzer and other components. The robot is controlled through Personal Computer.

Paper [2], here they have used RF technology to control the robot wirelessly. Arm is used that detect bombs and tracking position of bomb by using GPS (Global Positioning System). The system consists of Arduino microcontroller and different sensors. Here wireless camera is used to make controlling easy and accurate.

Paper [3] illustrates how human hand movements could direct the robotic motor. Here for operation hand wave mode or gesture controlled mode are used.

Paper [4], Robots are referred as Unmanned ground vehicles or self-controlled robots as it finds application in Border patrol, surveillance and in active combat. The robot is controlled through human commands.

III.DESIGN OF HARDWARE

This chapter briefly explains about the Hardware. It discuss the circuit diagram of each module in detail.

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. Arduino board has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.

- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Fig: ARDUINO UNO

POWER SUPPLY:

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 by 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”.

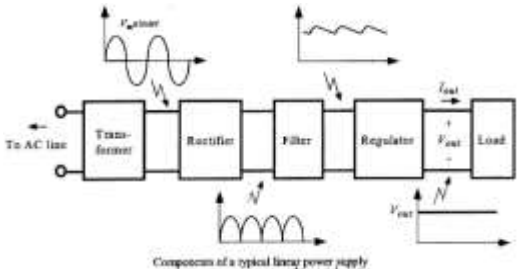

Fig: Block Diagram of Power Supply

LCD DISPLAY

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right),

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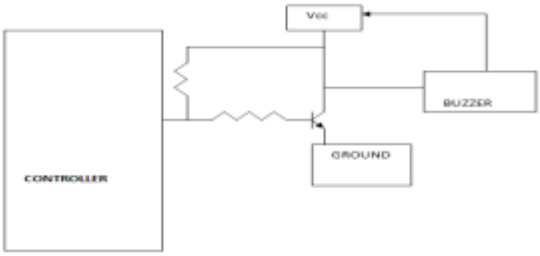
appearance of the pointer, backlight etc. are considered as useful characteristics.

Fig: LCD

BUZZER

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller's pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.

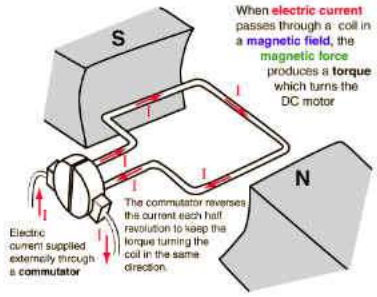


L293D:

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo- Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications.

DC MOTOR

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bearin motor, which is (so far) a novelty. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source -- so they are not purely DC machines in a strict sense.



METAL DETECTOR

INDUCTIVE PROXIMITY SENSORS

• SENSE FERROUS & NON-FERROUS METAL OBJECTS TO "ZERO SPEED"
• 2-WIRE CURRENT SOURCE (NAMUR) & 3-WIRE NPN TRUE OPEN COLLECTOR OUTPUTS

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• 5 SIZES & 3 SENSING DISTANCES FOR APPLICATION
VERSATILITY

• L.E.D. TARGET INDICATOR (PSA 2B, 6B, 7B, & 8B)

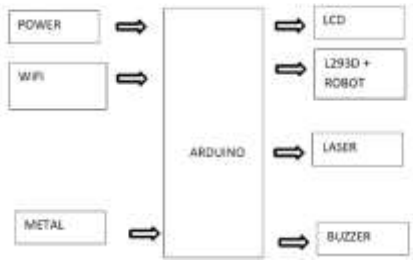
Inductive Proximity Sensors detect the presence of metal objects which come within range of their oscillating field and provide target detection to *"zero speed"*. Internally, an oscillator creates a high frequency electromagnetic field (RF) which is radiated from the coil and out from the sensor face *(See Figure 1).* When a metal object enters this field, eddy currents are induced into the object.
As the metal moves closer to the sensor, these eddy currents increase and result in an absorption of energy from the coil which dampens the oscillator amplitude until it finally stops.

Bluetooth

Bluetoot**h** is a wireless protocol utilizing short-range communications technology facilitating data transmission over short distances from fixed and/or mobile devices, creating wireless personal area networks (PANs). The intent behind the development of Bluetooth was the creation of a single digital wireless protocol, capable of connecting multiple devices and overcoming issues arising from synchronization of these devices. Bluetooth uses a very robust radio technology called frequency hopping spread spectrum. It chops up the data being sent and transmits chunks of it on up to 75 different frequencies. In its basic mode, the modulation is Gaussian frequency shift keying (GFSK). It can achieve a gross data rate of 1 Mb/s. Bluetooth provides a way to connect and exchange information between devices such as mobile phones, telephones, laptops, personal computers, printers, GPS receivers, digital cameras, and video game consoles over a secure, globally unlicensed Industrial, Scientific, and Medical (ISM) 2.4 GHz short-range radio frequency bandwidth. The Bluetooth specifications are developed and licensed by the Bluetooth Special Interest Group (SIG). The Bluetooth SIG consists of companies in the areas of telecommunication, computing, networking, and consumer electronics.

Bluetooth is a standard and communications protocol primarily designed for low power consumption, with a short range (power-class-dependent: 1 meter, 10 meters, 100 meters) based on low-cost transceiver microchips in each device. Bluetooth enables these devices to communicate with each other when they are in range. The devices use a radio communications system, so they do not have to be in line of sight of each other, and can even be in other rooms, as long as the received transmission is powerful enough. Bluetooth device class indicates the type of device and the supported services of which the information is transmitted during the discovery process.

IV. BLOCK DIAGRAM:



V.CONCLUSION

Thus, the proposed system affords exposure to design of simple bot for bomb detection. Manual control is applied to the robot from a certain distance. The buzzer alarms when it detects a metal. If the detected metal is a bomb, the robotic arm is manually controlled to dispose the bomb safely. The building cost for the robot is greatly reduced because of the use of

smartphone which makes this system very efficient and its manufacturing cost low. Therefore designed bot could assist bomb disposal squads in military and police applications.

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