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IoT Multipurpose Robot

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ABSTRACT: This paper gives a present day method for surveillance at far off and border areas the usage of multifunctional robotic based totally on IOT used in defence and navy applications. In Modern world, Automation robotic is used in many of the fields such as defence, surveillance, clinical field, industries and so on. This robotic is electromechanical as properly as synthetic clever desktop managed by means of laptop programming. It is designed to change human beings in quite a number hazardous areas. The manage sign from transmitter is despatched to the receiver which is linked to an object or machine or automobile that is to be remotely controlled. Similarly, this assignment mentions about a wirelessly managed commando robotic managed the usage of IOT.

I. INTRODUCTION

The major precept of our robotic is Principle of Humanity primarily based on simple three legal guidelines of robotic system. This robotic is electromechanical as nicely as synthetic clever desktop managed by means of laptop programming. it is designed to substitute human beings in a variety of hazardous areas. To overcome the complexity of wired communications, we are the usage of develop wi-fi RF and Wi-Fi technology. The manipulate sign from transmitter is despatched to the receiver which is related to an object or machine or car that is to be remotely controlled. Similarly, this venture mentions about a wirelessly managed commando robotic managed the usage of radio frequency technology. Military Robots are used to notice bombs, weapons, hearth and fuel etc. in the battle fields. The gain is that the value per hour to function a robotic is a fraction of the price of the human labor wanted to function the identical function. Including this, they are reprogrammed and operate features with a excessive accuracy. Human operators are a long way extra versatile so they can change to any pre-defined job duties easily. Robots are constructed and programmed to be job specific. Robots are in the infancy stage of their evolution. As robots evolve, they will turn out to be extra versatile, emulating the human capability and capacity to swap job duties easily. While the non-public pc has made an inefaceable mark on society, the private robotic hasn't made an appearance. Robotics is factor of science of automation which are operated beneath manipulate of mini or micro-computer. Robots require a aggregate of factors to be effective: sophistication of intelligence, movement, mobility, navigation, and purpose. Without risking human life, robots can change human beings in some hazardous responsibility service. Robots can work in all kinds of polluted environments, chemical as nicely as nuclear. They can work in environments so hazardous that an unprotected human would shortly die using IOT.

II. LITERATURE REVIEW

[1]. Robotics in the field of surveillance and rescue is very popular. A lot of research has been done for transmitting live video, wireless control system of robots to establish long range and reliable communication. The most common method is to use a wireless camera along with costly sensors and mount them on the robot to get the live video and other environment parameter details. The robot is controlled either with Bluetooth or ZigBee.

[2] Surveillance Robot Using Arduino Microcontroller, Android APIs and the Internet, that is capable of transmitting video relay to a local host was designed.

[3] Human Surveillance and Landmine Detecting Robot using Lab view, the automatic mode uses face recognition technique to combat intruders.

[4] Wireless Surveillance Robot using Automatic & Manual Control, The project is all about developing a wireless surveillance robotic vehicle which can navigate through obstacles with the help of sensors, embedded system and its programming.

Surveillance and Target Engagement using Robots International Conference on Electrical, Information and Communication Technologies 2 | Page (ICEICT -2017) Our concept is rather unique in the sense that it provides a low cost solution that offers unlimited range, video feedback. The robot is able to avoid obstacles. It is provided with temperature, humidity, smoke and gas sensors to measure various environment parameters. The robot has autonomous navigation facility. The use of Smartphone allows the user to get live audio data from the environment. The use of Android allows the use of many applications that can be helpful in surveillance and rescue operations. The robotic arm facilitates picking up of objects such as radioactive and other harmful objects. Acceleration and GPS data are received from inbuilt sensors in Smartphone. It can also detect humans if present in the vicinity. The robot can be controlled from a Laptop, a Tablet solving the problem of portability of controlling system.

III. EXISTING SYSTEM

Most popular surveillance systems use RF based communication for data transmission and DTMF for autonomous operation.

Use of RF hinders the range of operation as RF has very low communication range as compared to other available communication methods.

Line of sight operation makes it not totally apt for use in areas with obstacles or in areas like forests.

Use of DTMF for controlling movement of the robot make it semi autonomous as human intervention is always needed for robots to move. Robotic systems as proposed in use mobile phone on systems for data collection to data transmission, which increases cost of system as a good quality mobile device costs high and such systems are not feasible practically.

IV. PROPOSED SYSTEM

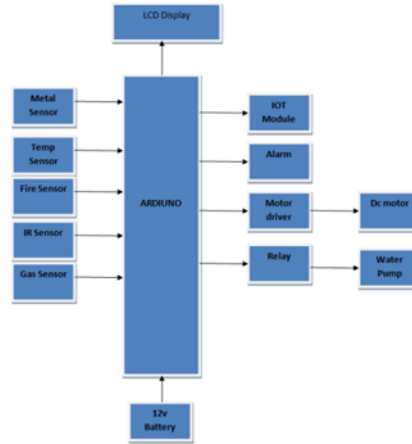
The paper presents an IoT robot which is based on arduino microcontroller and the mobile application using IOT communication. The main objective of the robot is to provide an effective and efficient work at the border areas. The architecture of the robot is mainly consists of the arduino microcontroller, IR sensor, fire sensor, Gas detection sensor, Metal detection sensor and an android application to control the robot.

The system consist of Micro-controller, LCD display, IR sensor, Metal detector, LPG gas sensor, Temperature sensor, DC motor for assembly and Wi- Fi module for wireless communication between Microcontroller system and Android phone having Android web server which we have designed as per our application. This robot will continuously check for bomb detection with the help of Metal detector and send information to the Android application using Wi-Fi connectivity.

The robot will move by analyzing the obstacles in the path with the help of IR sensor. The hazardous gases are detected like LPG with the help of Gas sensor interfaced in the system for safety purpose.

We are able to control the movement of robot remotely using Android application.

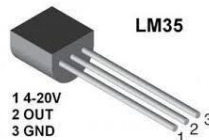
V.BLOCK DIAGRAM



1. TEMPERATURE SENSOR

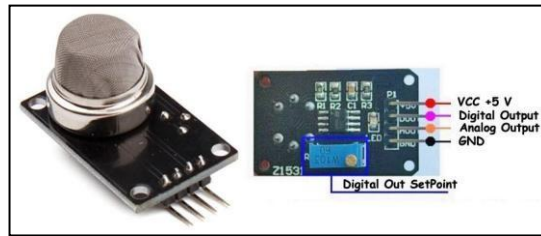
The LM-35 collection are precision integrated-circuit temperature gadgets with an output voltage linearly proportional to the Centigrade temperature. The LM35 gadget has an benefit over linear temperature sensors calibrated in Kelvin, as the person is no longer required to subtract a massive steady voltage from the output to reap handy Centigrade scaling. The LM35 system does now not require any exterior calibration or trimming to grant standard accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full

-55°C to 150°C temperature range. Lower price is guaranteed via trimming and calibration at the wafer level. The low-output impedance, linear output and unique inherent calibration of the LM35 system makes interfacing to readout or manage circuitry specially easy. The machine is used with single electricity supplies, or with plus and minus supplies. As the LM35 system draws solely $60\ \mu\text{A}$ from the supply, it has very low self-heating of much less than 0.1°C in nevertheless air.



2. GAS SENSOR

Gas sensor is a chemical optical sensor utilizing the acidic nature of alcohol for detection. It consists of a gas-permeable membrane in which a pH-sensitive luminescence dye is immobilized together with a buffer and an inert reference luminescent dye. alcohol permeating into the membrane changes the internal pH of the buffer. With this changes the luminescence of the pH- sensitive dye. Together with the inert reference dye internal referencing is made for detection of the luminescence lifetime of the sensor. The measurement signal detected by the alcohol mini correlates to the partial pressure of alcohol ambient.



FIRESENSOR

Fire sensor will distinguish heat radiations in condition. The sensor is used to understand any trace of furnace and it will provide meddle with banner when it acknowledges Fire in underground locale. It tackles the trendy of IR bars or Heat radiation recognizable proof.



3. WATER MOTOR

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 producenoise.

4. BUZZER

Buzzer or beeper is an audio signalling device. Buzzer will automatically turn on when alcohol is detected.



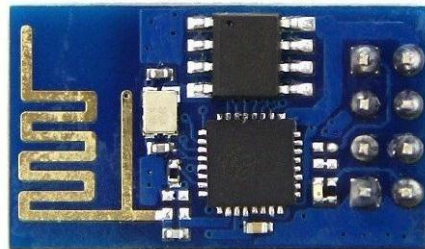
5. MOTOR

DC motor is used as a prototype to indicate the motion of the vehicle. When alcohol is detected we can slow it down to a certain speed by using pwm function when interfaced with Ardiuno using relay motor driving IC.



6. ESP8266 WIFIMODULE

The receiving internet records via ESP8266 modem when interfaced with microcontroller or PC is tons much less tough as differentiated and Ethernet module when you consider that ESP is a SoC and Integrated TCP/IP way of life stack. AT firmware is supplied convenient to use bearing set with which it will in accepted be orchestrated or labored at a variety of Baud Rate (Supported 9600, 115200 or 57600). Plain Text may additionally be despatched via the modem via interfacing solely three warning signs of the successive interface of modem with microcontroller (TxD, RxD and GND). In this arrangement RTS and CTS symptoms of successive port interface of ESP Modem are associated with one another. The transmit banner of successive port of microcontroller is associated with of the consecutive interface get sign (RxD) of ESP Modem whilst get banner of microcontroller successive port is associated with transmit hail (TxD) of successive interface of ESPModem.



7. MICROCONTROLLER ARDUINO:

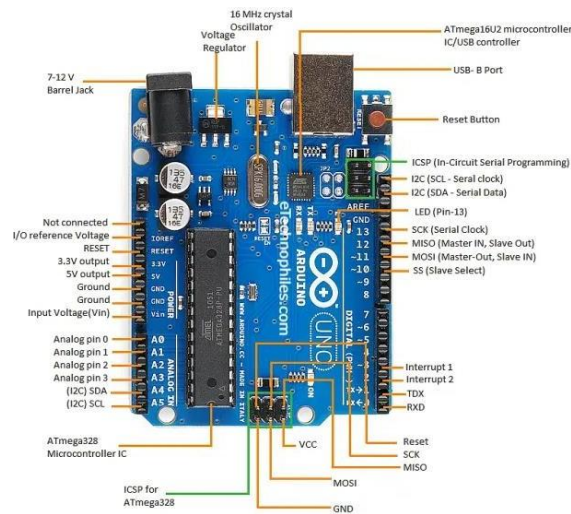
Arduino Uno is primarily based on AVR microcontroller referred to as Atmega328. This controller comes with 2KB SRAM, 32KB of flash memory, 1KB of EEPROM. Arduino Board comes with 14 digital pins and 6 analog pins. ON-chip ADC is used to pattern these pins. A sixteen MHz frequency crystal oscillator is geared up on the board. Following parent indicates the pinout of the Arduino Uno Board.



Pin description

There are various I/O digital and analog pins positioned on the board which operates at 5V. These pins come with fashionable running scores ranging between 20mA to 40mA. Internal pull-up resistors are used in the board that limits the modern-day exceeding from the given running conditions. However, too lots enlarge in present day makes these resistors vain and damages the device.LED. Arduino Uno comes with built-in LED which is related thru pin thirteen Providing

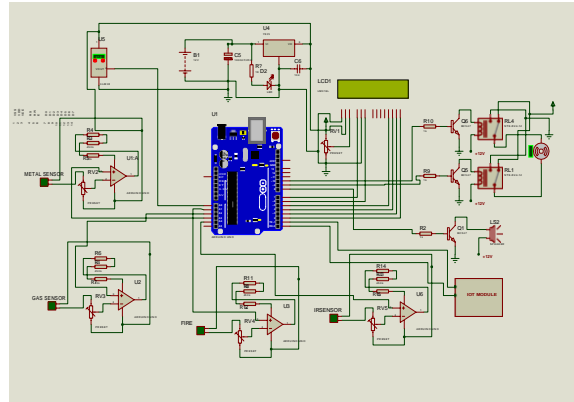
HIGH price to the pin will flip it ON and LOW will flip it OFF. Vin. It is the enter voltage supplied to the Arduino Board. It is unique than 5 V provided via a USB port. This pin is used to grant voltage. If a voltage is supplied via electricity jack, it can be accessed thru this pin.5V. This board comes with the capability to grant voltage regulation. 5V pin is used to furnish output regulated voltage. The board is powered up the usage of three approaches i.e. USB, Vin pin of the board or DC energy jack.USB helps voltage round 5V whilst Vin and Power Jack guide a voltage stages between 7V to 20V. It is endorsed to operate the board on 5V. It is vital to notice that, if a voltage is furnished thru 5V or 3.3V pins, they end result in bypassing the voltage law that can injury the board if voltage surpasses from its limit.GND. These are floor pins. More than one floor pins are supplied on the board which can be used as per requirement.Reset. This pin is integrated on the board which resets the application walking on the board. Instead of bodily reset on the board, IDE comes with a characteristic of resetting the board via programming.IOREF. This pin is very beneficial for supplying voltage reference to the board. A protect is used to examine the voltage throughout this pin which then pick the applicable strength source.PWM. PWM is furnished via 3,5,6,9,10, 11pins. These pins are configured to provided 8-bit output PWM.SPI. It is acknowledged as Serial Peripheral Interface. Four pins 10(SS), 11(MOSI), 12(MISO), 13(SCK)grantSPI verbal exchange with the assist of SPI library.AREF. It is referred to as Analog Reference. This pin is used for imparting a reference voltage to the analog inputs.TWI. It is known as Two-wire Interface. TWI verbal exchange is accessed via Wire Library. A4 and A5 pins are used for this purpose.Serial Communication. Serial conversationiscarried out via two pins known as Pin zero (Rx) and Pin 1 (Tx).Rx pin is used to acquire information whilst Tx pin is used to transmit data.External Interrupts. Pin two and three are used for imparting exterior interrupts. An interrupt is known as by means of offering LOW or alteringvalue.



VI.FUTURESCOPE

The future extension to the system is detect the faces of terrorist using image processing (OpenCV) and system may be alert other users about landmines, live bomb and terrorist activities and its geolocation.

VII.CIRCUIT DIAGRAM



VIII.CONCLUSION

Multi-purpose field surveillance robot has been successfully designed, constructed and integration tested using the best available resources. This multipurpose robot can be deployed in war fields for military use. The robots successfully detect metal and toxic gases so the robot instead of humans can be put to detect a dangerous item. Our robot prototype employs Wi-Fi technology hence it has wide range of operation and can cover better distance.

The robot is controlled by Android which is used by most popular mobile and available to any kind of people around the world. The robot is safely encoded with an authentication token which provides maximum security and hard for trafficking. The robot weighs less than a kilogram; hence it is easily portable and can be deployed on all kinds of terrain. Integration of modern IoT technology has profoundly supplied bounteous information of the field area at anytime and anywhere in the world. Use of Cloud technology makes our robot a market demand product and a must for military operations.

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