SMART SURVEILLANCE SYSTEM

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Abstract: The planet is stuffed with police work, which was monitored by enemy countries. Especially, the border region of any country was controlled and monitored by the own country for his or her safety purpose, for that a lot of technology was wont to monitor the region. Earlier, the police work was done by a human, which causes several deaths by an enemy country. To beat that matter, the technology was introduced for police work with the assistance of a mechanism. But now, the technology was upgraded, which created the US to form a brand-new mechanism for police work, bomb detector with the machine-controlled gun. During this project, this was controlled exploitation Arduino with a Wi-Fi module. The camera was fastened and captures the video and monitored through it. The mechanism will move ups and downs of any place for police work with the help of motors. This was one of the useful robots for military use.

Index Terms - **Arduino, Surveillance, Robot, IoT.**

I. INTRODUCTION

Technology has brought a dynamic and tremendous modification in the AI and automation field that ranges altogether forms of areas. the police investigation is that the method of shut systematic observation or direction maintained over someone, group, etc. particularly one in custody or below suspicion. therefore, police investigation is principally needed within the areas like border areas, public places, offices, and industries. it's principally used for watching activities. The act of police investigation is often performed indoors likewise as in out of doors areas by humans or with the assistance of embedded systems like robots and alternative automation devices. A golem is nothing however associate automatic electronic machine that's capable of acting programmed activities, therefore, replacing human work, providing extremely correct results, and simply overcoming the constraints of people in general. therefore, replacement humans within the police investigation fields are one amongst.

The robot consists of Arduino Uno microcontroller which acts as the heart piece of the robot. This robot also consists of DC motors, conveyor belt wheels, battery, GSM module, Wi-Fi camera and various types of sensors such as ultrasonic sensor for obstacle detection.

Existing System

- Already existing systems use robots that have limited range of communication as they are based on RF Technology, Zigbee and Bluetooth.

- Some existing projects use short range wireless camera.

- Some existing robots can only be controlled with a manual mode which needs human supervision throughout the whole surveillance process.

II. LITERATURE REVIEW

Priyanka D.Balapure et.al has described the working of robot for surveillance through zigbee module. In this, thefunction of various sensors and weapon were controlled using embedded software code. The main drawback of this robot was the high range of data was not utilized for this technology.

B.Subrahmanyeswara Rao et.al has done a work on robot for bomb detection and diffusion through zigbee module. Here, the metal detector was fixed in the system, which was used to detects the bomb and diffused using robotic arm. This was controlled by wireless embedded software coding.

Radhika.P et.al has described the work on robot for surveillance and detecting landmine using labview. In this, the author has designed the robot in manual mode an automatic mode, which helps to detect the guns and bombs. The IR led was used to in automatic mode for tracing movable and immovable objects.

Jonathan Garcia et.al has done a work on robot for security patrolling assistance. Here, to control the usage of security guard, the robot was designed with flipper arm mechanism, camera, Wi-Fi module and some sensors like ultrasonic, thermal and sound. This robot can be operated through Arduino UNO.

Widodo Budiharto et.al have done a work on designing a surveillance robot using neural network. Here, the author has done experimental work on robot with shaft encoder, which is used for odomentry measurement and also used ultrasonic sensor for detecting the obstacle through the algorithms in neural network.

S.Witwicki et.al has done a model of surveillance robot autonomously. This can do the activities of surveillance in real time based on uncertain conditions and it also serves as decision making to a robotic problem in research platform.

Tarunpreet Kaur et.al have done a wireless robot for military application. In this, the robot can be operated using DualTone Multi Frequency, which can be controlled by mobile and the range has maximum level to operate the robot.

Anas f. Ahmed et.al have done a work on a robot for surveillance using ATmega328. Here, the connection between the GUI and controller is due to using the MT7620 integrated circuit, which helps to monitor the location.

III. COMPONENTS USED

Arduino: Arduino is an electronic board, which is a type of microcontroller that can control both physically and digitally. Arduino board is embedded with a chip and compiler that can be programmed by c-language. It helps in receiving the input from the user and control the movement of robot. It has 54 digital input/output pins. It contains 16 analogue inputs, 16MHz crystal oscillator. DC current for 3.3volts pin 50mA. DC current for I/O pin-40mA.

Figure 1 Arduino UNO

Ultrasonic Sensor: Ultrasonic sensor is a device that can measure the distance to an object (obstacle) by using sound waves at a particular frequency. It provides a 3cm to 3m range. It can work in any lighting conditions. Thus, the robot easily dodges obstacles present on its way.

Figure 2 Ultrasonic Sensor

GSM Module: A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network. GSM modems typically provide TTL-level serial interfaces to their host. They are usually used as part of an embedded system.

Figure 3 GSM Module

Bluetooth Module: HC-05 is a Bluetooth device used for wireless communication with Bluetooth enabled devices (like smartphone). It communicates with microcontrollers using serial communication (USART). Default settings of HC-05 Bluetooth module can be changed using certain AT commands. As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, there is no need to shift TX voltage level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.
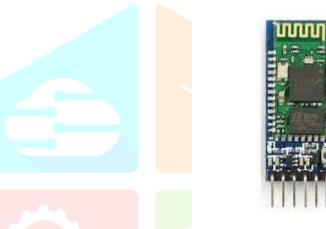

Figure 4 Bluetooth Module

Wireless Camera: Wireless security cameras are closed-circuit television (CCTV) cameras that transmit a video and audio signal to a wireless receiver through a radio band. Many wireless security cameras require at least one cable or wire for power; "wireless" refers to the transmission of video/audio. However, some wireless security cameras are battery-powered, making the cameras truly wireless from top to bottom. In addition to the ease of use and convenience of access, wireless security camera allows users to leverage broadband wireless internet to provide seamless video streaming over-internet.

Figure 5 Wireless Camera

DC Motor: Motors that operate on 12V DC power supply are used. These are rotary electrical machine that converts direct current electrical energy into mechanical energy. The motors used are of 30 rpm speed of operation.

Battery
Conveyor Belt Wheels
Transistors
Capacitors
Resistors
Connecting wires

IV. WORKING AND IMPLEMENTATION

The two most important systems are joint angles and Cartesian (X,Y,Z) coordinates. Y-axis, Z-axis, X-axis.

A few robots support cylindrical coordinates, but these are probable nod as useful as Cartesian because they are manipulator-centered rather than work space centered.

The form of a joint angle description is just a list of the joint angles in all manipulator designs, any such list corresponds universally to one position & orientation of the end effectors. This is typical of simple control systems.

If the reference frame in which the Cartesian coordinates are measured in flexed in position in the work space, it is called an inertial reference. A particular inertial frame is usually designated as the default reference frame. It is often called the "Base" frame, which moves and turns with the object.

It is useful in assembly task to be able to specify positions and motions with respect to a tool, fixture, or work piece. For this purpose, it should be possible to define a new reference frame fixed in an object. These auxiliary reference frames should not have to be aligned with the base frame.

A frame fixed in the end effectors and rotating with it is also very useful in assembly task for describing reaching motions. For ex. Animation calls this the "Tools Frame". Another useful moving frame moves with a conveyor belt.

The industrial robot is a programmable mechanical manipulator, capable of moving along several Direct sound equipped as its ends with a work device called the "end effectors" (or tool) and capable of performing factory work ordinarily done by human beings. The term robot is used for a manipulator that has a built-in control system and is capable of stand along operation.

Modern robotic systems consist of at two major parts:

1. The manipulator, which is mechanical moving structure.
2. The device to actuate the joints of the manipulator.

In general, the structure of a manipulator is composed of a main frame and a wrist with a fool at its end. The tool can be a welding head, a spray gun, a machining tool, or a gripper containing open shut jaws, depending upon the specific applications of the robots. Each of arms practically consists of a sequence or mechanical links connected by joint to the next link. The function of the joints is to control the motion between the links.

The motion of the end effect or is generated by controlling the position and velocity of the robot's axes of motion. An axis of motion in robotics means degree of freedom in which robot can move. Basically, the robot needs six axes of motion (or degree of freedom) to reach an arbitrary point with a specific orientation in space. A different orientation might completely change the position of robot arm. For example, to place a weld on the top side of beam requires completely different orientation from the required to place a weld at almost the same point but on the beam and consequently the position of the arm is changed. Typically, the arm has three degrees of freedom, the linear or rotary motion and the wrist section contents three rotary motion the combination of these six motions will orient the robots end effectors and position it at the required point in space nevertheless, with increase in the number of freedoms, the complexity of the machine increased and so also the cost. Most of the industrial operations may be completed with only 3 to 6 degrees of freedom.

There are several possibilities a fire can start in any remote area or in an industry. For instance, in garments, cotton mills, fuel storages electric leakages will result in immense harm. Also, it's a worst-case scenario, causing heavy losses not only financially, but also conjointly destroying areas surrounding it. Robotics is the rising answer to guard the human lives, wealth and surroundings. A fighting robot is designed and built will be designed with an embedded system. It should be able to separately navigate through a modeled floor plan, whereas actively scanning for an enemy. The robot will even act as a path guide in normal case associated as a fire place device in an emergency.

These robots are designed to search out a border, before it ranges out of control, will sooner or later work with fighters greatly reducing the danger of injury to victims. The fighting robot project will help generate interest as well as innovations within the fields of robotics while operating towards a sensible and obtainable solution to save lives and mitigate the danger of property harm.

Fighting Robot Remotely Operated by Android Applications

The main intention of this project is to design a fighting robot using android application for remote operation. The fighting robot includes a gun, that is used to fire and it is controlled over wireless communication. For the desired operation, pic microcontroller is used.

In the proposed system, RF module application is used to send commands from the transmitter end to the receiver end to control the movement of the robot either to move forward, backward, right or left. At the receiver side, two motors are interfaced to the PIC microcontroller where two of them are used for the movement of the vehicle and the remaining one to place the arm of the robot.

The main goal of this project is to design a fighting robot using RF technology for remote operation. This robot is loaded with a gun with a load which is controlled over wireless communication. For the desired operation, a pic microcontroller is used.

At the transmitter end, push buttons are used to send commands to the receiver end to control the robot movement, either to forward, backward & right or left. The RF transmitter acts as an RF remote control that has the benefit of adequate range up to 200 meters with apposite antenna, while the decoder decode before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work.

In future, this project can be developed by interfacing it with a wireless camera so that the person can view the controlling operation of the robot remotely on a display.

V. ADVANTAGES OVER EXISTING SYSTEMS

In various places, there is a need for a constant monitoring. The current monitoring system includes surveillance using CCTV cameras and another monitoring system. Mostly these systems are stagnant and can cover a limited area. These programs are largely controlled by hand or computer. They cannot be used to cover a larger area and cannot be controlled using any mobile phone. In short, it can be said that these systems are not flexible enough to provide the need for highly robust and remote-controlled monitoring system. This system aims to improve the remote-control system using the Android App. It includes a robot with a wireless camera attached to it. This robot captures high-resolution video feeds and transmits them to a connected Android device which is used to control the robot.

VI. APPLICATIONS:

The practical application domains where robotic technology is most likely to be used are;

- Civil, defence
- Search and rescue
- Domestic services like cleaning, arranging.
- Security/surveillance patrol, observation etc.
- War machines
- Exploration (oceans, space, deserts etc.)
- By an organization.
- Private agencies

VII. CONCLUSION

The robot is successfully controlled using the android application through wireless Bluetooth technology. Even the real-time video feel is a successfully achieved using the Wi-Fi technology on our designed android application.

In this project, the surveillance robot has been made for the border enemies and soldiers' protection to safeguard our nation from the enemy country. As there is a surveillance camera fixed it will be monitoring 24*7 and will send any information even during the night hours. So, the concerned person can monitor and take the necessary actions if any enemy soldiers are crossing our border. This can be operated easily and the surveillance is done clearly.

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