Intelligent Spy Robot

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Abstract- **Saving human life and providing security to the same both are two different aspects but both of them are essential and instead mandatory. A robot is a sort of human replacement which is controlled by human itself. Areas where human cannot be sent or life of human is endangered, robots can be used in such cases. In various military applications and for security purposes our project can also provide live streaming of various on goings which the robot witness at the sites it is sent to. Our project incorporates as a spy robot based on embedded system having an obstacle detector and other advanced features integrated in the same. Secondly the robot is more improvised in the sense that it provides self-defense system into it i.e. if we provide with an obstacle detector so that it can prevent from damaging itself. And thirdly we have LCD display, and attached to display the current directions the robot is taking it can help transmitting various messages as well in an encrypted formats. And it also comprises of few advancements wherein the latest android technology can be utilized.**

Keywords— Face detection; Steganography; biometrics; Principal Component Analysis; Least Significant Bit technique;

I.   INTRODUCTION

The development in technology is continually evolving around the world on the fast track, of which one factor is Robotics. Robotics is an amalgam of computer, electrical and mechanical engineering, to be precise a combination of programming, interfacing, motors and integrated chips. The etymology of the term ROBOTICS stems from the word ROBOT, and the term ROBOT finds its roots from the Czech word 'Robota' which signifies forced labor or slavery. A ROBOT is a machine which
Performs functions analogous to human, but under human guidance i.e. as per command from his owner. There are three laws of robotics also named as Asimov's Laws. Those three laws can be stated as follows [1]:

1.   A robot is restricted from injuring human being as well as through inaction, all human being to falling into dangerous situations.
2.   A robot is expected to obey and follow each and every command given by human being but under a condition which won't conflict the first law.
3.   A robot has to project himself i.e. it should be keen in self defensing, with respect to the First and the Second law Robots are bifurcated as shown below

1.   Robot arms:

A typical robot arm is made up of 7 metallic segments which are joined by 6 joints. The robotic arm is controlled by the computer in a way by rotating each individual stepper motors connected to each joints. Apart from ordinary motors step motors move in increments of fixed levels, while states as a convenient method for computer for movement of arm in an accurate manner, iterating each movement over and over again. Such an arm robot with 6 joints resembles a human arm.The fixed robot i.e. the robot arm is mounted on a base which has a stationary structure and not on a movable body, hence such type of robots are also called FIXED ROBOTS. This type of robot has 6 degrees of freedom i.e. it can move in 6 different directions, where as a human arm has seven degrees of movement.

2.   Mobile Robots:

A robotic arm is the one which is confined into a specific area, where in this doesn't works with mobile robots. Wherein the name itself suggests that mobile robots are the ones with movement more than a limited are and hence they are classified as humanoid robot which are also called as legged robot and other one is non-humanoid robots which are also called as wheeled robot, wherein number of wheels varies from three to four wheeled robot.

The humanoid robots are also called as biped robots in which the term biped means 'two leg' and since humanoid robot resembles human it can be called as biped robot. Exampled of the biped robots are Advanced Step In Innovative Mobility (ASIMO), HUBO which is a walking humanoid robot head mounted on a bipedal frame, MABEL which is famous for being the worlds fastest bipedal robot with knees (with an average speed of 1.95 m/s i.e. 4.4mph) and QRIO abbreviation for Quest For Curiosity which is originally named as Sony Dream Robot (SDR) which was a bipedalhumanoid entertainment tool. Similarly there are many other humanoid and non-humanoid robot models which are been devised and also being currently under research for best utility.
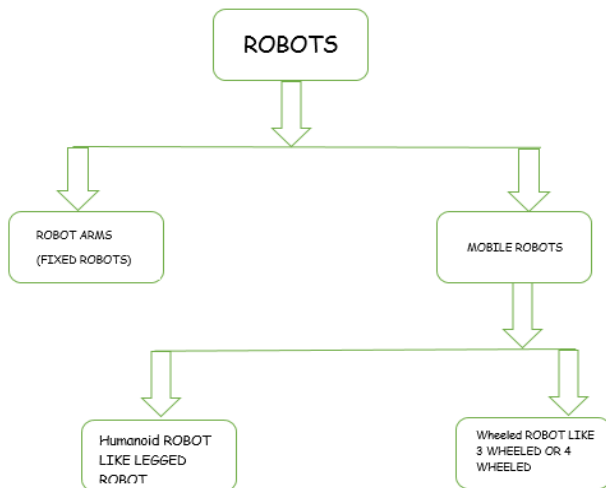
Fig. 1 Classification of ROBOTS

II. OUR PROJECT

The project comprises of two major hardware sections i.e. transmitter and receiver section.

1. Transmitter

The transmitter section is a remote like unit which majorly comprises of switches and encoder section. The remote is used as a controlling unit to control the robot in the way of movement in various directions.
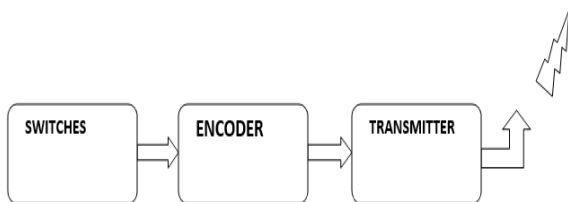

Fig. 2 Transmitter Block Diagram

IC HT12E is used as an encoder which is embeddedon the remote module transmitter. IC HT12E is basically a parallel to serial converted integrated circuit which is a 2^{12} series of encoders [2]. These set of encoders are paired with 2^{12}equivalent set of decoders for efficient use in remote control systems.it finds its major applications in interfacing RF and IR (infrared circuits). The selected pair of encoder and decoder should have similar pair of addresses and data format to provide efficient codec setup. It takes parallel inputs and then converts them into stream of serial bits this 12 bit encoded serial stream of data is down through RF transmitter. The total generated bits are 12 bits out of which 8bits are the address bits and the remaining 4bits are data bit. The transmitter section is embedded with DIP (dual-in-package) switches those address latches are synchronized as that in the receiver unit as stated above. The remote module also has a pair of wireless Trans-receiver module which transmits data wirelessly with the help of Amplitude Shift Keying (ASK). The range of the remote and receiver is approximately 75METERS. It also has one antenna jumper

JP1 which is used for internal antenna if mounted on pin 1-2 and for external antenna mount it on pin 2-3.The transmitter wireless frequency is 433MHz.

2. Receiver

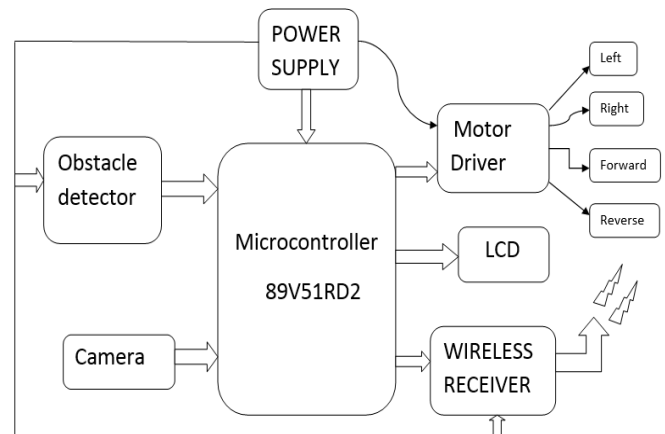The receiver section is an amalgam of various sections embedded on a single board as shown in the block diagram below

Fig. 3 Receiver Block Diagram

3. Microcontroller

The controller of the system is MICROCONTROLLER which controls all the majorly activities of transmitting and receiving signals. IC 89V51RD2 which is a Philips company IC is used here, which is a 8-bit microcontroller with an in-system programming flash memory of the above mentioned Flash program memory supports parallel programming and serial in-system programming which is abbreviated as ISP [3]. The parallel-programming mode offers gang-programming at higher speeds, reducing the cost, and the time to market wherein ISP allows the device to be reprogrammed in the end product under software control unit. IC 89V57RD2 is also an in-application programmable, allowing the reconfiguration of the flash program in the state when the application is running. Various other modules of the receiver section is interfaced and programmed in the microcontroller sections.

4. Motors

A DC motor is used with 60rpm at 12olts and 30 at 6volts. The motor driver IC used is L293D IC.

Working of DC motor

The working of DC motor goes like it majorly comprises of direction control of a DC MOTOR, wherein each and every DC motor has two terminals out, and the direction can be controlled or devised by reversing the polarity of the same as explained below [4]. When DC voltage is applied to the motor, it starts rotating in a particular direction and when the polarity is reversed it rotates in another direction.
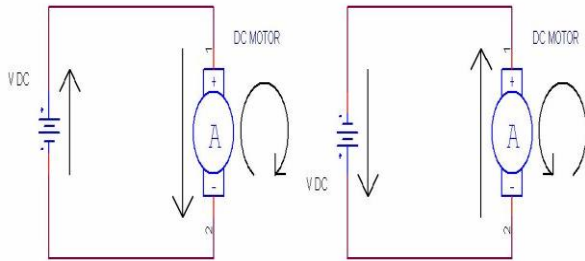
Fig. 4 Working and Connection of DC MOTOR [5]

DC motor controlling using microcontroller

Microcontroller provides two voltage level to the motors they are logic 1 or logic 0.Voltage polarity is not available or can't be plugged-in from microcontroller. Logic 1 which is provided as one of the output of the microcontroller has a voltage level of 5V wherein most of the motors require more than that voltage for proper functioning of the motors.
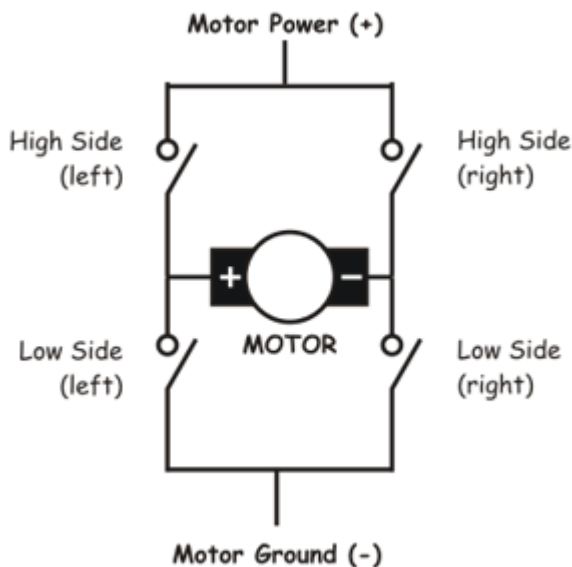
So a solution for the same is using H-BRIDGE.

Fig. 5 Connection Diagram of H-Bridge [6]

H-Bridge is a circuitry which allows motor rotation in both the directions. H-bridge is a four terminal configuration as shown in figure above, we can interface the DC motor with the H-Bridge, and hence these four terminals control the movement of the DC motor. Two L293d dual half H- Bridge can be used to design H-bridge transistors, but for designing and connection ease purpose we have used IC L293d which has inbuilt H-Bridge transistors in it. IC L293d can control maximum two DC motor and one stepper motor for proper functionality.

5. Obstacle detector

Obstacle detector majorly comprises of IC 55 which is a timer IC working in ASTABLE MODE. It also comprises of a pair of IR LED and IR sensor. The working of the IR (infrared) is based on the principle that the transmit unit transmits an IR ray or signal or radiation in the required direction and if there exists any obstacle detected the radiated signal or ray reflects back towards the IR receiver [7]. As shown in the figure below let the object be a box i.e. the object body be a box which acts as an obstacle, the IR LED transmits the IR signal on the box and the signal is reflected back from the surface of the box. The reflected signal from the box is received by the IR receiver. The IR receiver can be a photodiode or phototransistor.
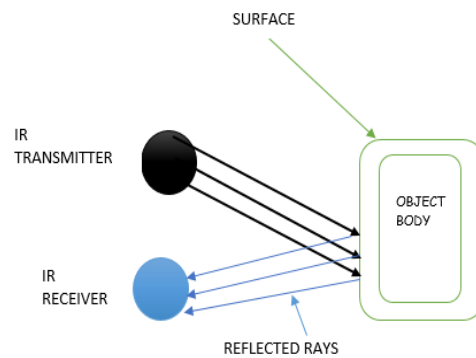
Fig. 6 Working of IR section

6. Camera

A spy CAMERA is incorporated in the receiver section where in it will display the videos or snapshots taken while travelling onto remote areas. And can also store the data or videos and provide live streaming of what is been recorded by the camera incorporated on the receiver section. An another alternate for using SPY CAMERA we can use android mobile phones camera by installing the application available on play store IP CAMERA, which can connect with a particular Personal computer or laptop and prove live streaming or storing of videos and snapshots.

III. WORKING

1. The robot works left right back and forth as per the direction provided by the DIP switches on the remote.
2. As it has obstacle detector section on the project whenever the module detects any obstacle it stops and waits for the direction to be provided by the remote user.
3. The module also has a LCD incorporated in it displays messages on the LCD display. Like when it is witched ON it displays message: HELLO! And as it goes in any direction it displays the same on the lcd screen on detection of obstacle it displays a message for the same
4. The robot also includes RF Camera attached to it, which can be used for spying purpose.
   Example
   Suppose the robot is instructed to move from bedroom to kitchen, using Dip switches the robot goes forward and then takes a left

The robot moves forward and suddenly finds Pair of shoes and robot halts (because of obstacle detector in it). Then user takes reverse and move right and finally reach the destination

Working of the robot can also be enhanced by use of spy camera to provide more security into it.

IV. ADVANTAGES

1. It utilizes the latest android technology wherein the camera unit of the receiver section, such that the ease of installation, connections and usage becomes much easier as compared to normal CCD units or WEBCAM units to be mounted on the robot.
2. LCD module embedded in the mechanism can be used to transmit code messages from one end to another, by encrypting the message. If the message is confidential between two ends of individuals, it can be transmitted with the help of the robot, without any other member of the team knowing the same.
3. It saves human life, it's better to afford a loss of robot in case the robot is been detected by the enemy or thief rather than losing human life.
4. It has self-defense unit wherein with providing security to the user, it also serves itself by having obstacle detector feature incorporated for the same, which avoids from crashing and damaging itself. Which makes the robot intelligent.

V. FUTURE SCOPE

The project stated above can be further enhanced by incorporating various types of sensors like pressure sensor, fire sensor, light sensor, temperature sensor, and incorporate GSM unit as well so that the in case of any threat it will send notification on personal computers or mobile system, hence It can be enhanced as an alternate system as well besides this, a gun type mechanism where in laser pointer can e incorporated in the mechanism can also be incorporated in the same project so as to make the robot a combat robot. And hence many more advancements can be done so as to improve the performance of the project

VI. CONCLUSION

As states above with a deep description of the major parts of the project. The project as a whole can be used in security based systems with a moving camera installed into it.it founds its application to find in people in case building collapses since human being cannot reach in each and every corner in such scenarios. Installation of such spy robots in stadiums, sacred places, government and non-government organization assures top security as it serves as a moving unit.

VII. REFRENCES

1. 'Robotics and Intelligent Systems', Virtual reference book by ROBERT F. STENGAL, Princeton Universit
2. Digital Computer Electronics', Albert Paul Malvino.
3. '8051 microcontroller and embedded system', Muhammad Ali Mazidi
4. Electric Machines', B.L.Thereja
5. www.electroons.com/8051/electroons/dc_motor_control.html
6. www.robotplatform.com/howto/L293/motor_driver_1.html
7. 'International Sensor technology', Stretching vibration infrared spectrum theory.