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DEVELOPMENT OF CAMOUFLAGE TECHNIQUE BASED MULTIFUNCTIONAL ARMY ROBOT

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ABSTRACT

In today's era, lot of expenses are made in the field of defence for the sake of adopting primitive security measures for safeguarding the border from the trespassers. Some military organizations utilizes robot in the risk prone areas which are very much effective and efficient when compared to the army men. The main intention of this system is to get camouflaged to hide its existence from the outside world. These robots are also enhanced in order to give the guarantee of success in the hazardous region. The main objective of this paper is to implement a Wireless multifunctional Army Robot which is based on Camouflage technology. It can be controlled by smart phone using IOT.

Keywords: *Arduino Mega, Camouflage, IOT (Internet of things).*

I. INTRODUCTION:

A robot is a mechanical device which is capable of carrying out a complex series of actions automatically, often resembling a human or an animal. Robots have replaced humans in performing repetitive and dangerous tasks continuously without getting tired. It also includes a PIR sensor to trace the dead bodies, IR sensor for obstacle detection and many more sensors for various utilities. This army robot is more efficient and effective compared to the soldiers in terms of strength, calculations, capacity and capabilities. Excellency of this robot is in being operated wirelessly by a remote which offers no threat to the soldier lives.

The main intention behind the Camouflage Robot is to minimize the number of human losses in military operations, sting operations, terrorist attacks and many such operations which results in human death. Camouflage Robot can act as a personified spy and can be sent into the dangerous locations (and those locations which are out of reach of humans) for observations and evidences because a naked human eye can't detect minute evidences very easily. The Camouflage robot is also used in testing the various security systems developed in the market to measure the amount of efficiency it offers. The existing systems faced many problems such as setting up of communication between robot and rescue control unit, noisy wireless communication link between robot and control unit ultimately stopped robot to function, implementation cost was relatively. Since, Bluetooth and X-bee has a low range, distance became the limiting factor in these systems [4] [5].

II. LITERATURE SURVEY:

Premkumar. M presented that low power X-bee wireless sensor network is used to propose the new system to trace out the unknown and unauthorised persons and the robot will take the required actions against them on its own. Thus, manual error is reduced by the proposed system, an Intelligent Unmanned Robot using X-bee to save human lives in defence side. [1]

Akash Ravindran et al., proposed that to interface controller and android, Bluetooth communication should be established. Using the Bluetooth module, controller can be interfaced though UART protocol. Robot motion can be controlled according to the commands received from android. If any movement or position is tracked, it has the ability to re-establish contact with main station. [2]

P. Hymavathi et al., proposed that, using X-bee interface, implementation of wireless multipurpose robot can be controlled through personal computer and tries to find the humans by navigating around the disaster areas who need help and also to identify the enemy site. [3]

Yadnika Warang et al. proposed the implementation of a multifunctional army robot based on camouflaged technology using Blue-tooth module controlled via smart phone. In addition to this, for the safety of army robot, certain artificial intelligence was added to it. [4]

III. PROPOSED SYSTEM:

The principle of the army robot is based on the camouflage techniques. The aim of the project is to design, develop and operate the robot via a smart phone, used as remote control device. Apart from this it can also reproduce the colour accordingly with the ground surface where it will be moving on with the help of colour sensor, hence being camouflaged to the outside world. Hence, in order to achieve these goals, we have used a LED that can diffuse uniform colours, coupled to sensors that can precisely identify colour of the ground. On the other hand, we have also created a system which can receive and implement the information received from the smart phone using IOT to further control motors which in turn drive the robot in any required direction. Here model is redesigned to make the machine perform multitasks so that along with checking for several parameters for monitoring, it also carries out other significant tasks on its own using IOT.

IV. BLOCK DIAGRAM AND DESCRIPITION:

The proposed design consists of Arduino Microcontroller, LED, Sensors, DC motors, WI FI Module, WI FI camera and the components are arranged as shown in fig 5.1. The PIR sensor is a high temperature electric device. Whenever there is a change in infrared radiation due to the movement of surrounding object, it generates an electric charge, and Fresnel lens is used to focus the infrared radiation onto the object. The metal detector will detect the nearest metal object between a range of 1cm by the eddy current losses produced by the high frequency and accordingly output signal changes. Similarly, obstacle detection sensor will detect the obstacles in the surroundings and produces the output signal. Wi-Fi Camera is used for the real time interpretation of data. Arduino Microcontroller will guide the output devices by taking the input signals from the sensors. The color

that is sensed by the color sensor as the robot moves according to the command given to it through BLYNK tool, the LED will glow with suitable intensity and match with ground color. After reacting with color filter on receiving light reflected by ground, photodiode generates a signal which is analyzed in terms of frequencies and then it gives the color of ground. The microcontroller will guide the DC motor driver for the locomotion of robot with respect to the signal received from the PIR sensor, obstacle sensor and metal detector etc.

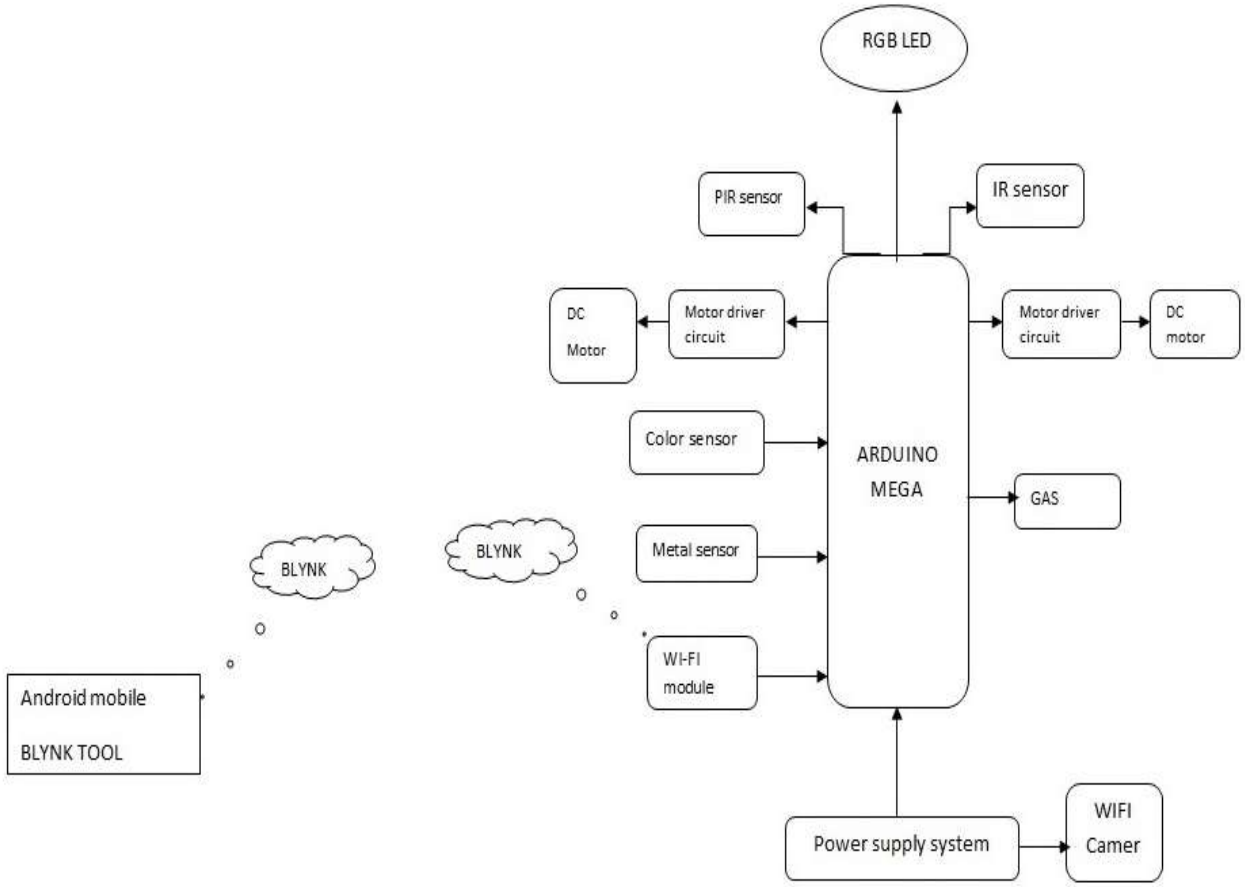

Fig 1: Block diagram of the proposed design of the robot

V. IMPLEMENTATION:

In this proposed system, controlling of robot is done by the BLYNK app. The controllers are designed in the BLYNK app to manage the movement and the robot is as shown in fig 2. In fig 3, in BLYNK platform the controllers are defined using the embedded c programming that is dumped in the arduino mega controller and even the output parameters are displayed using the BLYNK platform which is interfaced using NOD-MC Wi-Fi module through the arduino mega microcontroller.

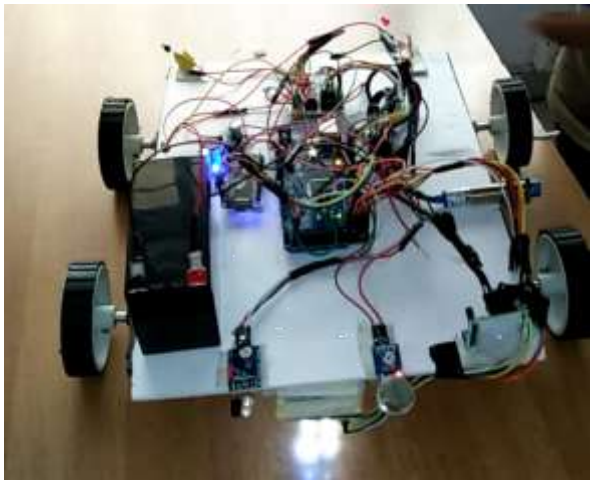

Fig 2. Army Robot

Fig 3. BLYNK app

Also it has special display buttons for displaying the output of sensor. Live video streaming from the robot end is received using 'Plug and Play' app. The colour sensor detects the surface colour and respective LED glows and thus camouflages the robot as shown in fig 4 & fig 5.

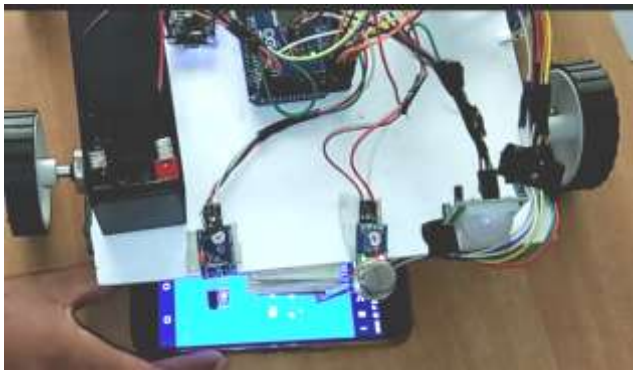

Fig 4. Colour sensor sensing blue colour

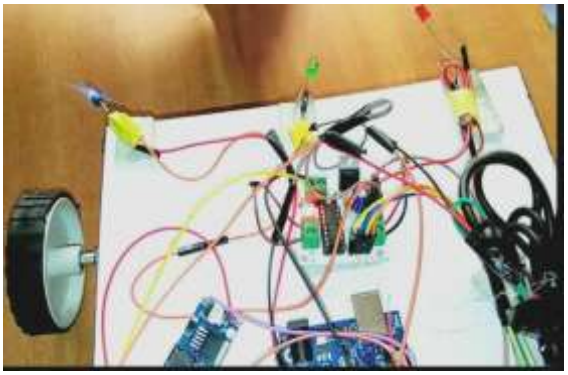

Fig 5. Blue LED glows

The other hardware components used are dc motors, sensors (PIR, IR, Metal Detector and Gas Sensor). Toxic gas is detected using a gas sensor, metal arms and weapons, if any, are detected by metal detectors. Similarly human intruders are sensed using PIR sensor. The software used in this proposed design of robot is Arduino IDE, Embedded C, BLYNK app, Plug and Play android app. We are using WI-FI connectivity and concept of IOT to communicate with robot and get the output parameters through it.

VI. RESULT:

The movement of robot is controlled by the 4 controllers as shown in fig 6. When 0 and 2 controller is on, robot moves forward. When 1 and 3 controller is on, robot moves backward. Similarly when 0 and 3 controller is on, front left wheel of robot rotates and when 1 and 2 controller is on, front right wheel of robot rotates.

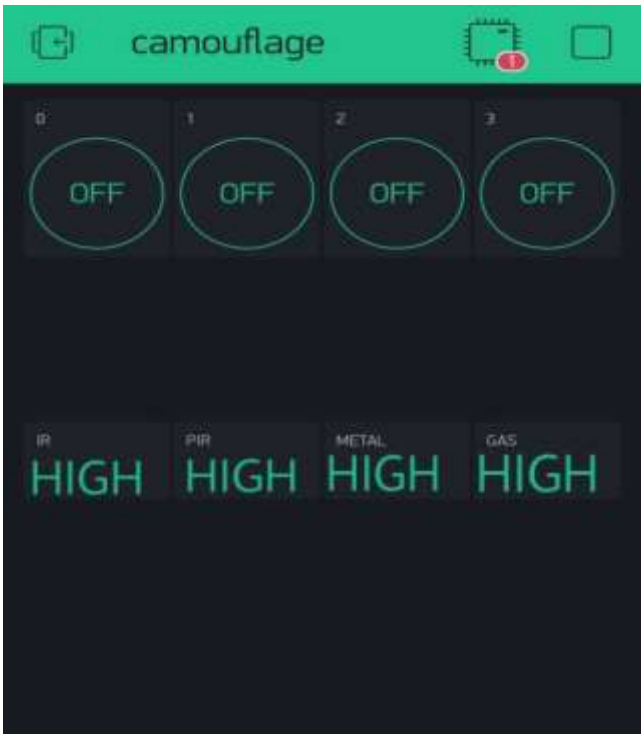

Fig 6. Detected results in BLYNK app

As shown in the fig 6, when IR sensor detects the obstacle, the respective controller in BLYNK app switches to high state. When PIR sensor detects human bodies, the respective controller switches to high state. Similarly metal detected and gas detected will be shown by their respective controller.

VII. CONCLUSION AND FUTURE ENHANCEMENT:

Thus, we have proposed a design of robot which will change its colour according to surrounding surfaces and can easily be hidden from enemies to keep the information confidential using chameleon's camouflage technique. The constructed robot is also equipped with wireless camera that will help us to keep eye on enemy territory and also various other sensors to increase its capabilities and output parameters obtained by sensor is monitored and read in BLYNK app which is an open source platform.

Implementation of the real time camouflage feature to the proposed robot design and to give a feature of autonomy to the proposed design of the robot. Target is acquired in better accuracy by the use of finer quality and more precise position sensing devices. Observation and firing platforms are enabled by wireless data transfer to and from the control station and needs to be separated by greater distances.

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