

Android Application based War Field Spying ROBOT with Night Vision Wireless Camera

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ABSTRACT

The military forces always tried to use new gadgets and weapons for reducing the risk of their casualties and to defeat their enemies. With the development of sophisticated technology, it mostly relies on the high-tech weapons or machinery being used. Robotics is one of the hot fields of modern age in which the nations are concentrating upon for military purposes in the state of war and peace. They have been in use for some time for demining and rescue operations but now they are under research for combat or spy missions. Today's modern military forces are using different kinds of robots for different applications ranging from mine detection, surveillance, logistics and rescue operations. In the future they will be used for reconnaissance and surveillance, logistics and support, communications infrastructure, forward-deployed offensive operations, and as tactical decoys to conceal manoeuvre by manned assets. To make robots for the unpredicted cluttered environment of the battlefield, research on different aspects of robots is under investigation in laboratories to be able to do its job autonomously, as efficiently as a human operated machine can do. Latest techniques are being investigated to have advanced and intelligent robots for different operations. The main objective behind developing this robot is for the surveillance of human activities in the war field or border regions to reduce infiltrations from the enemy side. The robot consists of night vision wireless camera which can transmit videos of the war field to prevent any damage and loss to human life. Military people have a huge risk on their lives while entering an unknown territory. The robot will serve as an appropriate machine for the defence sector to reduce the loss of human life and will also prevent illegal activities. It will help all the military people and armed forces to know the condition of the territory before entering it.

Keywords: Spying robot, Wireless camera, Arduino controller, Android application.

1. INTRODUCTION

War inevitably yields injuries and fatalities -- with most recipients recognized for their outstanding devotion and commitment to country [1]. To reduce the casualties, animals were trained for certain tasks that range widely from force protection to military applications. Researchers long ago realized that dogs have an acute sense of smell and can be trained to detect bombs and drugs. War Dogs were also used for a long time to attack the enemy or deliver a message. Ordinary honeybees were studied for the ability to help human investigators detect nuclear, biological, or chemical weapons. Dolphins were trained and used for mine detections etc. Scientists have studied many animal characteristics over the years to better understand how nocturnal animal functions and whether the capabilities, certain species possess, might have practical applications for the military [1]. But the animals also have limitations such as they must be trained well for any task. They can only work in the suitable environment (Bees cannot detect bombs if it is concealed or in the night), also a bee trained in an environment may not be able to work in another environments. The one possible solution is the use of robots having the same or better sensors as do animals have. Looking at the achievements of new technology, the world militaries that have large budgets and political pressure to eliminate casualties are eagerly researching the application of robots in not only spying but also combat and other missions [2].

Robots are typically used when a task is dangerous, tedious, or dirty. Many commercial industries have successfully made use of robotic technology in well-structured environments such as manufacturing and in semi structured environments such as automated agriculture. To date, the use of robotics in the Military environment has been extremely limited due to the technical challenges the machine perception and control systems encounter in that complex and changing outdoor environment. Researchers are developing robots in the likeness of their living animal or insect counterparts. The robots, researchers hope, will be able to reproduce animal or insect intricacies - like slithering through a pipe, traversing rocks and walking on the walls and ceilings without falling off.

This work will also be helpful for the design of military robots for tasks like spying [3, 4], monitoring, guarding etc without the fear of being seen or noted by others. Robots were originally developed to do repetitive, "hard to do", or dangerous tasks in industry. In military operations the main reasons of using robots are [5, 6]:

- To reduce exposure of personnel to extreme danger in battle. or other dangerous duties (such as rescue, decontamination, evacuation, and intelligence collection).
- For personnel cost savings, either in operations or support, with a resulting reduction in life cycle cost.
- To reduced workload for skilled manpower categories.
- To improve decision-making under tactical stress conditions, including the introduction of artificial intelligence assistance, collection, analysis, and fusion of data, execution and elaboration of decisions, and dissemination.
- Easiness in the exact duplication of robots of high intelligence.
- Less cost for generation of army of robots as compare to training manpower.
- No threats to robots in case of biological attacks.
- If captured, a robot can simply self-destruct, thus improving the security of a combat mission.
- Robots could also be hidden for long period of time without food and less energy.

2. PROPOSED METHODOLOGY

The advent of technology has brought a revolutionary change in the field of robotics and automation which ranges in all the sectors from household domestic works to the defence sector. Today in the global market, smart phones also have brought a revolution in changing people's lifestyle and providing numerous applications on different operating systems. Android operating system is one of these systems build on open source which has made a huge impact providing many applications for robotics to help people in their day to day life.

The main technology used here for serial communication with the robot is the Bluetooth technology. Bluetooth technology can be used to share data between two devices considering the range between two devices. The Bluetooth module HC-05 will relate to the robot and the commands to the robot will be given through the android application. The war field robot consists of Arduino uno board as a controller board. It has L293D motor driver IC's along with a HC-05 Bluetooth module. Two DC motors are also used for the motion of the robot. The night vision wireless camera is attached with the robot to monitor the situation and the camera can be rotated 360 degrees via the android application through motor. The Sydney siege is considered one of the historic moment in the field of automation and robotics where a robot with a laser beam light and Bomb disposal Kit inbuilt was sent inside a dark room before the military commanders in order to reduce the risk of losing human life. It was so far considered as the best police operation carried out by New South Wales police department with the use of latest technology resulting is less loss of human life.

Features

- Remote communication using a video capturing in the field.
- Reliable for remote tracking of war fields when needed.

Software tools

- Arduino IDE for Embedded C programming.
- Arduino IDE for compiler, dumping code into micro controller.

Applications

- Military war fields.
- Construction buildings.
- Rescue operations.

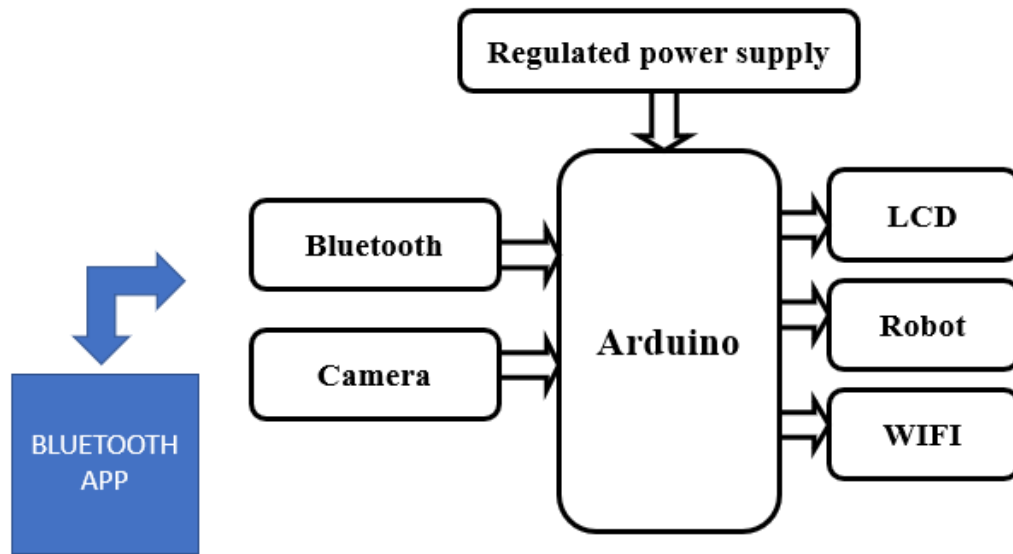


Figure 1. Block diagram of proposed spying robot model

LCD

LCD is liquid crystal display technology works by blocking light. Specifically, it is made of two pieces of polarized glass that contain a liquid crystal material between them. A backlight creates light that passes through the first substrate. It is used for display purpose.



Figure 2. LCD module.

Bluetooth

Bluetooth is a wireless technology standard used for exchanging data between fixed and mobile devices over short distances using short-wavelength UHF radio waves in the industrial, scientific and medical radio bands, from 2.402 GHz to 2.480 GHz, and building personal area networks.

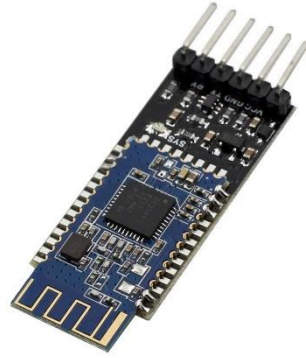


Figure 3. Bluetooth module.

Arduino UNO

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

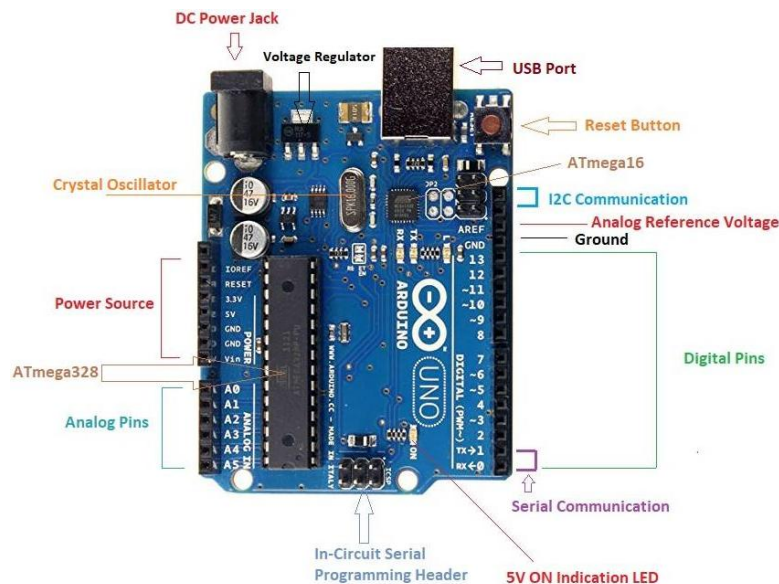


Figure 4. Arduino UNO microcontroller.

Arduino can be used to communicate with a computer, another Arduino board, or other microcontrollers. The ATmega328P microcontroller provides UART TTL (5V) serial communication which can be done using digital pin 0 (Rx) and digital pin 1 (Tx). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The ATmega16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. There are two RX and TX LEDs on the Arduino board which will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328P also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

3. EXPERIMENTAL RESULTS

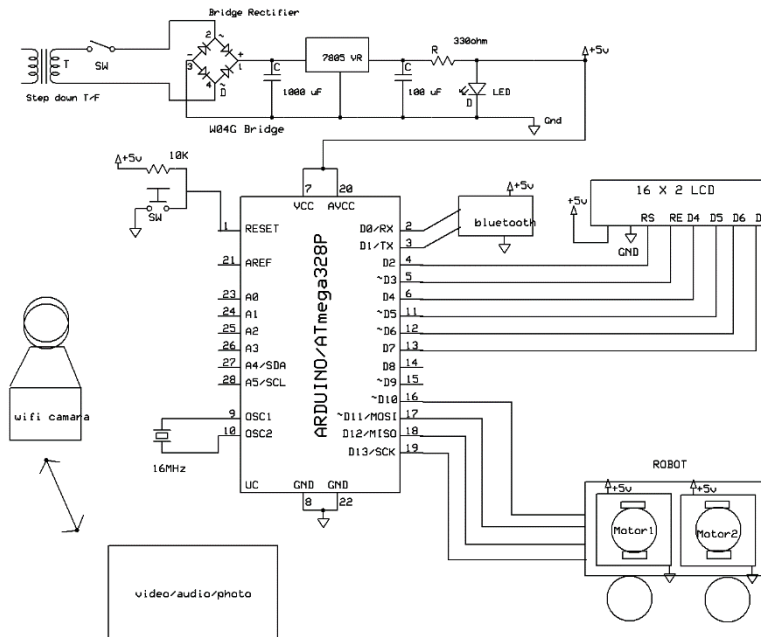


Figure 5. Schematic diagram of proposed war filed spying robot with wireless camera.



Figure 6. Hardware setup of wireless camera with robot.

Figure 5 demonstrate that proposed schematic diagram of android based war field spy robot using night vision wireless camera. The hardware setup of spy robot is disclosed in Figure 6, where the wireless camera is interfaced with the robot which is built with L293D motors with the help of Arduino Uno controller.

4. CONCLUSIONS

This article presented an android application for war field spy robot with wireless night vision camera using Bluetooth module. The controlling is done using Arduino Uno microcontroller. The video capturing is done by night vision camera and transmitted to the smart phone where a user or a person can monitor the field of war. This robot is very efficient and cost effective.

Future scope of this robot is very efficient it may have gas sensors to detect the harmful or hazardous gases in the surroundings. It can also be used as bomb diffuser and bomb disposal team can also use these types of robot in many ways and reduces the risk factor of human loss. Further, a terminating framework can be set on the robot, to fire any foe when he is spotted.

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