Design and Implementation of Smart Robotic System for Wildlife Observation with GPS and Wi-Fi using ANDROID Technology

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Abstract **- As we know, the days of poaching and animal trafficking are now threatening wildlife and have led to endangering most species, hence Wildlife rangers need to get a closer look at wild animals by invading their habitats. So, here we are with a concept namely the Wildlife Observation Robot. The robot has a nightmarish video camera. This robot can be used wireless by users by their android phones. The robot has a wireless camera that sends wireless video streaming to the user's PC. So, the wild animal's observers can safely access images of wildlife while driving this robot car at a safe distance. This program contains an Arduino micro-controller unit used for processing user sent instructions. These instructions are accepted by the system via Bluetooth modem. The micro-controller then processes this data and also transmits signals to motor drivers. Motor drivers also use engines to provide the desired Signal for driving motor engines. And when the micro-controller receives a camera switch signal via Bluetooth modem, it transfers this signal to a camera car to achieve the camera angle user want. Therefore, this wildlife robot allows for safe wildlife observation view using Android device control.**

Index Terms **- Android Technology, Arduino, Robotic Systems, Sensors, Wildlife.**

1.INTRODUCTION

Due to poaching and animal trafficking, many endangered species are threatened extinction. To keep track of these endangered species we have introduced this technology. this technology will result in changes among wildlife observers. Smartphones have made tremendous changes in humans' lifestyles by providing various apps. Android app is an open-source operating system which has tremendously increased the number of applications related to robotics to help all the technocrats working in the same field. Key technologies used in our standard project are communication technology with Bluetooth technology. Bluetooth works to exchange information between two devices, beyond a limited short distance. The Bluetooth module (HC-06) is to be connect to the robot with provided instructions & the robot will be provided with the Android application. A wildlife watching robot contains a uno Arduino board as a control board. It features L293D for IC driver and Bluetooth module HC-06. Two DC motors are used for robot movement. A night vision camera is used at the top of the robot. The robot contains a set of track wheels to move the robot to difficult and difficult locations such as forests. The entire arrangement is done using wood to reduce the chance of being attacked by the robot by wild animals.

2. LITERATURE SURVEY

2.1 Bluetooth Module (HC-06)

The Bluetooth HC-06 module has four anchors which are 5V, ground, Transmitter, and Receiver. The Bluetooth module has two devices

1. Master device
2. Slave device

One device connects to the master while another device connects to the slave.

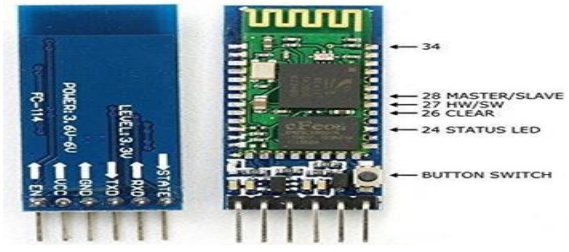

fig 1. Bluetooth module (HC-06)

2.2 Motor Driver IC

From Fig. 2, the driver IC details are:

- The L293D and L293 have four higher level half-H drivers.
- The L293D is designed to provide a variety of bidding machines up to 600-mA currents at voltages from 4.5V to 36V.
- The L293D IC has sixteen anchors out of which four are input anchors and four output.

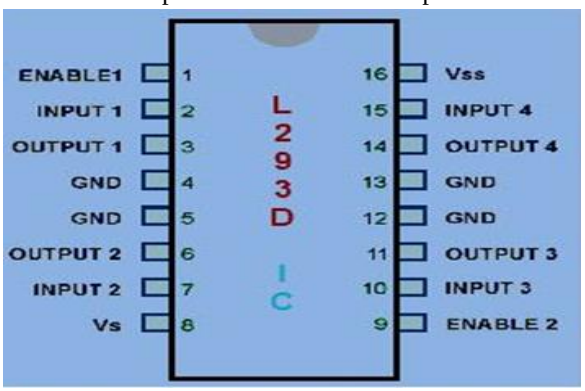

fig 2. Motor Driver IC

2.3 Global positioning system (GPS)

The Global Positioning System (GPS) is a global radio navigation system developed from a network of 24 satellites and their earth stations. The system was originally designed for U.S. military operations and hence funding and regulation of GPS is done by Department of Defence the USA. But now-a-days, many GPS community users are there around the Globe. This Positioning Service is allowed for use of Public without being charged or restrictions in anyway.

GPS receivers are small horned sensors that receives radio frequency signals from the satellites that are orbiting in the sky above. In most cases, the sensor receives the signals from at least four satellites, and then location is calculated by the receiver using the process called trilateration. ^ 22squared.

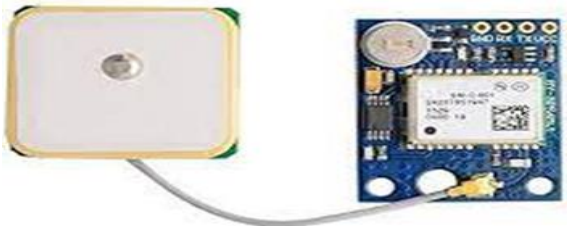

fig 3. GPS Module

2.4Wi-Fi positioning system

Setting up a Wi-Fi strategy works best in crowded, urban areas full of Wi-Fi networks (probably the opposite of where GPS works best).

First, the Wi-Fi being scanned with the Wi-Fi antenna of a device and signal strength of each network is measured.

Wi-Fi trilateration is based on three different signal strengths access points. Based on the strength of the signal, each circle is an approximated distance. The device being shown in the center area and gets located where overlapping of the three circles is happening.

fig 4. Wi-Fi Module

3. HARDWARE DESIGN

3.1 Motor Interfacing:

DC motors connected to L293D IC in pairs of pins from Arduino and two other Arduino pins. The L293D IC input pins are connected to Arduino and IC output pins connected to motors.

Here we can use L293D IC to control motors or L298 IC to pull engines. Conventional DC motors need a current greater than 250-300mA. if we directly connect the engines to Timed ICs, ATmega328 Micro-controller, 28 ICs will get damaged because they can't bring this current value, therefore we should not connect the engines to the exit of any of the above given ICs, which can be damaged. Required file for regions that can serve as a bridge between the above ICs and powerful devices like motors. So, this is done using L293D. The L293D is a pair of H-bridge motor driver ICs. We can control it rotation direction of two motors on the side of the clock and against the clock. Here the L293D IC is used to control engines, used for wheels. L293D IC connection with dc motors as shown below.

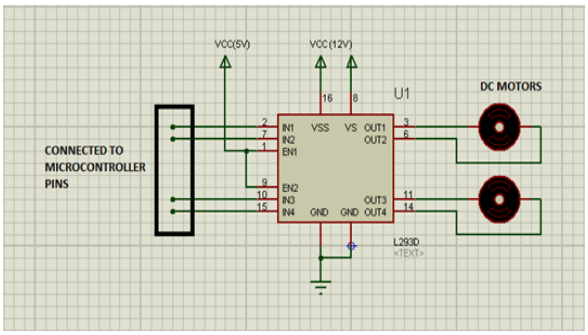

fig 5. Motor Interfacing

3.2Bluetooth Connection with Arduino:
The four pins of the Bluetooth module are connected to the Arduino as shown in the picture:
The Tx HC-06 pin is directly connected to the Arduino Rx pin.
The RX HC-06 pin only needs 3.3V, so the connection is made by separating the electrical energy region.
From Fig 6. Bluetooth and Arduino connections are shown

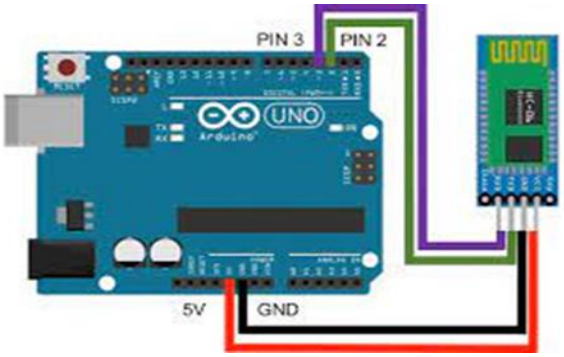

fig 6. Bluetooth Interfacing

3.3 Global positioning system (GPS) Interfacing
The three pins of the GPS module are connected to the Arduino as shown in the picture:
3.3.1 GPS module - Arduino

- TX -- Digital pin (D3)
- RX -- Digital pin (D4)
- Vcc -- 3.3 V

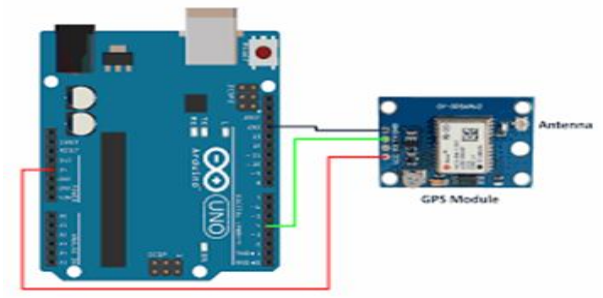

fig 7. GPS Interfacing

3.4 Wi-Fi positioning system
The four pins of the Wi-Fi module are connected to the Arduino as shown in the picture:

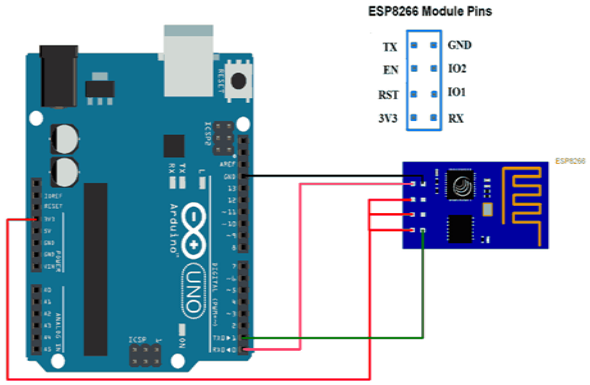

Fig 8. Wi-fi Interfacing

3.3.2 Night Vision Camera:

- Camera weight: 15gm
- Low brightness: 1.5 lux
- Default features of the motion detector.
- View angle: 62 degrees

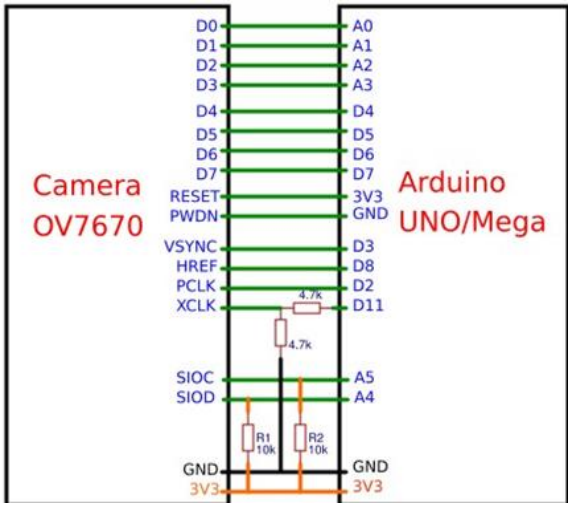

fig 9. Camera Interfacing

4. ANDROID APPLICATION BASED NAVIGATION SYSTEM

Most users only use Android apps. Android emulators are one of the forums that have allowed many creators to create new apps. The algorithm steps are mentioned below procedures for making an android app. Fig.10 shows the Android app that has been made and its process is shown below.

fig 10. Android Application Interface

Android Application Algorithm:

From Fig. 11, below is the following algorithm designed for Android navigation creation controls,

Step 1: Start and check the serial data from the Android application is not available for step 8.

Step 2: When serial data is available save details to variable 'input'.

Step 3: If the input found is 'F' then go forward.

Step 4: If the input found is 'B' then go back.

Step 5: If the input is 'L' then go to the left.

Step 6: If the input found is 'R' then scroll right.

Step 7: If the input is 'S' then move the stop.

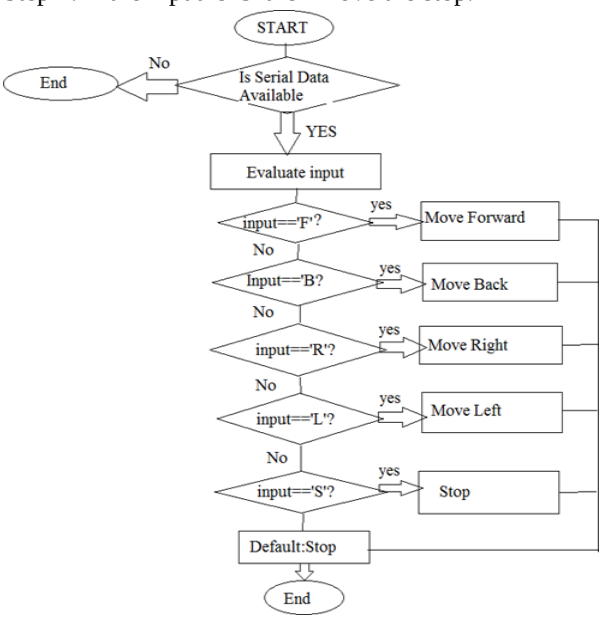

fig 11. Algorithm flow chart

5. RESULT AND DISCUSSION

The wildlife observation robot located the location and clicked the pictures successfully and sent them to the server.

fig 12. Wildlife Obervation Robot

6. CONCLUSION

In this project, we found that close-up images of wildlife can be easily taken at all angles without injury to wildlife and can be used to track wildlife as well as helps researchers.

A robot can be built using a Bluetooth module. Therefore, the robot can be controlled using a Bluetooth android application. This robot can be used to view wildlife animals and habitats.

7. ACKNOWLEDGEMENT

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8. FUTURE ENCHANCEMENT

We can install sensors to the robot so that it can sense and detect the animal and with the help of Machine

Learning and Artificial Intelligence, it can take decisions automatically itself and control itself on its own.

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