INTERNET CONTROLLED HOME SURVEILLANCE ROVER

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Abstract.   Devices these days are becoming smarter by the minute with advancements in processor technology and electronics. The Internet of Things concept, first proposed by Kevin Ashton in 1999, is becoming a reality where every object has a virtual representation in the internet. Robotics is a fast growing field in today's world. Robots have sufficient intelligence these days to perform a wide range of operations better and faster than humans can. The main goal of our project is to provide remote mobile surveillance to the user and the relaying back of video feed to the user via the internet.

Keywords. Arduino, internet, web control, universal device compatible, video stream.

INTRODUCTION

Internet of Things (or **IoT** for short) refers to uniquely identifiable objects and their virtual representations in an Internet-like structure. The term Internet of Things was proposed by Kevin Ashton in 1999. This concept first became popular through the Auto-ID Center at MIT and related market analysis publications.

Radio-frequency identification (RFID) was seen as a prerequisite for the Internet of Things in the early days. If all objects and people in daily life were equipped with identifiers, they could be managed and inventoried by computers. Besides using RFID, the *tagging* of things may be achieved through such technologies as near field communication, barcodes, QR codes and digital watermarking.

As the population increases and devices become smarter, the number of connected devices is on the rise. By 2020, an estimated 50 billion connected devices will exist. Modern day smart homes can be considered as a practical example for Internet of Things.

Embedded Systems

- Computer system designed to perform one or a few dedicated functions.

- Real-time computing constraints. Must have real-time response.

- Small device, like a cell phone. It is embedded as part of a complete device often including hardware and mechanical parts.

- Contains small processing core such as microcontroller or Digital Signal Processors(DSPs).

- Design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance.

- Can be mass-produced.

- Software used to control a consumer device. Software is hidden from user.

Project Overview: Why This Project?

Our project is also an application of the Internet of Things concept. It consists of a mobile bot that can be controlled over the internet remotely by the user, which can deliver a live video feed of its surroundings and even relay back sensor details to the controller.

This is a very useful project for the end user. If a user is interested in checking on his or her house from a remote location such as school or work, that person would be able to do so from an infinite amount of angles. It can also be used to switch on appliances automatically by detecting presence in the room.

The user can move around the house wirelessly. If you have children you can keep an eye on them!

METHODOLOGY

The main hardware components used are:

1) Arduino board with ATMega328 onboard microcontroller
2) Ethernet Shield
3) Ultrasonic Ranging Module HC-SR04
4) Servo Motors and DC Motors
5) H – Bridge

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for students, designers, hobbyists and anyone interested in creating interactive objects or environments.

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators.

Why Arduino?

Arduino was developed to aid novices, students and hobbyists to build interactive objects or environments.

The Arduino simplifies hardware and software for the user by hiding complex concepts in programming and allowing easy interfacing.

It is widely available at low cost. Being open sourced, the Arduino is backed up by a huge community of engineers and hobbyists.

Working

This project is an Arduino powered internet controlled home surveillance rover that is capable of monitoring your home. Arduino microcontroller prototyping board is used as the brain of the project. It consists of a chassis running on DC motors which is controlled via an H-Bridge IC to which ultrasonic sensors for distance sensing and obstacle avoidance. Camera can be connected to via the internet and provides live video feed to the end user. Servo motors are used for tilting, panning and turning the ultrasonic sensor and the cameras. All this is controlled through the Arduino which is programmed. An Ethernet shield is connected to Arduino to interface with the router. The router connects to the internet. The rover can be controlled via the webpage which the user can access using the IP address that is specified. This project can be considered as an implementation of the Internet of Things and Robotics.
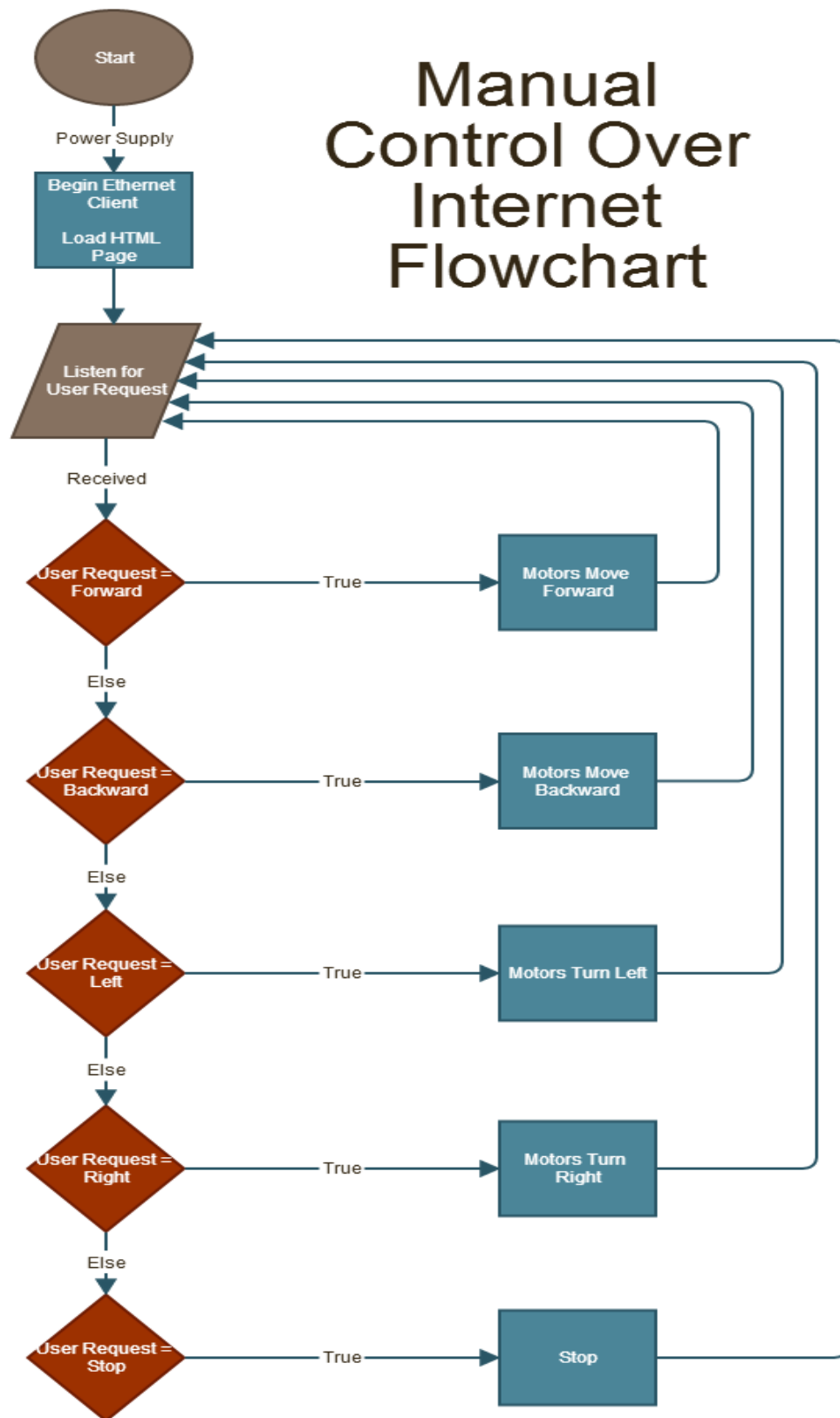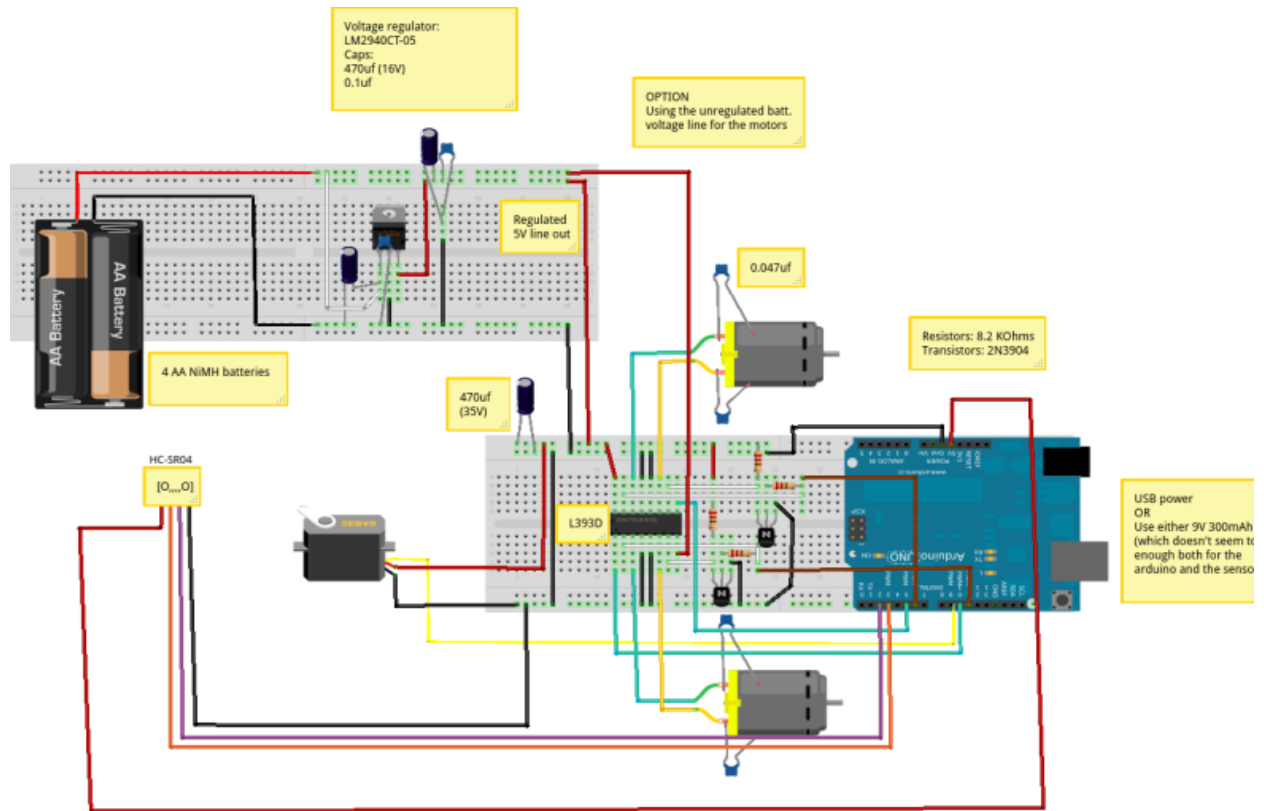
Manual Control Over Internet Flowchart

Start

Power Supply

Begin Ethernet Client

Load HTML Page

Listen for User Request

Received

User Request = Forward — True — **Motors Move Forward**

Else

User Request = Backward — True — **Motors Move Backward**

Else

User Request = Left — True — **Motors Turn Left**

Else

User Request = Right — True — **Motors Turn Right**

Else

User Request = Stop — True — **Stop**

Figure 1. Manual Control Over Internet.
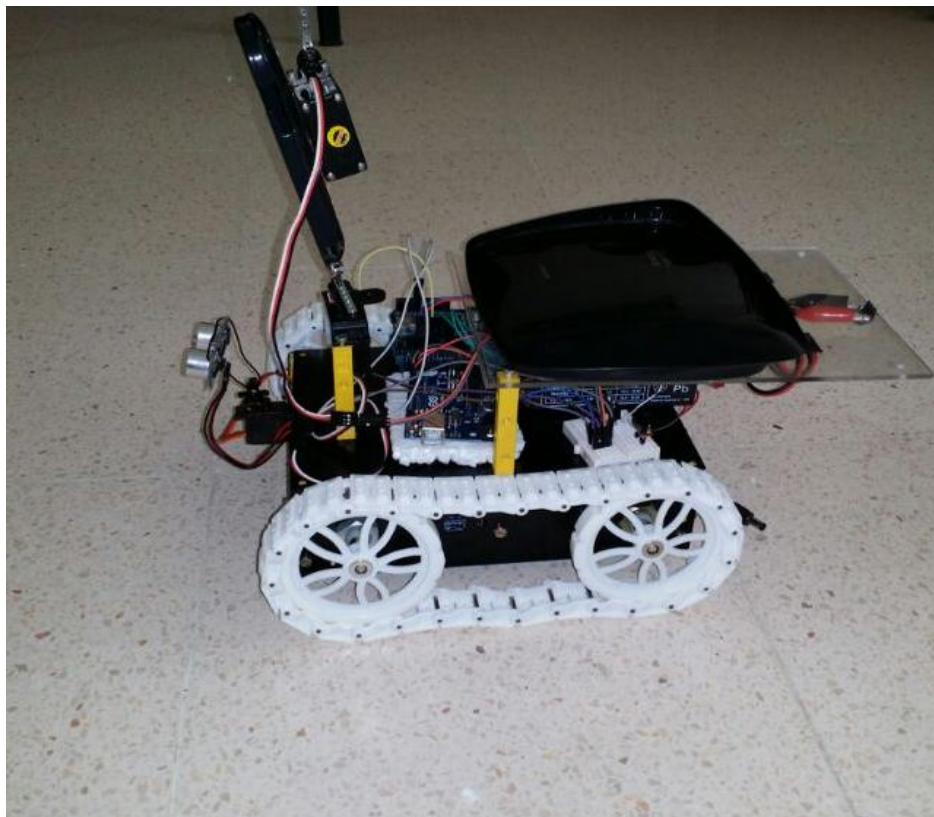
Figure 2. H-Bridge Circuit Diagram

Figure 3. Internet Controlled Surveillance Rover

RESULTS AND DISCUSSION

From our research and attempts so far, we have managed to acquire the required components to develop the circuits for the Rover. The ultrasonic sensor along with the DC motors have been successfully integrated with the Arduino. A web interface has been successfully developed to control the rover via the internet. The programming is done in the Arduino programming environment which is based on C language.

CONCLUSION

This report describes the project up to its current stage. It provides an idea of our project to a certain depth. The whole integration is compact, easy to service, modify, and maintain. The design cost is low.

Future Scope

As the number of connected devices increases, the concept of Internet of Things becomes more realizable. In the future, more devices can be interfaced with the mobile surveillance bot allowing for greater degree of control and security in one's home from a remote location.

With advancements in technology and robotics, the era where every household will have a robot to manage various tasks is just around the corner of this century. Our project can be considered as a 'stepping stone' or a 'leap forward' in that direction.

Application

Internet Control means the ability to control the rover from anywhere in the world. This allows you to monitor your home say, from work, or while on vacation. You can monitor small children in the house while your away. You can control appliances via the rover and even monitor for burglar break ins. The rover provides a camera feed for monitoring.

Advantages

- Internet Control. This allows you to operate from anywhere in the world.
- The Internet Control is provided with the help of routers. The choice of using routers is to extend the range to around 20m.
- Mobile nature provides wide range of angles to monitor from, this a limitation of static monitoring systems.
- Easy addition of new functionality is possible. Home automation can be fully implemented based on the rover if required.
- Autonomous functionality can be implemented if wifi connectivity is not present or if user is not monitoring.

REFERENCES

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[4] URL – www.stackoverflow.com – Used to obtain code snippets and examples