

Remote Access of Raspberry Pi Robot via Internet

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Abstract: For awareness environmental condition tell us what is happening by using robotics in the sense of new places. The main purpose of this paper to invent Raspberry pi base robot which can worldwide control wirelessly through internet communication. The transmitter is android mobile phone which placed on robot. By using Bluespp application in android phone we can control the Bluetooth module. The Bluetooth control mobile has limited range so this is the reason mobile is placed inside the robot and mobile phone will be control via internet by using computer. By using the team viewer software we can control robot from base station. Mobile wireless cam is used to live video streaming. GPS in android phone can also track the location so this can be used to aware the sense of new places. Text to speech converter in robot is used to communicate with the people near the robot. This robot has to work in all environments around the world without the actual involvement of human.

Keywords: Android, Raspberry pi controller, Pick and place arm, Robot, GPS.

I. INTRODUCTION

Robots are smart machines that can be programmed and used in many areas. These robot are perform hard, hazardous and accurate work to facilities our life and to increase the production. For new kind of this robot are used instead of human. Relevance of this type of robot is taking photographs, pick ad place the object or collecting the samples, convey the message with audio video streaming.

This robot has to do work in any condition around the world without involvement of human. It has unique user id and password. For this purpose of robot is designed in such a way that is can be controlled through internet. As internet in robotics continuous to grow, robots are increasingly being integrated into everyday life.

The results of this integration are end-users possessing less and less technical knowledge of technology. In this case, the need for simplified, reliable and user-friendly robot design is of almost important. Controlling the robot includes moving in any direction, speaking with the people in front of the robot. This paper contains literature survey, methodology, information, results and finally conclusion.

II. OBJECTIVE

The main aim of the paper is to control the robot from whole over the world. Internet is the one of the source which easily available whole the word. By this we can use robot as servant by sending where ever he wants and communicate with the new people easily. Controlling the direction of the robot includes the movement, collecting the samples and photographs and doing small thinks like talking with the people in front of there. Initially humanoid robot is planned to be design to establish both wireless communication between the mobile robot and remote base station and serial communication between the remote base stations.

III. LITERATURE REVIEW AND PROBLEMS

The robot is designed to move as per the command given by the controller. There are no robots are available with the all features such as internet controlled, video streaming, collecting the samples and talk the peoples which are in front of the robot. There are most types of robots are available which are android controlled, pick and place, line follower. This can be controlled through the RF, DTMF, Bluetooth or internet. But to combine this all features the circuit become more complex and the need more difficult coding to it. Conventionally, the wireless controlled robot uses such as RF, DTMF circuits which have drawbacks of limited working range, limited frequency range, and the limited controls. To get the video streaming a camera need to interface this is more expensive. To get the location of the robot we also need the GPS module to interface with the robot. To talk the robot in front of the people we need the text to speech converter on robot. The main part of the product is to send the all data from robot to base station we need GPRS module.

IV. METHODOLOGY

Robot controlling using the Bluetooth module is easy and also implemented widely. Controlling the robot along with video streaming and robot voice through internet needs the GPRS module, web cam and text to speech converter which make the circuit and program more complex and bulky. For overcome these entire problem replace the all component with the android mobile phone. Which is placed on the robot and that mobile is controlled from any other mobile or PC through internet. Thus the robot is indirectly controlled through internet. Figure 1 shows block diagram of robot.

Android is a software stack for mobile devices that include an operating system, middleware and key application.

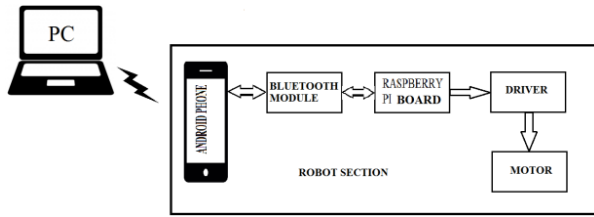


Fig.1. Block diagram of Remote access of Raspberry pi robot via Internet.

Android boasts a healthy array of connectivity options, including Wi-Fi, Bluetooth and wireless data over a cellular connection. Android provides access to a wide range of useful libraries and application that can be used to build rich applications. One of who is controlling the robot can view what is going in front of robot and speaking to the people near by the robot. It can also show the position of the robot in the world map. This method has more flexibility because of huge range of application available in the android. Any of these applications can be downloaded from the Google play store and used to controlling the android phone from any other android phone or PC itself. Android is an operating system for mobile devices it is mostly used for cell phone, like Google's on galaxy nexus, as well as by other phone manufacturer.

V. RESULTS AND SIGNIFICANCE OF WORK

The ultimate aim is to make the system reliable and portable. From the block diagram shown in the Figure 1 the mobile placed in the robot which controls the robot by using remote access software. Team viewer software is used here as a remote access software here. Mobile sends Bluetooth signal to the Bluetooth module which is interface to the Raspberry pi board. Based on the programming code in the Raspberry pi board motors are activated for the respected commands received. Robot is totally made of D.C. motors so the programming is easy and torque is high. The robot is made to stand three wheels, which includes one free wheel. The hand is made from the hoist mechanism and D.C. motor. This hand is used to pick and place small things and collecting them. Mobile flash is used to as a head light so that can be controlled in the dark place also. Figure 2 shows the program flow in the Raspberry pi board.

Now detailed depiction of each step, Firstly Bluespp software is installed in mobile phone which is placed on the robot so as to send data serially to Bluetooth module interfaced with the raspberry pi board. Bluespp software gives the facility of scanning and selecting the receiving module as shown in fig 3. Bluespp also gives the competence of creating our own keypad.

To preferred module data can be transfer by using the key pad in the mobile. Bluetooth module is a simple 4 pin chip which can be easily interfaced. It has LED's to specify status also. Receiver and transmitter pins are connected to the UART of Raspberry pi board along with power supply. Raspberry pi board is programmed such that for every specific character received it has to give output through some GPIO pin which is connected to the driver which drives the motor.

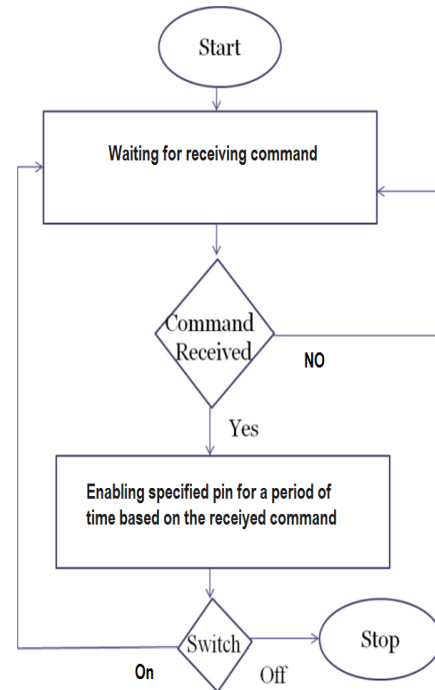


Fig.2. Program flow.

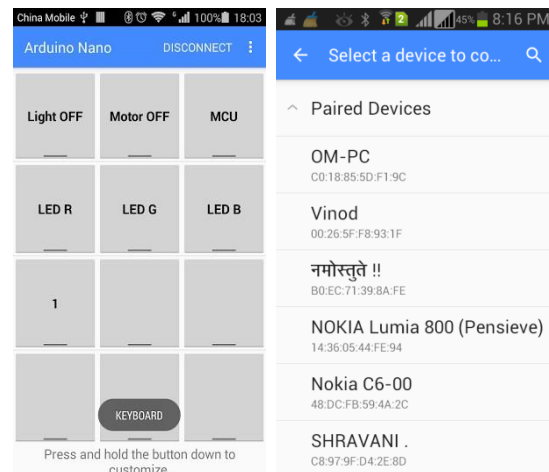


Fig.3. BlueSpp screenshots

Much extra software to be installed in the mobile on the robot is as QS team viewer, Robot voice translucent Screen. Team viewer is remote access software which can remotely control from any other PC. Screen of the system which is being controlled appears in the PC directly internet. The team viewer software is show in Figure 4.

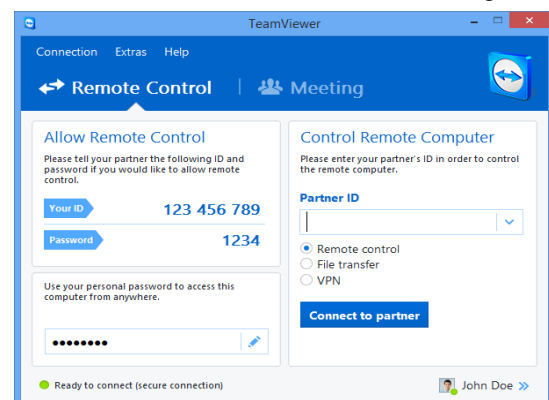


Fig.4. Team viewer screenshots.

Transparent screen is application which continuously streams the camera view in the background even if we are operating on any other application. This is installed to get the view in front of the robot continuously. Screen shots of transparent screen are shown in figure 5.

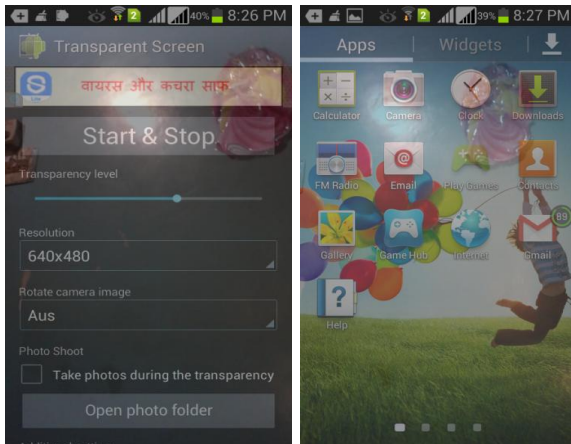


Fig.5.Transparent screen screenshots.

Robot voice is a text to speech converter which talks as a robot by using this text which is typed in the mobile is spoken by it. By making the mobile registered in android device manager we can track the robot by using mobile GPS as shown in figure 6. The location is nearly to 7-10 meter equally.

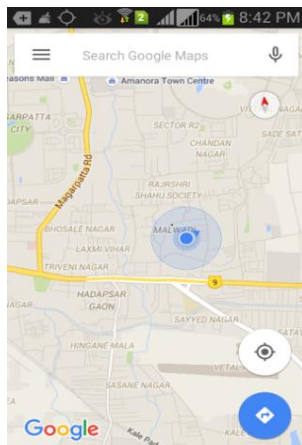


Fig.6.Online GPS Tracking.

VI. COMPARISON WITH LITERATURE REVIEW

Methodology is used here for the difference and efficiency purpose. Area of implementation of raspberry pi board is small compared to logical element. In this method circuit consumes less power during session. Speed of video streaming depends upon the capability of the camera; it can also support high video streaming like skype application. According to what we studied electronic circuit, embedded circuit, GPS, GPRS, camera, audio speaker, microphone, and loudspeaker are attached externally. The complexity of the circuit is replaced by a simple smart android phone which has all these features. Figure 7 shows the embedded circuit is complex with all GPS, GPRS, Camera, Speaker, Microphone, and Loud speaker attached externally.

So power requirement for a single android phone is much less than any other electronic home appliances and

electronic devices. Power consumption in Raspberry pi Board is 0.9W and in mobile is 1016.4mW. Instead of this if all GPS, GPRS, Camera, Speaker, Microphone, and Loud speaker are interfaced to some microcontroller as arduino or ATMEGA separately.



Fig.7. Circuit complexity and size comparison of embedded circuit and android mobile.

In that case ATMEGA controller itself dissipates 81mW for 5v supply and when all other modules are interfaced it dissipates more than 2000mW. In order to sensitivity and accuracy the android software itself a platform where thousands of applications can be installed and played while in any other platform it increases complexity of robot. Below table shows different methods used for remote access of robot including various parameter variations.

Table 1 : Difference between this methodology and other

Parameter	Different technologies			
	RF	DTMF	GPRS	Android
Area	Less	Less	More	More
Power	Low	Low	High	Low
Speed	High	Moderate	Moderate	High
Video	Yes	No	Yes, Moderate	Yes, High
Range	Less	High	High	High
Flexibility	No	No	No	Yes
Portability	No	Yes	No	Yes

VII. CONCLUSION

The implementation of Remote access machine using Raspberry pi board through internet is successful. The communication between different modules is perfect without any interference. The design met all the required specifications. Eagle is the software tool used. The performance of the system is more efficient when the methodology of placing an android phone on the robot instead of GPRS controlled robot. Remote access machine using Raspberry pi board working has been verified in the hardware along with in simulator. It can be concluded that placing android mobile in the robot and controlling it provides portability and flexibility.

VIII. FUTURE SCOPE

Number of robots could be at a time controlled by a single person and can do work professionally. It could be used in defense force instead of soldiers so that we can decrease the loss of lives. It could also be interfaced with the

personal computer and video could be recorded and stored. It can be used in security systems for uninterrupted monitoring of an office or an industry. An autonomous robot can be created by maintaining a server at the system and analyzing the signals from the robot and providing the response to those signals.

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BIOGRAPHIES



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