RF Controlled Digital Wireless Camera

Aakash Patel[1]
Electronic and Telecommunication
Vivekanand Education Society's
Institute of Technology
Mumbai, India.
e-mail: aakash.patel@ves.ac.in

Hema Soni[2]
Electronic and Telecommunication
Vivekanand Education Society's
Institute of Technology
Mumbai, India.
e-mail: hema.soni@ves.ac.in

Suraj Patil[3]
Electronic and Telecommunication
Vivekanand Education Society's
Institute of Technology
Mumbai, India.
e-mail: suraj.patil@ves.ac.in

Dr.(Mrs.)Saylee Gharge[4]
Dept. of Electronic and Telecommunication
Vivekanad Education Society's Institute of Technology
e-mail: saylee.gharge@ves.ac.in
Mumbai, India.

***Abstract*—** In the present scenario cameras are fixed in static position due to which they are able to monitor a limited area. The effective way to increase the coverage area to camera is to design a system which will give the flexibility to move the camera in different directions as per requirements [1]. This paper presents operation and working of wireless video camera system. This system is developed by using USB-camera, microcontroller atmega16A, serial communicator-FTDI232 which is used for communication between computer and micro-controller and vice versa and motor driving circuit. The special feature about this system is that direction of camera can be changed by user in desired direction from the control room using Bluetooth mobile application. So only one camera can cover the large area making the system reliable, cheap and convenient. This type of system can be used in surveillance application, military application and for monitoring purpose [1].

Keywords*--*RF(Radio Frequency), CCD(Charge Coupled Device), AAP(Application).

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I. IN TRODUCTION

The world is moving from wired to wireless communication system due to increased mobility, better access of information, ability of network expansion and flexible infrastructure towards developing technologies [2]. Among all the available wireless technology, RF link has gained more importance due to wide range, smaller antenna size and less health hazards compared to microwave, x-band etc. [3]. FCC has allocated the ISM band for unlicensed user application. Most of router, Bluetooth and cordless phones use ISM band. One of the common use of ISM band is in surveillance application [4]. The problem occurs from the current system is that the viewing angle of the camera is limited due to stationary position of camera. Hence more cameras are required to cover wide area, making the system complex and costly.

This paper presents wireless system to improve the viewing angle of the camera with the help of wireless controlling technique using radio frequency beam technology. This is operating in ISM band. So the system is more effective and reliable. The direction of camera can be changed using remote (Bluetooth mobile application) in the desired direction from control room. The sequences of images taken by camera from monitoring area are transmitted via internet to the control room. By using this technique it becomes possible to view in different angels and cover wide area with single camera.

To achieve this objective the system contain following modules

- Camera direction control circuit using RF link.
- Wireless transmission of video information using internet.
- Wireless reception of video information and display on PC.

The initiative is already taken towards this approach by various researchers. In [5] robot with RF remote control unit was made, with CCD camera which is slow for wireless application. System in [6] was implemented using CMOS camera which is faster but camera was static. Some system makes direct use of wireless cameras and receiver which are costly [7]. Coverage range is major problem faced in system [8].

Section II describes about the block diagram of system. In section III making of Bluetooth mobile application for controlling direction of camera is discussed. Section IV focus on results obtained.

 ISSN: 2321-8169
226 - 229

II. BLOCK DIAGRAM

The system consists of two main circuits one is mounted at an area to be monitored as shown in Figure.2.1.

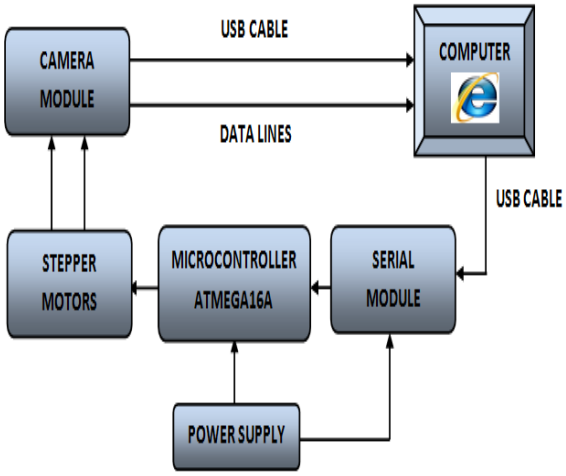


Figure.2.1 Block diagram of the system used at the area which needs to be monitored.

The video information taken by camera is feed to computer, from where the online streaming is done towards the control room [9]. This video is then monitored by the person sitting in the control room. The distinct feature of this wireless system is to control direction of camera from control room. To achieve this, Mobile Application is made which actually acts like remote. The circuit which is at control room has Bluetooth module HC-05 [10] is shown in the Figure 2.2.

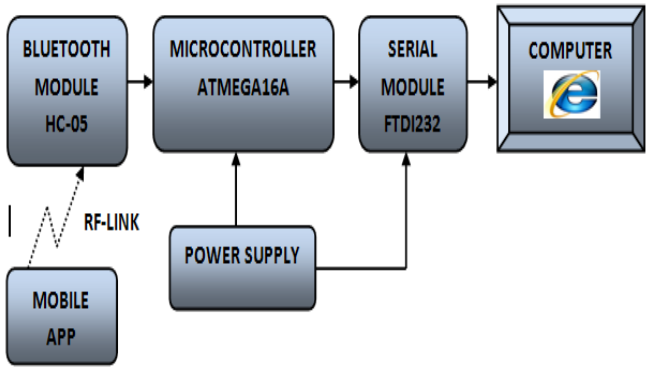


Figure 2.2 Block diagram of the system used at control room.

Whenever user wants to change direction of camera he will give command via Mobile Application. This command will be accepted by Bluetooth module and it would be given to microcontroller. Microcontroller then transmits the signal to the camera side PC via serial interface module FTDI232 [11]. From camera side PC, the command to change direction of camera is send to PC which is at control room with the help of MATLAB web functions via internet [12]. According to command received at control room, signal to change direction of camera is given to micro-controller ATMEGA16A via the serial interface module. It then drives stepper motors to change direction of camera in desired direction. Now user will be able to monitor in desired area.

III. DEVELOPMENT OF ANDROID APP

An Android application is made to establish connection between user mobile and HC-05 Bluetooth module via RF link. Application is made using "MIT APP INVENTOR" an open ware software [13] which look like Figure.3.1.

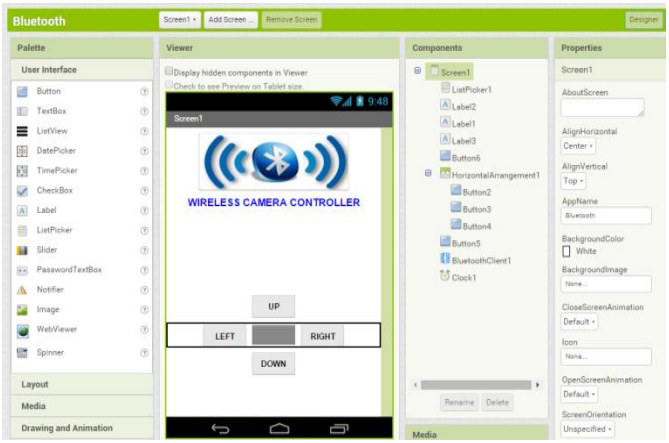
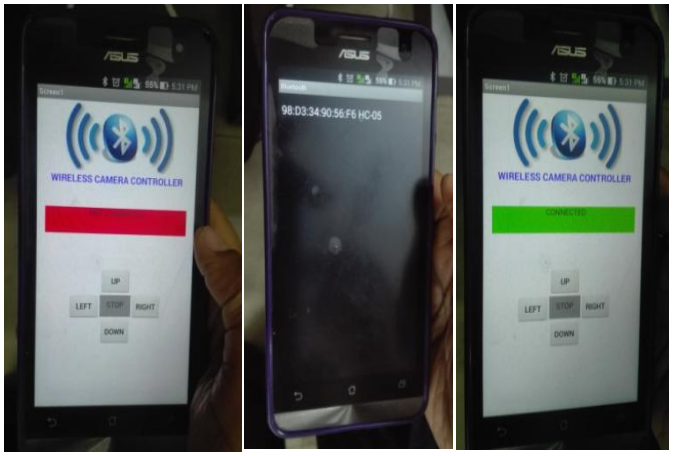


Figure.3.1Screen shot of APP development software.[13]

Firstly new screen is created and various functions are incorporated in it using block design. The Bluetooth mobile application developed has user interface which has 4 buttons on it namely UP, LEFT, RIGHT and DOWN. When each of button is pressed the steps to be taken is specified in corresponding blocks. The user connects its mobile to the Bluetooth module by selecting its address amongst the list available devices as shown in Figure3.2.



(a) (b) (c)

Figure 3.2 Status of the available device on mobile App. (a) when device is not connected. (b) showing available devices. (c) when device is connected.

IV. RESULTS

Suppose user present in control room want to change the direction of camera in upward direction .The user from control room presses the button "UP" using Mobile Application as

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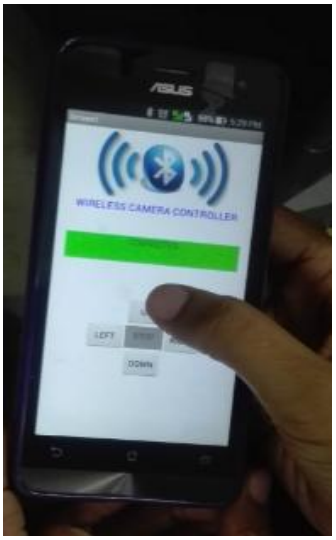
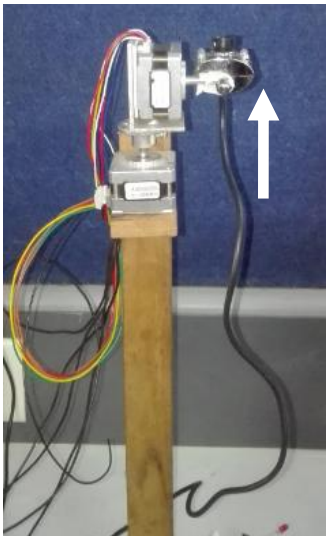
226 - 229

shown in Figure 4.1.(a). The corresponding command is send to circuit present in control room. This command is send to computer. Computer places the command over internet. Another computer present in monitoring area can reads the command and instructs the microcontroller to drive motor, such that camera moves 90 degree upward as shown in Figure 4.1.(b). Now the user present in control room able to view the upward area as shown in Figure 4.1(c).



(a)

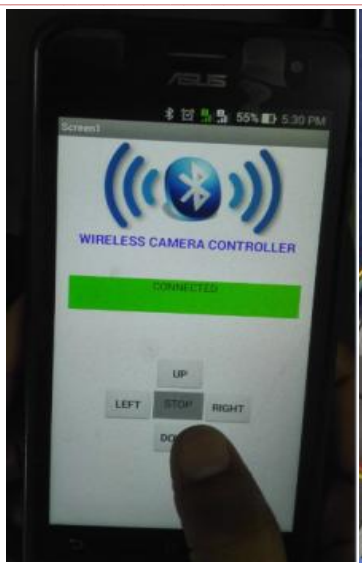


(b)

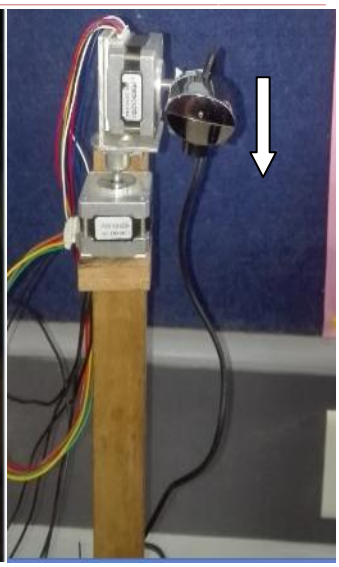
(c)

Figure 4.1 (a) Selection of upward direction. (b) Camera rotated in upward direction.(c) Monitoring area for upward view

Changing the view of monitoring area in downward direction is achieved as shown in Figure 4.2. Similarly results are obtained for left and right directions.



(a)



(b)

(c)

Figure 4.2 (a) Selection of downward direction. (b) Camera rotated in downward direction.(c) Monitoring area for downward view

V. CONCLUSION

Live streaming of video data from monitoring area to control room is done with the help of internet. It helps in globalization of data and also there is no range limit for transmission and reception of information. The quality of data is fair and speed is also good. It requires the internet access for its operation which is easily available. Due to use of web services delay is present between transmission and reception of data. This makes the system less efficient for highly secured applications. But it has several advantages like wide area coverage, easily implementable with reduced cost. These properties make it suitable and appropriate choice for general applications like attendance system, monitoring of play grounds, offices and parking system. The main objective of the project is to control movement of camera as per requirement from remote place. This objective has been implemented successfully using combination of RF link technology as well as internet. The overall system performance is good and moderately efficient as number of cameras required can be

minimized. The efficiency of system can be increased by using faster processors and faster internet services.

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