Tactical Throw able Spy Ball Camera

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Abstract— Recent advances in technology and wireless networks made new trends to explore the unseen sectors. One such new trend is "tactical throw able spy ball camera". Unseen area like army field, defense, spy operation, stone mines factory, rescue operations are really troublesome to explore. To reduce this crisis problem this system can be used and it creates panoramic view of that unseen areas [2]. To design this system a soft ball material is used and under this ball the wireless camera attached. To make the entire cameras always in upward direction we use gyroscopic arrangements [3]. The most significant factor is real time working of this system. To make it real time we use IP address matching concept. This leads to transmit the data in real time [7]. Ball size can be diverge accordingly fabrication design. To create the panoramic view curve fitting algorithm is used [6]. Basically curve fitting algorithm is an algorithm which is used to construct curves or any mathematical function. For the compatibility we are using MATLAB software. This ball can be thrown in any direction with this softball sized camera we explore the unseen areas also. Through this we can achieve so many conclusions. Soft material is used here for future protection.

Key words: Panoramic, Gyroscope, Curve Fitting Algorithm, IP Protocol

I. INTRODUCTION

Unseen areas are really difficult and challenging for police and army, or any other man. First responders Rooms can be very dangerous, while collapsed buildings can cover up survivors. Now panoramic Imaging, is a useful parameter for this purpose, it is giving officers and rescuers a safe glance into the unknown place and unseen background [2]. Tactical spheres (immediate) equipped with cameras that can be tossed into periodic hazardous areas to instantly transmit panoramic images of those areas back to a Smartphone or any other device like PC, LCD. A spy camera is device that allows the user to capture secret video footage of any unknown place. Spy cameras are hidden as ordinary objects one might find in areas of their home or business, such as a smoke detector, tissue box, digital clock but this are the ordinary use in house.

This system is also useful in entertainment industry. The fact is film industry is a highly sophisticated environment and it is rising like a wild fire in entertainment industry. Some certain stunts and fast movements during shooting which needs to be recorded quickly. In order to ease this problem this system can be used.

We can capture those shots also which is impossible to capture like athletics games. In athletics some games are very tricky and zoom footage of every movement is impossible. But with this ball camera we can achieve the tricky footage also. For this purpose we throw our ball in such a way like human reacts in that particular game. Through this exact look of human body motion can capture and what the eyes of that sportsman see is also captured by this camera. We all know that view point of own sportsman is different from what audience see. So the real view through sportsman eyes is easily captured. Athletics games like:

Fig. 1: Athletics View

II. RELATED WORK

The related work of this system is alienated in parts they are as follows:

A. Gyroscopic Arrangements

In this system gyroscopic is used to make it all the cameras always in upward direction and to make balance of ball [3]. Through this, in any condition camera can clicks the snapshots and can explore unseen field consistently without any obstacle. Basically gyroscope is a spinning wheel in which the axis of rotation is free and it is assume any orientation by itself. The rotation is based on the law 'the conservation of angular momentum. Because of this effective superiority gyroscope are useful for measuring orientation. The other types of gyroscopes are:

1) MEMS (micro electromechanical system) gyroscope:
These are electronic microchip packaged devices which uses very small vibrating mechanism to detect any type of changes.

2) FOC (Fiber Optic Gyroscope):
In this type of gyroscope fiber optic coil determines changes in orientation by path of light in the coil. the beam traveling against rotation has a different shorter path**.**

3) Quantum Gyroscope:
These types of gyroscope are extremely sensitive.

4) Rotary gyroscope:
This gyroscope almost unuseful. At present its property are really fundamental and poor. In this rotor gambol spins independently in order to keep angular momentum.

5) London moment:
In this gyroscope spinning superconductor generates a magnetic field and they are extremely accurate tool or modern science.

B. Properties of Gyroscopes

These properties cab be defined as follows:

1) Rigidity:

The axis of rotation that is spin axis of the gyro wheel tends to remain in a fixed direction in space if there is no force is applied to it.

2) Precession:

The axis of rotation (spin axis) has a propensity to turn at a right angle to the direction of an applied force.

The fundamental basic equation of the gyroscope is:

$$\tau = \frac{dL}{dt} = \frac{d(Iw)}{dt} = I\alpha$$

In this equation the vectors:

τ =the torque on the gyroscope.

L= angular momentum,

I = moment of inertia

ω = angular velocity

α=angular acceleration.

It describes that a torque τ applied perpendicular to the axis of rotation, and therefore perpendicular to L, this results in a rotation about an axis perpendicular to both τ and L. This type of motion is called precession. The angular velocity of precession wP is given by the cross product of wp and 1 gives as follows:

T= wp X l

C. IP Protocol

Wireless transmissions of data are really complicated when there is a question about range. Such system requires wireless transmission but range limitation is not acceptable here. For this purpose IP protocol is the finest technique. This system used IP protocol for real time operation to explore any particular unseen area [7].

The term internet is petite for internetworking: Basically internetworking means interconnection of networks with different network access mechanisms, addressing, different routing techniques, etc.

An internet isCollection of communications networks interconnected by layer 3 switches and/or routers. The internet is global collection of individual machines and networks.

IP (Internet Protocol)**:** IP protocol is most widely used internetworking protocol it connects source host to the destination host. IP protocol is a foundation of all internet-based applications.

IP provides connectionless service from source to the destination in IP network each packet treated are separately And the Network layer protocol common to all routers.

Advantages of using IP protocol here: They are Flexible and robust example in case of congestion or node failure packets find their way easier than connection-oriented services.

No requirement of unnecessary overhead connection setup.

IP network can work with different network types it does not demand too much services from the actual network.

D. Curve Fitting Algorithm

In this system curve fitting algorithm is used to create panoramic view of that particular unseen area [6]. Curve fitting algorithm is a algorithm which constructs curve. This is one of the most useful analytical techniques, and it can be apply to set of data. MATLAB is already featured with the curve fitting toolbox

There are three types of curve fitting:

- – Polynomial curve fitting
- – Surface curve fitting
- – Fit smooth surface curve fitting

1) Polynomial Curve Fitting:

Polynomial curve fitting points generated with a sine function. There are so many polynomial functions starting first degree polynomial equation which is:

Y=a+b

This is a line with slope. This line will connect two points. We can increase the degree of polynomial functions like first order second order, higher order and so on.

In curve fitting algorithm we use hyperbola curve fitting function. Because we all know that complete panoramic view is created using hyperbola function. In hyperbola asymptotes are perpendicular this is called equilaterals hyperbola or right hyperbola. This happen only when semi major and semi minor axis is equal. this corresponds to take a=b, when given eccentricity e=$\sqrt{2}$, put a=b in the generalized equation then we get

$$:\frac{(x-x0)^2}{a^2} - \frac{(y-y0)^2}{b^2} = 1$$

Therefore,

$$(x - x0)^2 - (y - y0)^2 = a^2$$

The poles of rectangular hyperbola are:

$$r^2 = a^2 \sec(2\theta)$$

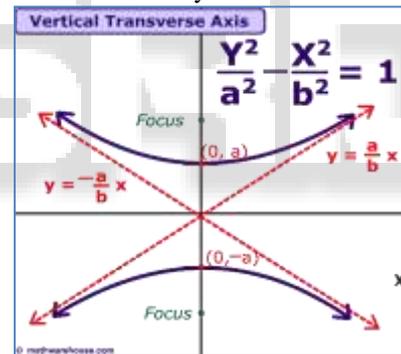When rectangular hyperbola open at first and third coordinate has the Cartesian equation:

Xy=a^2

Fig. 2: Hyperbola structure

III. METHODOLOGY

First of all, we prepare a softball-sized Explore which is covered in a thick rubber shell. Inside is a camera with six lenses or so many it depends on our choice. This camera is fabricated using gyroscopic arrangement picking out at different concave spots around the circumference (3). IP address matching will be done The camera snaps photos from all lenses (camera), a few times every second software uploads these disparate images to a mobile device or a computer and stitches all them together rapidly into full panoramic images(2). Then all the raw images is processed by MATLAB and prepare the panorama view and at last for receiver IP address matching is must between IP camera transmitter and smart phone receiver or any other device [7], Camera takes panoramic snapshots; receiver device stored these images in memory (2).

In methodology for creating panorama view we use curve fitting algorithm. Curve fitting algorithm is a algorithm which constructs curves on axes [6]. This algorithm is widely

used in MATLAB. Matlab build with this feature named curve fitting tool box.

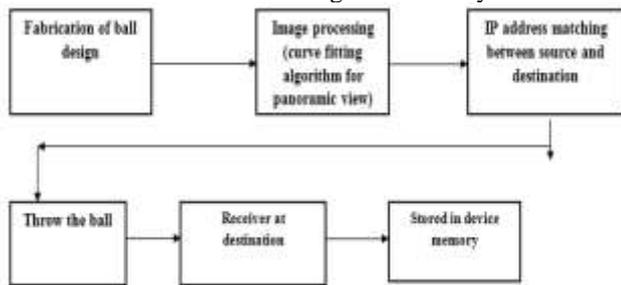And the basic block diagram of this system is:

Fig. 3: Block diagram of system

IV. IMPLEMENTATION OF HARDWARE

First of all we cut the ball in exact two equal parts that can be open as per our demand. Then the very critical task to made gyroscope setup in the ball, so for this we use fiber optic cable gyroscope setup laying on the ball. And for the cameras some space left blank in which camera can be attached and then join the ball as per previous pattern. The very first design of system hardware is:

Fig. 4: Initial basic design of ball

In the second step we are going to attach the wireless cameras. We use one IP address camera for real time operation. Basically IP camera is a type of digital video camera which is used for surveillance. IP camera is also called as net cam .For the transmission net connection is required. There are two types of IP cameras centralized or decentralized we use here decentralized IP camera. These cameras assign with their own IP address. Decentralized camera does not require a central NVR thus recorded footage can be stored in and media device. The IP camera is shown in figure:

Fig. 5: IP camera

After all the cameras attached to the ball we join the 2 parts of ball tightly, and make sure the cameras always in upward direction that means camera lens faces outside the ball.

V. RESULT AND DISCUSSION

This work has been carried out using MATLAB software. The code is divided in two parts one is complete panoramic view of raw images and the other is panoramic view of real time video. The first code can be run as follows:

Fig. 6: Panoramic view of raw images

Now for IP address matching we have to assign our device on the same IP address which allocated to IP camera. This IP can change accordingly present network. For this purpose our code should be compatible with that IP so we give this IP in our code for our compatibility. In the code one line is all about the IP address whenever we use any new IP network then that line should be change instantly. This is as follows:
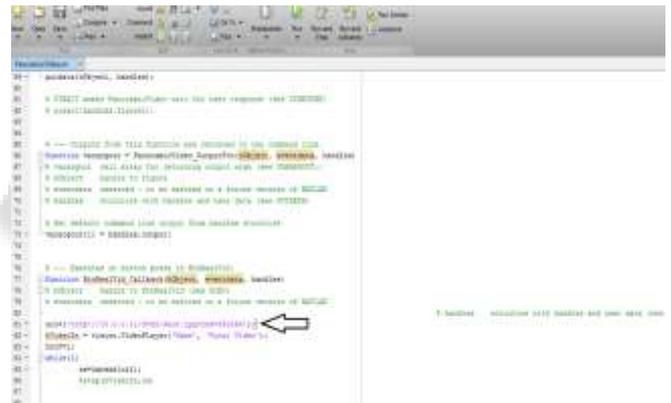

Fig. 7: indicates the line of IP address

After this when IP address matching is done we throw the ball in any unseen area. And then we run the matlab code like this:
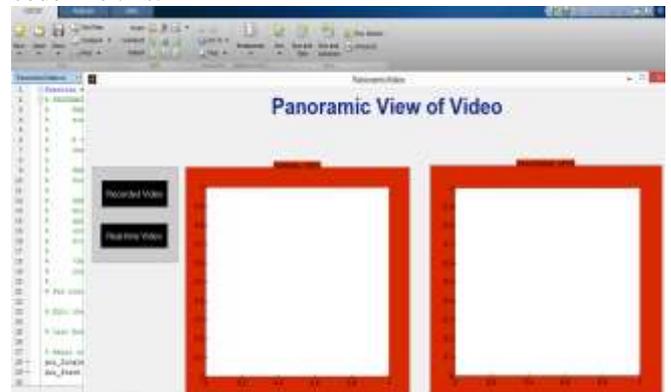

Fig. 8: GUI view of panoramic video

We can see that there is two options that is recorded video or real time video we click both one by one given below:

Fig. 9: Panoramic view of video

We can see the panoramic view of a particular video the pixels are stretched like a real panorama. And the hyperbola shape helps to create effective view of panorama. Then MATLAB save this snapshots continuously in folder.
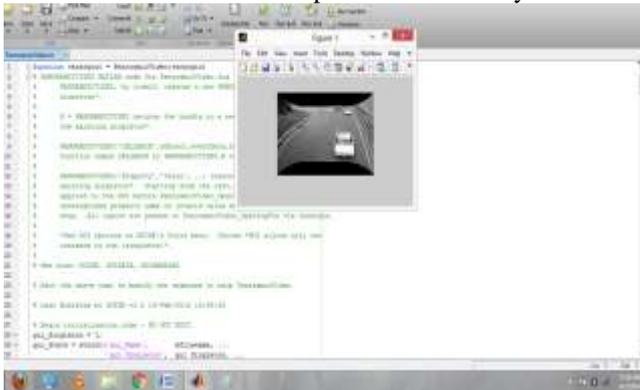

Fig. 10: Save results

And the complete hardware setup with all the cameras is look line given figure:

Fig. 11: Complete hardware with the cameras

VI. Conclusion

The proposed paper can explore the unseen areas effectively this will be very useful in defense. The proposed approach provides intelligence and troubleshooting in the emergency areas. It is basically provides security. This project idea is useful in curfew area, army, and spy operation. In this paper a softball sized camera is design. We are going to fabricate this spy camera in a throw able bouncing ball with gyroscopic arrangements [3]. Through this we can easily detect the random and each motion of opposite side. This ball is helpful where the men cannot reach, like unseen areas. As a advantage we use IP TECHNIQUE which is globally defined transmission so our information will be safe for future [7]. This ball is exactly like the bouncing ball with the six lenses

cameras attached to it. It clicks the panoramic images of desired location where we cannot reach easily. And through image processing we design the complete panorama view [2]. For the future we can add any danger gas to the ball to destroy enemy like carbon mono oxide. Or the tear gas to distract the enemies from their mission.

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