Smart Luggage Carrier system with Theft Prevention and Real Time TrackingUsing Nano Arduino structure

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Abstract-**Travelling has become one of the most important aspects of human life. In general, the travel bags or luggage carrier systems used by the public were very conventional, which requires a huge human effort with security. In these days, development of electronics reduces the effect on physical work and to tie up between the machine and man which makes the smarter work. The advancements in electronics system can be extended to design a better safe and secure luggage carrier system which leads to reduce the human effort and assures a comfortable hand free journey to the peoples. Our proposed Automated Luggage carrier system is essentially like an electronic porter that follows the operator around wherever he/she goes. It is a hands free load carrying propulsion system that maintains a safe following distance behind the user. Privacy of the luggage bag can be ensured by owner's identity. Location of the system can be tracked using GPS and GSM.A wireless controlled watch is designed as a control element. The traveler will wear the watch to give commands to the luggage system for following him/her.**

1. INTRODUCTION

Automation will make the machine to work smart and leads to optimized productivity of goods and delivery of services. Great progress has been made in this area of study over recent years and automated systems can be found everywhere in our daily lives from the automobile industry to manufacturing. It employs the various controllers' and information tools to decrease the requirement for efforts of human in the services and goods. Conventional luggage stacking system available in Airports, which is more both time consuming and labor intensive. Meanwhile, the process is the slow model and expensive process. The present proposed Automated System for luggage carrying system will reduce the issues of the conventional luggage carrier system and also provide additional features to make the system much smart. Nano Arudino implemented six wheel based robotic employed to ensure the proper movement of the luggage system as per the instructions provided by the user. Automated system followed by algorithm uses by person to find out the exact position of the user and instruct the system to follow the passenger. The distance between the luggage system and the user will be designed with 2meters to avoid clashes. In such a way this automated system can be proposed so in front of this system obstacles means, where it can be easily detected. If there depending upon the situation any obstacles in front of the automated system it can have the alternative way can be followed by using the smart watch holder.

II. PROPOSED SYSTEM

From one place to another the luggage are required to transmit by the people. For example, transport luggage can be within long corridors of the airport are required to transmit by the travelers. And it requires undesirable level of exertion for the travelers to transport the luggage. Even the bags can also been rolled for the long distances, which can be strain and arm and back of the person for luggage transporting. Furthermore, conventional luggage stacking system is available in airports and it typically does not allow the useful electronic components. Accordingly, a need exist for the smart luggage that has the undesirable features have transportation of luggage or/and that can use for electronic components. Creating intelligent systems that can sense and interact with their environment has been a huge factor behind the work on artificial intelligence and automation. The people used to carry luggage when they are moving from one location to the next. Especially in airports, the passengers will drag out their own luggage. For the old people trailing their bag is very difficult.

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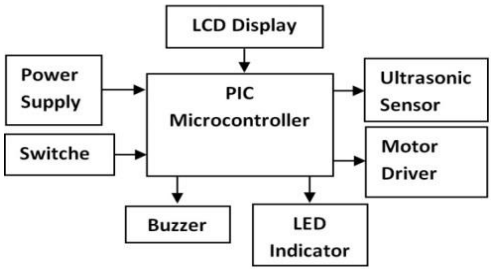

Fig.1: Block diagram of Transmitter

So in the proposed system, a simple, compact and light weight carry one's luggage is designed by the Automated Luggage Carrier system and follow the operator wherever he/she goes with the help of the signal transmitted from the watch he/she is wearing.

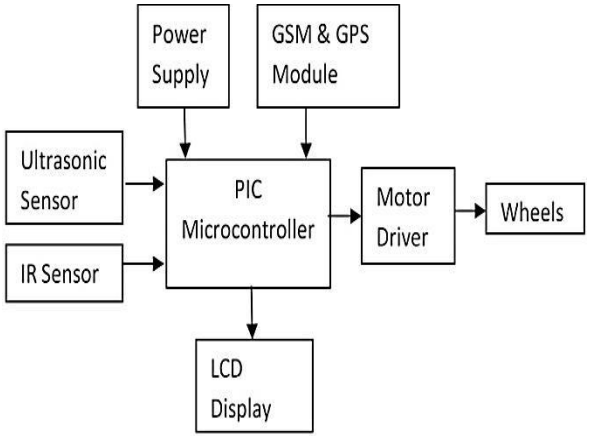

Fig.2: Block diagram of Receiver

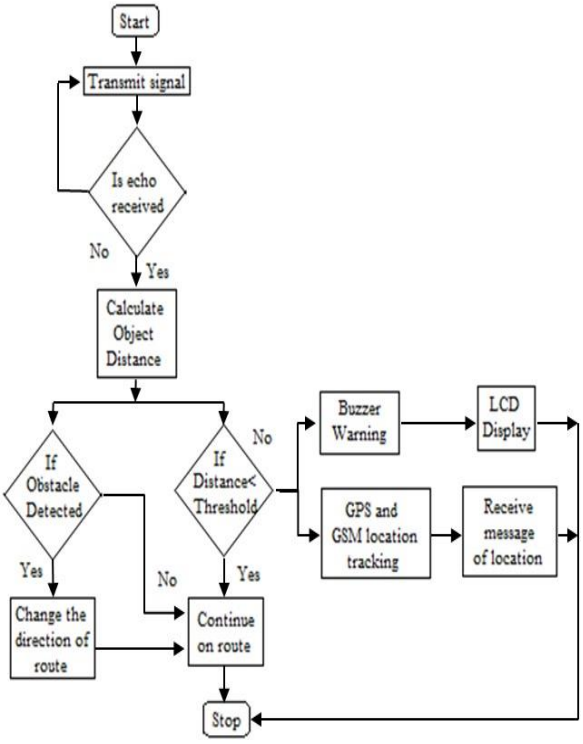

Fig.3: Flow Chart

The two ultrasonic sensors are used mainly for calculating the distance between the objects and the luggage system. Ultrasound sensors will send the sound waves and it will compute the distance between bag and human by collect the reflecting waves when it strike an obstacles. In this system work flow is shown in the above fig 3.The transmitter will send the signal, based on the echo signal received, the object distance is computed. If any obstacle is detected in its path, the watch will give commands to the bag for changing the direction of the Route. If no obstacles are detected, the bag will follow the same route. The distance between the user and the bag is already predefined in the system. The front, left and right movement of the luggage senses the input signal from the receiver in the system. Different motors incorporated in the system will decide the movement of the bag based on the programming and can be incorporate in the PIC Microcontroller. The ultrasonic sensor always compares the distance between man and luggage by the predefined program in the PIC controller. The microcontroller will be programmed to check the distance between the bag and the user, such that it will always follow the user. If the distance between the two is not within the limits, the bag will stops and then Buzzer will give the warning to the user.

The most significant feature of the proposed system is the Anti-theft tracking feature. Global Positioning system and GSM modules are utilized for anti-theft facility. If the bag is lost by the user, it can be traced by the GPS and GSM system. During the theft condition, a message will be sent by the user to activate the GPS to get the current location.

III.COMPONENTS DESCRIPTION

The overall system has two important modules. The smart watch and the robot. The watch will be used as a tracking device and acting as the control circuit.

A. Arduino Nano

The Arduino Nano is a tiny, comprehensive, friendly bread board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x). The voltage requirement is 5V .It is 14 digital I/O pin configuration with clock speed of 16MHz. The microcontroller board structures two external interrupts on 2 and 3 pins which can trigger an interrupt on a low value, falling and rising edge, or when a change in value occurs. The Arduino Nano has 16KB of flash memory for the ATmega168 or 32KB for the ATmega328.Flash memory with 2KB size is used for the boot loading. It also features a single UART.

Fig.4: Arduino Nano controller

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B. Accelerometer

An electromechanical is accelerometer is devices that will quantity the acceleration forces. It will measure the static forces like constant forces of gravity or it will measure the dynamic forces, caused by vibrations or movements. With respect to the earth gravity the amount of static acceleration can be observed by the small tilt in device. By sensing the amount of dynamic acceleration, the movement of device can be analyzed. ADXL335 Accelerometer structure is a tiny, thin with low power consumption. The product measures acceleration. It will perfectly able to distinguish between the soft and rapid motion activities by the help of conditioned voltage signal outputs and also by using the XYZ axis accelerometer with a minimum of ±3 g.

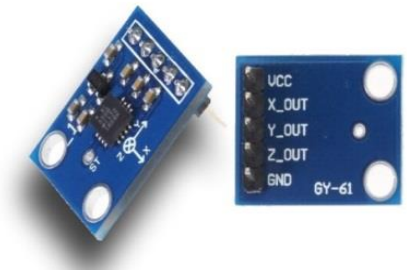

Fig.5: Accelerometer

The user selects the information measure of the measuring device victimization the one hundred ten, C_Y, and C_Z capacitors at the X_{OUT}, Y_{OUT}, and Z_{OUT} pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis.

C. Gyro Sensor

Accelerometers and Gyroscopes are like a two faces in a coin and mostly they cannot function without each other. An accelerometer measures the gradual increasing speed or directional motion of a device, whereas Gyroscope Sensor tracks the angular velocity or tilt or lateral orientation of the object. Gyroscope sensors for XYZ axis are also available. ADXL335Gyro sensor is used in our proposed system which is powered by 6V DC.

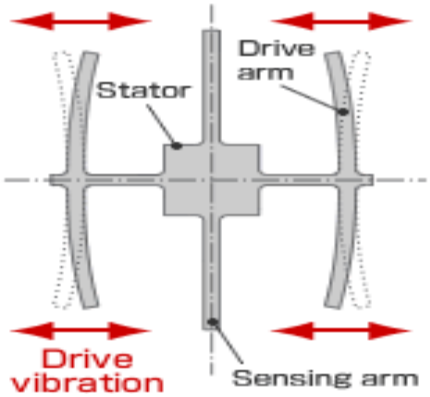

Fig.6: Gyrosensor

D. Geared DC Motor

For the compact use, here we are going for the geared DC motor, instead of ordinary one. This geared DC motor which consist of attachment of gears over the shaft and the rotation of the gears carried by the shaft per minute (RPM) which is carried by the motor shaft. By gear reduction technique this geared DC motor will produce high torque with reduced speed, which is very helpful to carry out huge weight. The input voltage used in the range of 2.8-5.0V, with stall torque of 0.85-3.40Nm. It provides maximum output power of 0.10-0.97W


Fig.7: DC Motor

E. Rechargeable Battery

In our proposed system, 12V rechargeable battery is employed to power up the various components of the system.

F. Buck Converter

A buck converter is a converter which reduces the DC output voltage from the DC input voltage. The LM2596 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving a 3-A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3 V, 5 V, 12 V, and an adjustable output version. The advantages of this particular module are simple to use, internal frequency compensation, and a fixed frequency oscillator. This buck converter module uses switching frequency of 150 kHz. So requirements of filter components are not required much or its requirement in comparison with other buck converters is too low.

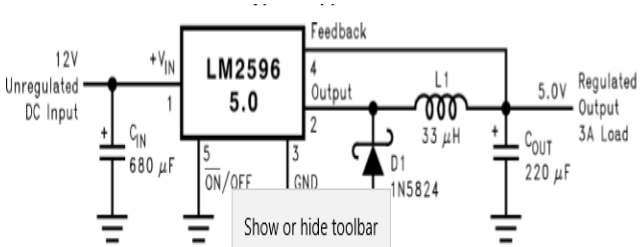

Fig.8: Buck Converter

G. Radio Frequency Sensor

To send and receive the radio signals, the RF module is employed. It has two modules namely transmitter and receiver sections. Both transmitter and receiver modules are small PCB sub assembly units, which are capable of transmitting and receipting the radio wave signals alongside microcontroller units. In our proposed system, Super regenerative modules are usually employed to get more accurate results.

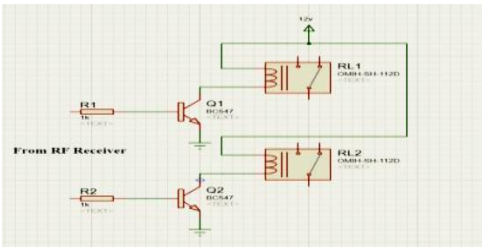

Fig.9: Radio frequency sensor

H. Programming Code Description

The microcontroller is programmed with Keil µv4 unit. Embedded C language is used for writing the programming codes for the microcontroller unit.

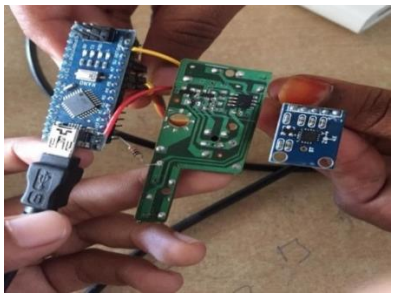
Fig.10: Components of the watch

The RF transmitter and receiver

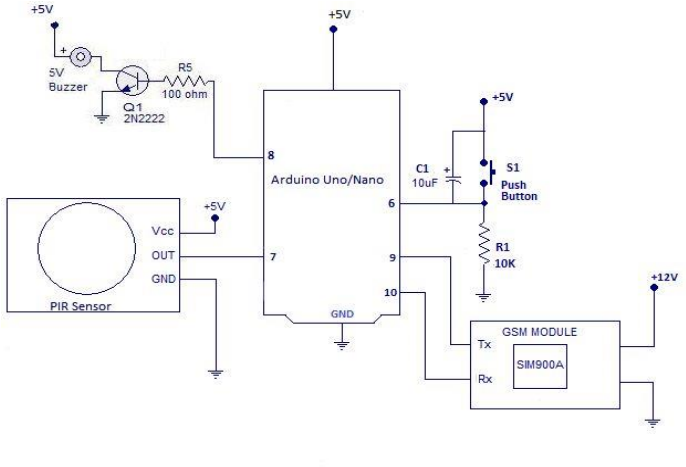

Fig.11: Anti-Theft alarm system

CODING FOR ANTI THEFT ALARM MODULE

```
int sensor=7; //output of PIR sensor connected to pin 7
int push_switch=6; // push button connected to pin 6
int buzzer=8; // buzzer connected at pin 8
int sensor_value; //variable to hold sensor value
int sms_count=0;
void setup()
{
pinMode(sensor,INPUT); // configuring pin 7 as Input
pinMode(push_switch,INPUT); // configuring pin 6 as Input
pinMode(buzzer,OUTPUT); // configuring pin 8 as OUTPUT
mySerial.begin(9600);
}

void loop()
{
Check_Burglar();// check sensor status
Check_Reset(); // check if alarm reset switch pressed or not
}

void Check_Burglar()
{
sensor_value=digitalRead(sensor); // Reading sensor value from pin 7
if(sensor_value==HIGH) // Checking if PIR sensor output is high
{
  digitalWrite(buzzer,HIGH); // Activating the buzzer
```

TABLE 1. WHEEL DIRECTION WITH CO-ORDINATION

Direction*	Turn	Set Direction*	Set Co-ord.
N	Front	N	Y++
N	Left	W	X--
N	Right	E	X++
E	Front	E	X++
E	Left	N	Y++
E	Right	S	Y--
S	Front	S	Y--
S	Left	E	X++
S	Right	W	X--
W	Front	W	X--
W	Left	W	Y--
W	Right	N	Y++

*N-North, E-East, S-South & W-West

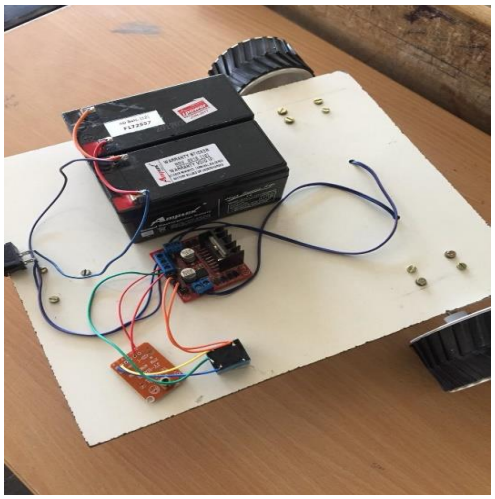

Fig.12: Components of the Luggage Carrier

IV. MERITS OF THE PROPOSED WORK

TABLE 3. RADIO FREQUENCE BAND RANGE

Frequency (all in Hz)	λ	Band
30 - 300	104- 103 km	ELF
300 – 3000	103- 102 km	VF
3 – 30 K	100 – 10 km	VLF
30 – 300 K	10 – 1 km	LF
0.3 – 3 M	1 – 0.1 km	MF
3 – 30 M	100 – 10 m	HF
30 – 300 M	10 – 1 m	VHF
300 – 3000 M	100 – 10 cm	UHF
3 – 30 G	10 – 1 cm	SHF
30 – 300 G	10 – 1 mm	EHF

This model can able to detect the frontier obstacle in distance of 30cm and also the luggage following human distance range are measured as 1meter so; this model meets all most all the properties of the proposed system. But, it gets activated only if the weight of the luggage does not exceed 2kg.

V. CONCLUSION

This Smart Luggage overcomes the entire drawback faced by the old style luggage carrier we used. Using technology human themselves updating and keeping the mankind so sophisticated in this world by their new innovation. This era sure will be for automation and the market is big enough to accept the new face of luggage. Know the weight of your Luggage at any time and pack accordingly. We can easily able to transport our luggage either by autonomous and manual modes depends on customer choice. The smart luggage will ensure its safety and builds security for its user. From built-in scales to GPS tracking and mobile apps, these bags won't make hauling stuff any lighter, but they could make the experience less harrowing.

VI. SCOPE FOR FUTURE WORK

Now-a-days in busy world peoples have to manage and overcome many stresses and this automatic luggage follower model could be a stress buster. To enhance this model to a supper one can add a security system that the user can be free of worries of its luggage being stolen or left behind. In future features like headphone points, USB point, Wi-Fi technology, fingerprint system for security purpose can be added and focus on to make less expensive and easy to handle.

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