APPLICATION SPECIFIC INTELLECTUAL BACKPACK

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ABSTRACT

A Smart bag is an application specific design that can aid everyone in the society and will be intellectual to carry out the everyday work. The results of a survey shows that 90% of the people were satisfied. It also enhances an individual's potential to maintain their bag in a conventional manner. In case of school goers whose parents are working the project helps to detect and intimate about the presence of study materials and unnecessary things like knife, scissors, keys and mobile, and also they can identify the location of their children once they step out from the home with this bag. Considering the professionals the project is intensified by the following applications: detecting the presence/absence of electronic gadgets (mobile, pen drive, camera, kindle), checklist for people regularly used things like wallet, lunch box, identity card, medicine, along with this mobile charging is available.

1.INTRODUCTION

Internet of things (IoT) is a world where, trillions of objects can be sensed and can communicate the information by interconnecting the objects over open or independent networks. Thus, these interconnected objects have the data's which are collected, analyzed and use the suitable intelligent sensors to sense and monitor the objects. It has a large number of applications over the smart vehicles, smart phones, and home automation appliances and also in toys, cameras, people, buildings, medical instruments and for the industrial systems [1]. IoT is mainly used in order to achieve the smart reorganizations and to position, trace and control the objects in real time online monitoring. This exposes the cloud computing capability and the transition of the Internet. The motive of IoT is to connect the things in anywhere and at any time with any device and everybody.

Thus a brief understanding about the Internet of things (IoT) paved the way for the development of the smart backpack for preschoolers and for professional .We further made our research in sensors which would be useful for this project to sense, read, locate, address and mainly recognize the information and can be controlled by the internet. Sensors are used to sense not only the electronic devices, but also our day today things like food, clothes, animals, water and tree. There are different types of sensors like IR sensor, Proximity sensor, Gas sensor, Pressure and Temperature sensor [2, 3]. Each sensor has its unique properties and used in our day today applications such as our home automations.

As we know that Raspberry Pi is a small computer which uses LINUX based OS, we used it as our platform to work. Raspberry Pi is used in various applications and it is very easy to work with it [4].

This project is all about to detect the objects which are presented in the smart bag. Thus, the information about the objects are recognized and addressed through the sensing device by the internet. This project was mainly developed to overcome the burden and tension of the parents (in case where both of them are working) to regularly schedule and check their pre-schooling children backpack for the regular class books and the items which are needed by their pre- schooling children. In case of the presence of any unnecessary things like any metals, knife, scissors, gadgets, this project will immediately sense about it and intimate about their presence to the registered mobile number via the cloud. The bag also ensures the parents that their children are safe by tracking the location.

For the Professionals, this project will help them to identify the presence or the absence of the objects inside their smart backpack. We will provide a check list for the professional for the things they regularly use in their day today scheduled work like electronic gadgets, wallets, lunchbox, identity card, medicine, mobile charging unit, etc.

In their busy scheduled work professionals may tend to forget some important object which may be the very important thing for that day and so this project will be very useful for them to identify their respective important objects for their day today work.

2.RELATED WORK:

The smart backpack proposed in the springer paper by Sau- ming Lau and his fellow authors [5] provided method for reducing the bag weight. This helps in better enhancement of the backpack. We aim to add on some extra features pointed out for a specific group of children and individuals thereby aiding in their regular activities. This provides an added advantage to the existing system. The way of implementation varies on the type of components used and their interfaces.

Considering the development of wireless networks using IoT, it has been found that these can alsobe introduced in the applications that are particularly used in regular life. This connection has captured more attention and has shown to be a field with consistent growth. Interfacing sensing networks with mobile and static networks is dealt in this paper. Our aim is to achieve the same, but a with minimum possible network interface to reduce the circuit complexity, thereby overcoming the drawbacks of the above mentioned paper. The heterogeneity and intelligence of IoT features the proper optimization of the devices interfaced to the network. The power supply is a major drawback for all the devices connected with IoT. The power estimated for this paper is sufficient for our project.

The sensor plays an important role in this paper. To identify the perfect sensor certain features had to be examined specifically. As explained in the paper by Mithun Sakthivel and his fellow authors [7] regarding a sensor to find a metal, we found the same can be applied to be an important part for the recognition of unnecessary metal objects in the backpack to avoid any harm to the user.

The explanation for the proximity sensor as given by Carlton Shepherd, Lakovos Gurulian and his fellow authors in the paper [6] describes the relay attacks that appear on the NFC. The proximity sensor implementedin mobile can itself be used as a sensor but that needs a constant touch with the object to be sensed. This cannot be always feasible so we replace this with another appropriate sensor.

Open CV consists of programming functions which helps in real time computer vision. It is a cross platform and gives preference to image processing in real-time. It was used for detection and recognition of face as proposed in the paper by K. Goyal and his fellow authors [8].

3. METHODOLOGY

3. A. MATERIALS USED

In case of preschoolers we found that **Open CV OCR algorithm** can be used to detect the books, inductive **proximity sensor** can be used to detect the metal objects which include knife, scissors, keys, and any other metal things harmful to the children [2,3]. For professionals **Open CV OCR algorithm** are used to identify the electronic gadgets. In common **color detection** is used for detection of the things in case of both professionals and preschoolers. To track the location of kids a **GSM and GPS** module is used.

3. B.OPEN CV

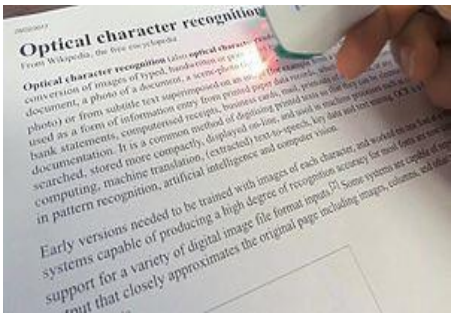
Open CV supports a lot of algorithms which are related to machine intelligence and computer terminals. These algorithms are used to detect and diagnose the faces, identify the substance, classify the human activities in video, capturing the moving substance, tracing the camera movements and thus finds the similar images from the image database. Numpy is an efficient package for numerical operations, which supports the Open CV. The array structures of the Open CV are converted using the numpy operations which are done in this can be combined with numpy. The libraries like spicy, mat plot lib and also several other libraries are available in Open CV. Thus Open CV has C, C++, JAVA and MATLAB interface and supports many OS versions. It relies mostly for real time applications. There are about 47,000 people of the user community and the calculated number of downloads are exceeding 14 million [8].

APPLICATIONS

It is extensively used in government sectors, research groups and in companies like Google, Microsoft, Yahoo, Intel, IBM, Sony, Honda and Toyota.

3. C.OCR ALGORITHM

Optical character recognition is known as optical character reader and used for the **transformation of images** which are in the form of typed**,** handwritten, printed text **into a machine form**. They can be obtained from a inspected document, a photo document, photos which contains the signs and the billboards or from the text which are concealed on an image. It is a form of information that can be obtained in printed forms. It is a process of transferring the printed text from one computer to another one so that they are easily editable, searchable, stored and displayed on-line electronically. OCR is used in engine processes such **as intellectual computing, machine transcription,** text**-to- speech** data and **text excavation.** It is used in the area of pattern **acknowledgement, machine intelligence** and **computer vision.**



Earlier versions of OCR are to be instructed with the images of every character. The advanced systems of the OCR are capable of producing a high degree accuracy for recognizing most for the fonts which are commonly used. It supports various numerical image file formats. Thus, some systems are capable of reproducing the required formatted output that includes the images, columns, and other non- textual components.

OCR is generally a "logged off" method, which analyses a fixed document. Handwriting recognition can be attained by giving the input from handwriting movement analysis. Instead of hardly using the structure of the words, this technique is able to obtain the action, such as in which order and direction the segments are drawn. This extra information can make the start-to-end process more precise. This technology can also be known as "on-line character recognition", "dynamic character recognition", "real-time character recognition", and "intelligent character recognition" [9].

CHARACTER RECOGNITION:

Matrix matching is used in comparing an image of a stored character by using pixels, also known as "design matching", "**pattern recognition**", or “image interconnection". Thus the input character is abruptly confined from the rest of the image. This method is well suitable for the texts which are typewritten and is not suitable for any new fonts. This is the method where the early OCR is implemented.

The characters are decomposed in to "features" like edges, closed loops, and line

intersections. The features which are obtained from the characters are reduced and the process is computed efficiently. The **feature** detection from the characters in computer vision can be applied to this OCR, and they are commonly used in handwriting recognition and in modern OCR software. K-nearest neighbor is analgorithm
which are used to equate the attributes with stored character and chooses the most near match of the neighbor.

APPLICATIONS:

- Extracting business card information into a contact list.
- Make electronic images of printed documents searchable.
- Converting handwriting to control a computer, pen computing.
- Assistive technology for blind and visually impaired users.
- Entering data for Business Documents.

3. D. GSM AND GPS MODULE:

Global system, the major source for mobile communication is the component used for intimation of messages. Time division multiple access (TDMA) is the technique used in GSM. The operation of GSM includes compressing the data, sending it to the channel along with other two used data. Its frequency of operation is 900MHz to 1800MHz [10].

FEATURES OF GSM:

It includes

- Compatibility to international roaming.
- Alarm management with real time clock.
- Short message services (SMS).
- More secured telecommunication standards.
- Management of SIM phonebook.

Global positioning system operates independently without any reception to telephone or internet. These technologies can increase the usage of GPS positioning information. It provides critical positioning capability service to militarian, civilian and commercial applications all over the world. It consists of satellites orbiting around the earth and sends accurate details about their location in space back to the control station
USES

- Automotive: turn by turn driving directions.
- Handheld: hiking and other sports.
- Pilot: piloting aircrafts.

3. E.RASPBERRY PI:

It is a miniature form of a computer that connects into a monitor or TV with the help of a standard keyboard and mouse. It is a little device that helps the exploring of computation and learn programming. It has the ability to perform functions similar to a desktop, from

internet browsing, making spread sheets, word processing and playing games.

In this project raspberry pi 3b module is used to integrate the output of all the sensors being used and the output of Open CV being used for character recognition. It can be connected to the sensors using wires and connectors and in case of character recognition the output of the Open CV is obtained. By this way the things in the bag are recognized [12].

TECHNICAL SPECIFICATIONS:

- Broadcom BCM2837 64bit ARMv7 Quad Core Processor powered Single Board Computer running at 1.2GHz.
- 1GB RAM.
- BCM43143 Wi-Fi on board.
- Bluetooth Low Energy (BLE) on board.
- 40pin extended GPIO.
- 4 x USB 2 ports.
- 4 pole Stereo output and Composite video port.
- Full size HDMI.
- CSI camera port for connecting the Raspberry Pi camera.
- Upgraded switched Micro USB power source (supports up to 2.4 Amps).

3. F.CLOUD COMPUTING:

The circuit developed would be enhanced by the use of cloud computing to either process the message to mobile phone for professionals and to the speaker for preschoolers. The message intimates the user whether the intended object
is present or not, which aids the user to easily identify the objects in the bag.

3.G.ARDUINO:

Arduino is a microcontroller embedded in a single- board meant to make the specific application more approachable to the interactive objects and its surroundings. The hardware has a board designed based on an 8-bit or 32- bit Atmel ARM. It is an open source design and the advantage is that it covers a large area of people using and exploring the features of Arduino. It is efficient to manage power and has a feature of voltage regulation which is built-in. This can also be powered directly using a USB port without any external power [11].

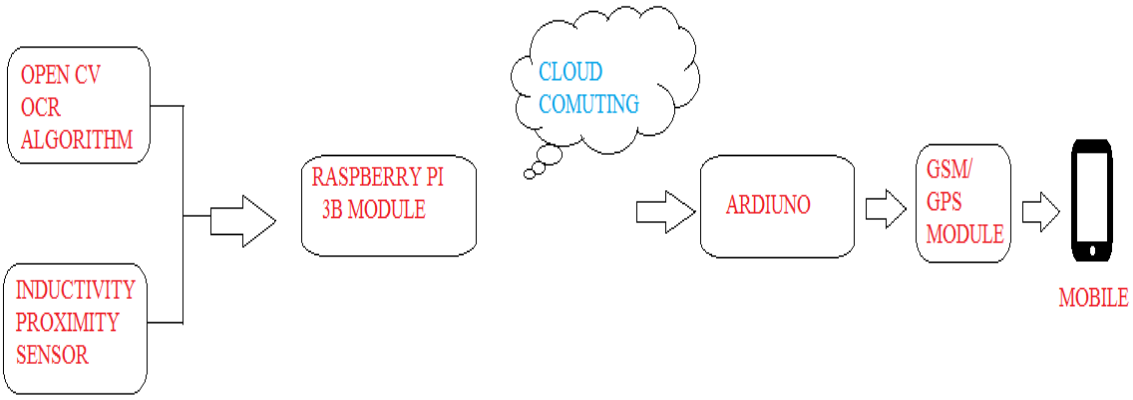
- Microcontroller: ATmega328.
- Operating Voltage: 5V.
- Input Voltage (recommended): 7-12V.
- Input Voltage (limits): 6-20V.
- DC Current per I/O Pin: 40 mA.
- DC Current for 3.3V Pin: 50 mA.

3.H. TYPES OF INTIMATION (can be either using a mobile phone or speaker):

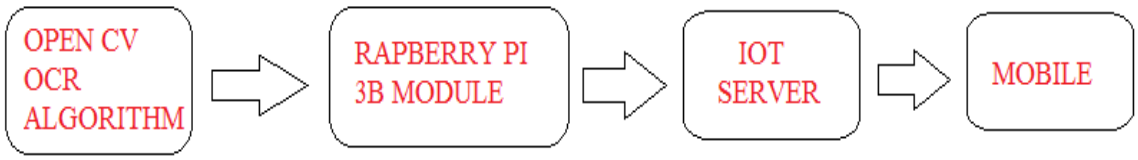
- Mobile phone: The circuit with raspberry pi is interfaced with the cloud and the message is being sent to the user's mobile.
- Speaker: The pi board is interfaced with the speaker and the absence of an object is given out as a voice message through a speaker. This is especially developed for school goers.

This circuit will be verified for its performance and then implemented into the bag. We are also in the plan of developing a specific new board incorporated with sensors which would help with the further advancement of this project

4.BLOCK DIAGRAM



4.1.FOR ELECTRONIC GADGETS:



4.2.FOR COMMON OBJECTS:

5. CONCLUSION AND FUTURE WORKS:

Over the year there is a fast growth in the technology and is often changing our lives to make things easier and better for humans. People in this world are running behind something and they don't even have time to look at their own things and work. In the field of technology, new inventions are increasing tremendously. One such invention is a smart bag, it is used for preschoolers and professionals and it is user- friendly, compact, etc. The older version of the smart bag could speak and provide remainder to the user and this survey was only to school students and not the professionals and the survey result was obtained [5]. But in our project, many useful things add to it and this smart bag is also designed for professionals and helps to Fulfill their needs. This safeguards the things for professionals and preschoolers, it will identify the objects as well as remind them about their needs and also ensures children safe from harmful metal things mistakenly taken to school and intimate about this to their parents. So this smart bag plays a vital role in student life and education. In future, further things can also be added to it, like the students bag can be organized according to their timetable.

7.REFERENCE:

1) Fraiwan, K. Lweesy, A. Bani-Salma and N. Mani, "A wireless home safety gas leakage detection system," 2011 1st Middle East Conference on Biomedical Engineering, Sharjah, 2011, pp. 11-14.
2) D. Goeger, M. Blankertz and H. Woern, "A tactile proximity sensor," 2010 IEEE Sensors, Kona, HI, 2010, pp. 589-594.
3) Zhenhai Chen and R. C. Luo, "Design and implementation of capacitive proximity sensor using microelectromechanical systems technology," in IEEE Transactions on Industrial Electronics, vol. 45, no. 6, pp. 886-894, Dec 1998.
4) K. Janard and W. Marurngsith, "Accelerating real- time face detection on a raspberry pi telepresence robot," Fifth International Conference on the Innovative Computing Technology (INTECH 2015), Galcia, 2015, pp. 136-141.
5) Sau-ming Lau, YammyWai-yan Wong, Fiona Wing- yin Luk and Stella Sin-tung Kwok, “The effectiveness of a smart school bag system for reminding students of forgotten items and reducing the weight of their bags” at Proceedings of Practical Social and Industrial Research (PISR) Symposium on 27 November 2015, Volume 4.
6) C.Shepherd *et al*., "The Applicability of Ambient Sensors as Proximity Evidence for NFC Transactions," 2017 IEEE Security and Privacy Workshops (SPW), San Jose, CA, USA, 2017, pp. 179-188.
7) Mithun Sakthivel, Boby George, Mohanasankar Sivaprakasam, "Packaging and evaluation of an online tool for locating metal shrapnel during surgery", India Conference (INDICON) 2014 Annual IEEE, pp. 1-6, 2014.
8) K. Goyal, K. Agarwal and R. Kumar, "Face detection and tracking: Using OpenCV," 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA), Coimbatore, 2017, pp. 474-478.
9) F. Alotaibi, M. T. Abdullah, R. B. H. Abdullah, R.W. B. O. K. Rahmat, I. A. T. Hashem and A. K. Sangaiah, "Optical Character Recognition for Quranic Image Similarity

Matching," in IEEE Access, vol. 6, pp. 554-562, 2018.

10) H. D. Pham, M. Drieberg and C. C. Nguyen, "Development of vehicle tracking system using GPS and GSM modem," 2013 IEEE Conference on Open Systems (ICOS), Kuching, 2013, pp. 89-94.

11) M. M. Rahman, J. R. Mou, K. Tara and M. I. Sarkar, "Real time Google map and Arduino based vehicle tracking system," 2016 2nd International Conference on Electrical, Computer & Telecommunication Engineering (ICECTE), Rajshahi, 2016, pp. 1-4.

12) Kaur and A. Jasuja, "Health monitoring based on IoT using Raspberry PI," 2017 International Conference on Computing, Communication and Automation (ICCCA), Greater Noida, India, 2017, pp. 1335- 1340.