TABLE OF CONTENTS

Project Synopsis

on

HUMAN DETECTION FOR AUTOMATION

Submitted as a part of course curriculum for

Bachelor of Technology

in

Computer Science & Engineering

Submitted by

AABHAS BISARIA (2000290100001)

DEVESH CHAUHAN(2000290100054)

HARSH VARSHNEY (2000290100065)

Under the Supervision of

Dr. Sushil Kumar

DECLARATION

We hereby declare that this submission is our work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgement has been made in the text.

Signature of student :

Name : Aabhas Bisaria

Roll No.: 2000290100001

Signature of student :

Name : Devesh Chauhan

Roll No.: 2000290100054

Signature of student :

Name : Harsh Varshney

Roll No.: 2000290100065

CERTIFICATE

This is to certify that Project Synopsis entitled "**Human Detection for Automation**" which is submitted by **Aabhas Bisaria, Devesh Chauhan, Harsh Varshney** in partial fulfilment of the requirement for the award of degree B. Tech. in Department of Computer Science of Dr A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

Supervisor's Signature:

Name : Dr. Sushil Kumar

ACKNOWLEDGEMENT

It gives us a great sense of pleasure to present the synopsis of the B.Tech Major Project undertaken during B.Tech. Third Year. We owe a special debt of gratitude to Dr. **Sushil Kumar** Department of Computer Science & Engineering, KIET Group of Institutions, Delhi- NCR, Ghaziabad, for her constant support and guidance throughout the course of our work. Her sincerity, thoroughness and perseverance have been a constant source of inspiration for us. It is only his/her cognizant efforts that our endeavours have seen the light of the day.

We also take the opportunity to acknowledge the contribution of Dr. Vineet Sharma, Head of the Department of Computer Science & Engineering, KIET Group of Institutions, Delhi- NCR, Ghaziabad, for his full support and assistance during the development of the project. We also do not like to miss the opportunity to acknowledge the contribution of all the faculty members of the department for their kind assistance and cooperation during the development of our project.

Signature of student :

Name : Aabhas Bisaria

Roll No.: 2000290100001

Signature of student :

Name : Devesh Chauhan

Roll No.: 2000290100054

Signature of student :

Name : Harsh Varshney

Roll No.: 2000290100065

ABSTRACT

Human detection for electricity saving refers to the use of technology to identify when a room or space is occupied by a human and adjust the lighting, heating, and cooling systems accordingly. The goal is to reduce energy waste by only using the necessary amount of electricity to maintain a comfortable environment when a person is present. This can be achieved through various means, including the use of motion sensors, occupancy sensors, and smart home systems that use artificial intelligence to learn a person's habits and adjust the energy usage accordingly. Human detection for electricity saving is an important aspect of energy conservation and sustainable living, as it helps to reduce carbon emissions and lower energy bills. Human detection for electricity saving is a growing trend in the field of smart homes and building automation. Advantages of using human detection for electricity saving include reduced energy bills, reduced carbon emissions, and increased comfort. The technology is also becoming more widely available and affordable, making it accessible to a larger number of consumers. Additionally, many energy companies offer incentives for homes and businesses that adopt energy-saving technologies, making it even more appealing. Overall, human detection for electricity saving is an important aspect of energy conservation and sustainable living, and it offers a simple and effective way to reduce energy waste and contribute to a greener future.

INTRODUCTION

Human Detection for Energy Saving is a technology-based solution that aims to optimize energy usage by counting the number of people in a given space and adjusting the energy consumption accordingly. This is achieved through the use of sensors, cameras, and machine learning algorithms that can accurately detect the presence of individuals and respond by controlling lighting, heating, cooling, and other energy-consuming systems. The goal of human counter technology is to minimize energy waste and reduce the carbon footprint by ensuring that energy is only consumed when and where it is needed. The implementation of human counter technology in buildings, homes, and public spaces can result in significant energy savings and cost reduction. It also helps to create more comfortable and sustainable environments, as well as promoting responsible energy use and conservation. With the rise of smart homes and the increasing demand for energy-efficient solutions, the human counter technology is becoming an increasingly important aspect of energy management and sustainable living.

As we saw in our surroundings that the lights will remain turned on in public areas like restrooms, public toilets, and multiplexes even if nobody is there. It causes more electricity consumption and wastage of resources. The TensorFlow Object Counting API is an open-source framework built on top of TensorFlow that makes it easy to develop object counting systems. So, we will use this API in our project for human counting where it will detect humans and control the electricity accordingly. We will use the camera for detecting the humans and make the counter increase we will keep an eye on the counter and as soon as the counter will become zero lights will turn off.

Till the person is present in the room (restrooms) lights remain turned on and whenever the room/restrooms become vacant counter is set to zero and the light is turned off after one minute timer. Thus, it will help in energy saving.

PROBLEM STATEMENT

As we saw in our surroundings that the lights will remain turned on in public areas like restrooms, public toilets, and multiplexes even if nobody is there. It causes more electricity consumption and wastage of resources. The problem that the energy-saving human counter seeks to address is the inefficient use of energy in buildings. Many buildings have lighting, heating, and cooling systems that are designed to operate at full capacity even when there are few or no occupants. This results in wasted energy and higher energy bills. The human counter aims to solve this problem by accurately counting the number of people in a building and adjusting energy-consuming systems accordingly, leading to more efficient energy usage, lower energy bills, and reduced carbon emissions.

OBJECTIVES

- To reduce energy consumption and waste in buildings.
- To lower energy bills for building owners and occupants.
- To improve building efficiency and comfort levels.
- To collect data on occupancy patterns and energy usage to inform future energy-saving measures.
- To contribute to a more sustainable future by reducing carbon emissions.

SCOPE

The future scope of energy-saving human counters is quite promising, as demand for energy-efficient solutions continues to grow.
Some of the areas where this technology is likely to be adopted in the future include:

1. Smart buildings: Integration with IoT and other smart building technologies will enable more advanced and automated energy management systems.
2. Commercial spaces: The use of human counters will become increasingly widespread in commercial spaces such as offices, shopping malls, and airports.
3. Public spaces: The technology will be used in public spaces such as schools, hospitals, and libraries to reduce energy consumption and promote sustainability.
4. Improved accuracy: The technology is likely to become even more accurate and reliable in the future, providing even greater energy savings and comfort for building occupants.

Overall, the future of energy-saving human counters looks bright, and it has the potential to play a significant role in reducing energy consumption, improving building efficiency, and contributing to a more sustainable future.

PROPOSED METHODOLOGY

The methodology behind energy-saving human counters typically involves the following steps:

1. Data collection: Advanced sensors and cameras are used to collect data on occupancy levels in a building. This information is then processed by the human counter to determine the number of people present.
2. Integration with building management systems: The human counter is integrated with building management systems such as lighting, HVAC, and security systems. This enables the system to control these systems based on the occupancy levels in the building.
3. Energy management: Based on the occupancy data, the human counter adjusts energy-consuming systems in real-time to conserve energy and reduce waste.
4. Data analysis: The human counter collects data on occupancy patterns and energy usage, which can be used to inform future energy-saving measures.
5. Continuous monitoring: The human counter continuously monitors occupancy levels and makes adjustments as necessary to ensure optimal energy efficiency and comfort.

This methodology provides a systematic approach to reducing energy consumption in buildings and promoting sustainability. By using advanced technology and data analysis, the human counter can help to significantly reduce energy waste and improve building efficiency.

TECHNOLOGY USED

TensorFlow:

It is an open-source software library for dataflow programming across a range of tasks. It is a symbolic math library, and is also used for machine learning applications such as neural networks. It is used for both research and production. TensorFlow computations are expressed as stateful dataflow graphs. The name TensorFlow derives from the operations that such neural networks perform on multidimensional data arrays. These arrays are referred to as "tensors".

Machine learning:

Machine learning is the kind of programming which gives computers the capability to automatically learn from data without being explicitly programmed. This means in other words that these programs change their behaviour by learning from data. Python is clearly one of the best languages for machine learning. Python does contain special libraries for machine learning namely scipy, pandas and numpy which great for linear algebra and getting to know kernel methods of machine learning. The language is great to use when working with machine learning algorithms and has easy syntax relatively.

Machine learning categories:

Supervised learning: The machine learning program is both given the input data and the corresponding labelling. This means that the learn data has to be labelled by a human being beforehand.

Unsupervised learning No labels are provided to the learning algorithm. The algorithm has to figure out a clustering of the input data.

OpenCV:

OpenCV stands for Open Source Computer Vision. It's an Open Source BSD licensed library that includes hundreds of advanced Computer Vision algorithms that are optimized to use hardware acceleration. OpenCV is commonly used for machine learning, image processing, image manipulation, and much more. OpenCV has a modular structure. There are shared and static libraries and a CV Namespace. In short, OpenCV is used in our application to easily load bitmap files that contain landscaping pictures and perform a blend operation between two pictures so that one picture can be seen in the background of another picture. This image manipulation is easily performed in a few lines of code using OpenCV versus other methods. OpenCV.org is a must if you want to explore and dive deeper into image processing and machine learning in general.

CONCLUSION

Saving electricity is essential for both personal and global well-being. By reducing energy consumption, we can reduce greenhouse gas emissions, conserve natural resources, and save money on energy bills. Simple actions, such as turning off lights when leaving a room, using energy-efficient appliances, and reducing air conditioning usage, can make a big impact. By making a conscious effort to save electricity, we can create a more sustainable future for ourselves and future generations.

References

[1] https://ieeexplore.ieee.org/document/7880030

[2] https://sci-hub.tw/https://ieeexplore.ieee.org/document/7396336?reload=true

[3] www.google.com

[4] https://realpython.com/face-recognition-with-python/

[5] https://www.pyimagesearch.com/2017/04/24/eve-blink-detection-opencv-python-dlib/

[6] https://github.com/tahaemara/sleep-detection/blob/master/README.md

[7] https://ieeexplore.ieee.org/document/7396336?reload=true

[8] https://github.com/mans-men/eye-blink-detection-demo

[9] https://docs.opencv.org/3.4/d7/d8b/tutorial py face detection.html

[10] https://www.learnopencv.com/training-better-haar-lbp-cascade-eye-detector-opencv/

[11] https://blog.goodaudience.com/real-time-face-and-eyes-detection-with-opencv-54d9ccfee6a8

[12] https://www.seeingmachines.com/technology/

[13] https://eyegaze.com/tag/lc-technologies