COST-EFFICIENT SMART HOME SECURITY SYSTEM BASED ON IOT

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A B S T R A C T

People are interested in approximate computing to make low-power, high-performance computers, which is in response to the growing need for computers that use less energy [2, 3]. A lot of different tasks need multipliers, like machine learning, image processing, and digital signal processing (DSP) [6, 8]. This work introduces an innovative approximation multiplier that optimises power efficiency and accuracy through the integration of higher-order compressors [9, 10]. These compressors reduce the amount of space needed, the amount of power used, and the time it takes to process data while keeping the required level of accuracy [5, 7]. To improve efficiency, we substitute the traditional Carry Kogge Stone Adder (CKSA) with a Carry Look-Ahead Adder (CLA) for expedited summation. Experimental testing with Xilinx Vivado 17.3v confirms the efficacy of our solution, showcasing substantial enhancements compared to prior designs. Key Word: Approximate Computing, Low-Power Multiplier, Higher-Order Compressors, Carry Look-Ahead Adder (CLA), Xilinx Vivado .

INTRODUCTION

Smart home security and home automation system are the main aspects of this project. The idea of home automation and its safety was first introduced in late 1970s. But with the advancement of technology, during the course of time our expectations and idea of home automation and its security systems has changed a lot. If we take a look at different home automation systems, we can see that they have always tried focus on providing efficient and convenient for inhabitants to access their homes. [1]. Home automation using internet of things is much more beneficial for some reasons [2]. - - - - Less installation cost. wide range control of appliances. Less power consumption and hence energy saving. Easy to control and access able to smart phone or other devices.

This paper proposes a low-cost Smart Home automation and security system that could make human life much easier. Nowadays, people are more concerned about their home security issues. It is because the crime rate is increasing all over the world. Domestic violence against women and children has become a crucial issue during past few years. Manusher Jonno Foundation (MJF) is a human rights foundation of Bangladesh that has surveyed that, during the lockdown for the coronavirus pandemic a total of 4,249women and 456 children were the victims of domestic violence in 27 selected districts of Bangladesh. them, 1,672 women and 424 children faced the violence for the first time during this lockdown [3]. Crimes like kidnapping, burglary, robbery, rape, child abuse have become common scenario in Bangladesh. It makes us more concerned about the safety of our family. So, we have tried to find a feasible solution about their home security issue.

The quest of present-day security system includes identifying any intruder trying to trespass into the home, notifying the owner about the intrusion or the attempt of intrusion, forbidding the intruder to gain access to the

house, and gather or collect evidence for the intrusion. The rapid advancement of technology changed the concept of security in modern homes. The system of a simple lock and key security concept are being replaced by advanced security systems like cameras, various contact sensors, proximity sensors, GSM, etc. Modern homes are now connected to the internet and users can control and access to their homes remotely from anywhere in the world [1]. The overall goal of this proposed system is to build a cost-efficient automation and security system that can assure the safety of our home and our family.

1.2 PROPOSED SYSTEM

The proposed system aims to create a cost-efficient smart home security solution utilizing IoT technology. This system integrates various smart devices, such as LDR, Gas, DHT11, and alarms etc. which are connected through a central hub. Homeowners can monitor and control their security system in real-time via a mobile app, receiving instant alerts and notifications. The use of wireless communication and cloud services reduces installation and maintenance costs, while providing enhanced flexibility and scalability. This IoT-based approach ensures a more efficient, user-friendly, and affordable home security system.

2.2 BLOCK DIAGRAM:
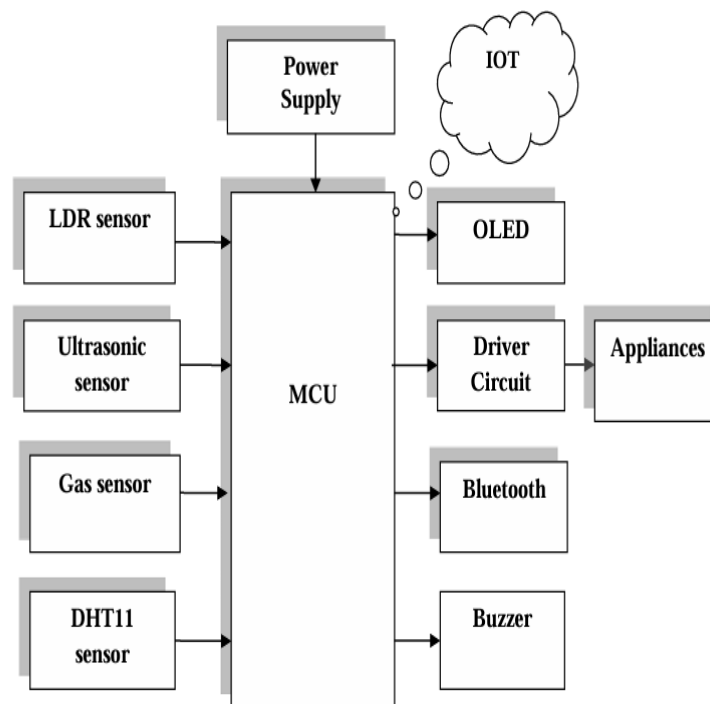
Application Areas

Nearly 99 per cent of the processors manufactured end up in embedded systems. The embedded system market is one of the highest growth areas as these systems are used in very market segment- consumer electronics, office automation, industrial automation, biomedical engineering, wireless communication, data communication, telecommunications, transportation, military and so on.

Industrial Automation:

Today a lot of industries use embedded systems for process control. These include pharmaceutical, cement, sugar, oil exploration, nuclear energy, electricity generation and transmission. The embedded systems for industrial use are designed to carry out specific tasks such as monitoring the temperature, pressure, humidity, voltage, current etc., and then take appropriate action based on the monitored levels to control other devices or to send information to a centralized monitoring station. In hazardous industrial environment, where human presence has to be avoided, robots are used, which are programmed to do specific jobs. The robots are now becoming very powerful and carry out many interesting and complicated tasks such as hardware assembly.

Medical Electronics:

Almost every medical equipment in the hospital is an embedded system. These equipment include diagnostic aids such as ECG, EEG, blood pressure measuring devices, X-ray scanners; equipment used in blood analysis, radiation, colonoscopy, endoscopy etc. Developments in medical electronics have paved way for more accurate diagnosis of diseases.

Computer Networking:

Computer networking products such as bridges, routers, Integrated Services Digital Networks (ISDN), Asynchronous Transfer Mode (ATM), X.25 and frame relay switches are embedded systems which implement the necessary data communication protocols. For example, a router interconnects two networks. The two networks may be running different protocol stacks. The router's function is to obtain the data packets from incoming pores, analyze the packets and send them towards the destination after doing necessary protocol conversion. Most networking equipment, other than the end systems (desktop computers) we use to access the networks, are embedded systems.

Security:

Security of persons and information has always been a major issue. We need to protect our homes and offices; and also the information we transmit and store. Developing embedded systems for security applications is one of the most lucrative businesses nowadays. Security devices at homes, offices, airports etc. for authentication and verification are embedded systems. Encryption devices are nearly 99 per cent of the processors that are manufactured end up in~ embedded systems. Embedded systems find applications in every industrial segment-consumer electronics, transportation, avionics, biomedical engineering, manufacturing, process control and industrial automation, data communication, telecommunication, defense, security etc. Used to encrypt the data/voice being transmitted on communication links such as telephone lines.

**Overview of Embedded System Architecture**

Every embedded system consists of custom-built hardware built around a Central Processing Unit (CPU). This hardware also contains memory chips onto which the software is loaded. The software residing on the memory chip is also called the 'firmware'. The embedded system architecture can be represented as a layered architecture as shown in Fig. The operating system runs above the hardware, and the application software runs above the operating system. The same architecture is applicable to any computer including a desktop computer. However, there are significant differences.

Now, let us see the details of the various building blocks of the hardware of an embedded system. As shown in Fig. the building blocks are; ·

Central Processing Unit (CPU)

· Memory (Read-only Memory and Random Access Memory)

· Input Devices

· Output devices

· Communication interfaces

· Application-specific circuitry
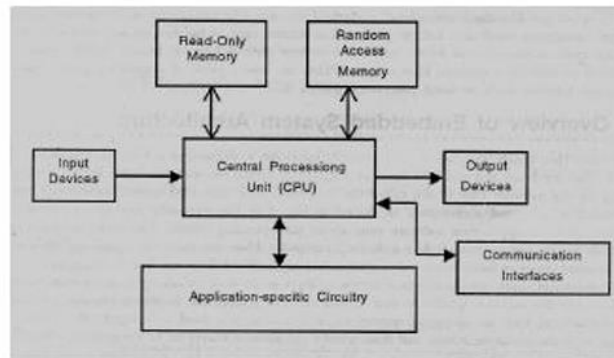

MODULES:

POWER SUPPLY

IOT OLED Driver Circuit Bluetooth Buzzer Appliances The power supply section is the section which provide +5V for the components to work. IC LM7805 is used for providing a constant power of +5V. The ac voltage, typically 220V, is connected to a transformer, which steps down that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation.

Transformer

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in India) to a safer low voltage. The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer.

Bridge Rectifier

When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners. Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B
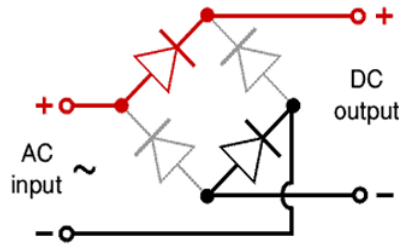
Voltage Regulators

Voltage regulators comprise a class of widely used ICs. Regulator IC units contain the circuitry for reference source, comparator amplifier, control device, and overload protection all in a single IC. IC units provide regulation of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be selected for operation with load currents from hundreds of milli amperes to tens of amperers.

IMPLEMENTATIONS

Code

```
from machine import Pin, ADC, I2C

import dht

import utime from ssd1306

import SSD1306_I2C

# Setup Sensors

dht_sensor = dht.DHT11(Pin(15))

ldr = ADC(Pin(26))

gas_sensor = ADC(Pin(27))

# Setup Ultrasonic

trigger = Pin(3, Pin.OUT)

echo = Pin(2, Pin.IN)

# Setup Buzzer & Relay

buzzer = Pin(16, Pin.OUT)

relay = Pin(17, Pin.OUT)

# Setup OLED Display (using I2C

i2c = I2C(0, scl=Pin(1)

, sda=Pin(0))

oled = SSD1306_I2C(128, 64, i2c)

# Measure Distance

def measure_distance():
```

```
trigger.low()
utime.sleep_us(2) t
rigger.high()
.sleep_us(10)
trigger.low()
# Simple Alert Conditions
if gas > 40000 or distance < 10:
    buzzer.high() relay.high()
# Turn ON connected appliance (e.g. exhaust)
else:
    buzzer.low() relay.low()
```
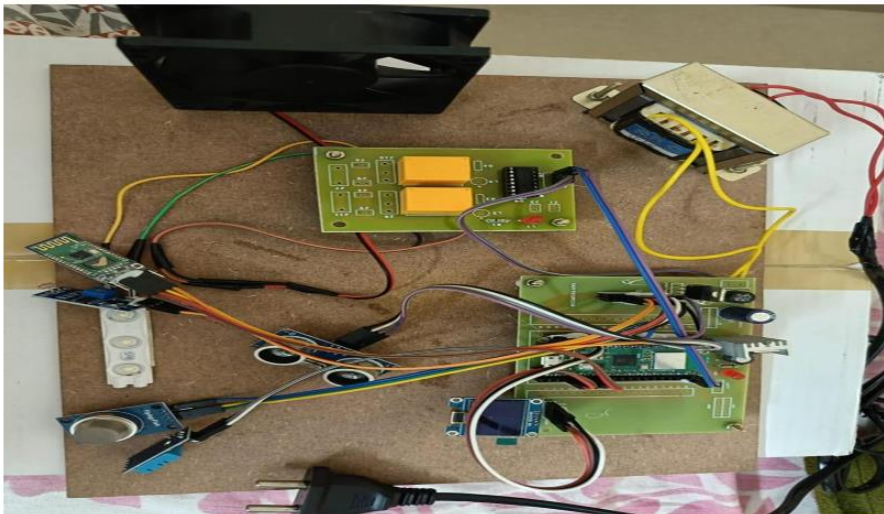
SIMULATION AND DESIGN

CONCLUSION

The research is equally contributed by all authors and there is no conflict of interest among authors. This paper represents cost-efficient home automation and security system with enhanced features. The system is much reliable and easy to control. The goal of this project is to automate the daily home appliances and ensure a strong security system for our home. The project can be further upgraded by implementing different types of sensors and efficient home appliances. Since smartphones are now widely used, these user-friendly systems can be used for the welfare of the mass.

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