# Summary of Computer Systems Engineering Projects October 1<sup>st</sup> 2009

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## 1 MOTION ACTIVATED LIGHT

The motion sensor detects the movement of a heat source in the specified area of reach. It spans about 45 degrees in width and uses an infrared sensor to detect the heat movement. The sensor is triggered by the infrared emitted from the source. Once the motion is detected, it triggers the light bulb to turn on only at night; that is in the absence of ultraviolet light.

The Combination of motion detection and absence of ultraviolet light will turn on the light bulb. It will remain switched on while motion of the heat source continues to be detected. When the last movement of the heat source is detected, the motion sensor remains in detection mode for about 15 seconds hence the light bulb will also remain turned on for about 15 seconds after the last movement is detected. This system has many applications including but not limited to (i) outdoor and indoor security lighting (ii) Indoor lighting to illuminate areas (rooms, steps,) only when the light is needed

### 2 LIGHT CONTROL SYSTEM USING A COMPUTER

This is an outdoor light control system using a computer. It's an automatic switching of lights by the use of time switches whereby the switching of lights ON and OFF is pre-scheduled to operate automatically for 24 hours time switch without any manual intervention. This system allows lights to be scheduled when to go on or off. It can control almost any electrical appliance in your home or office with the use of time switches. A light control system is a device that can control any and all lights

throughout a building. With the use of time switches, you can turn lights on or off, dim lights, power fans and more from anywhere in the building. There are many applications of light control systems, and they offer ease and convenience.

The goal of a Light control system is designed to help people to save money by increasing your energy efficiency and turning off lights that are not being used. With the light control system, the lights are programmed to automatically go off when the pre-scheduled time has clocked. Turning off lights that aren't needed can translate into hundreds of Shillings in energy savings annually. Further this light control system is designed to only control exterior lights according to time of day without the manual intervention.

Applications include accent lighting; a type of outdoor lighting that can dramatically increase the allure of outdoor landscape while increasing the value of home and land. This can be overhead lighting, or ground lighting on walkways and sidewalks around your home, or can silhouette gardens, trees, or shrubbery.

In addition Light control systems are great additions to security systems as they can be programmed to turn on all of your lights at night when someone enters a restricted area or breaks into your home. The convenience of light control systems is one of the biggest benefits they have to offer.

#### 3 A DIGITAL CLOCK

This is a cheap implementation of a digital clock. It provides standard functionality of a desk clock. It uses a LED 7 segment display with 4 digits. It displays the time in Hours, Minutes and Seconds at the same time. This cheap implementation of a digital uses 12 Diodes- BC635, 12 Resistors- 10K $\Omega$  and 270 $\Omega$  resistor. Eight outputs are used to turn the 7 segment and decimal points on and off. The display has common anodes so a port set "low" turns the segment on and a port set "high" turns it off. Each of the digits is turned on sequentially. The segments for that digit are only on while that digit is on.

#### 4 ELECTRONIC TOY CAR

This is a computer controlled car using parallel ports to move forward backwards. The care relies on the computer interface to control its movements. The true goal is to build a robotic car with all sorts of sensors

This system has several applications such as building auto pilots for flying planes, cars in case of emergencies and all sorts of machinery. This application can be used to building robots, some of these robots are seen in factories such as auto cars to drive the goods from one side of the building to the other this saves time and money because machines.

The design will be further expanded to make it more effective by using a microcontroller to carry the desired program, and sensors such as infrared which can follow a line drawn on the surface and motion sensor to detect and stop if there is movement ahead to prevent accidents.

#### 5 TRAFFIC LIGHT CONTROLLED

This project is a design and an implementation of digital traffic lights for T Road Junction. The system displays how much time is remaining to turn RED or GREEN. The road junction will display to motorists how much time is left for the traffic lights to turn.

The obvious application is on the streets for both motorists and pedestrians. This project was developed to give road users an idea of how long they still have to wait before the traffic lights turn green. When the traffic light turns red, a countdown from 9 to 0 is initiated showing a road user how long it will be before the lights are green. After zero, the green light will go on and then road users can safely drive out of the lane.

The project has been implemented in form of a T- road junction, where we have vehicles on one lane moving while others wait for there turn. On average, cars on a particular lane have to wait for about 10 seconds or countdown intervals before they can start moving. Here, the RED light means stop (don't move), GREEN (drive or move) and YELLOW/ ORANGE (get ready to stop).

#### **6 TEMPERATURE MONITOR**

This project displays the temperature on a Digital Display of two 7 Segment displays and a thermistor or temperature sensor is used for sensing the temperature from the environment or any body or item. This project also shows you how to build a digital thermometer, using a thermistor and a

Microcontroller-ATMega8515.

Being Analog to Digital Conversion (ADC), it is very easy to understand the functioning of the device, and you can build it with any microcontroller even if it doesn't have a built-in ADC. This project contains an ATMEL-AVR Board which has a built in ADC.

The temperature monitor can be embedded in many other applications such as Air Conditioners, refrigerators such that they can be automatically switched on or off depending on the temperature.

#### 7 CAR TRACKING SYSTEMS BY SMS

This system is uses two phone handsets; one hidden in the car and the other with owner of the car. Once a car is stolen, then the owner uses the second handset to talk to the car. You can listen in to the car, locate the position of the car by GPS, issue commands to the car to stop.

The rest of the communication between the phones is based on the existing phone network. The same project can be extended to tracking of any general merchandise or control of systems such as appliances at home using a phone while you are away. For instance, you can open a door to your visitors while you are away.

## 8 DESIGNER CONTROLLED PATTERNS

This project uses a computer program to control a set of lights to produce different patterns. This is an advanced implementation of commonly used patterns for Christmas lights or disco lights. The user can control the timing of lights using a computer based interface.

The obvious applications of this project are in the decorations for public and private places. It gives the user ultimate control on the kind of patterns to be displayed. Several choreographies can be added.