Home Alarm System

BASIC HOME SECURITY

SCOTT HESSANO – DAVID LAMB – FADY HANNA

Reason for Home Security

- Data from 2010 Crime statistics state that in the year of 2010 there were a total of 2,159,878 Burglaries reported in the United States.
- That is approximately 4 every minute.
- The average loss in dollar value is around 3500 dollars in property
- The average cost of home owner deductibles are around 1500 dollars per incident
- If a home owner claim was made for only half of reported burglaries it would cost nearly 1,619,908,000 to pay for these claims

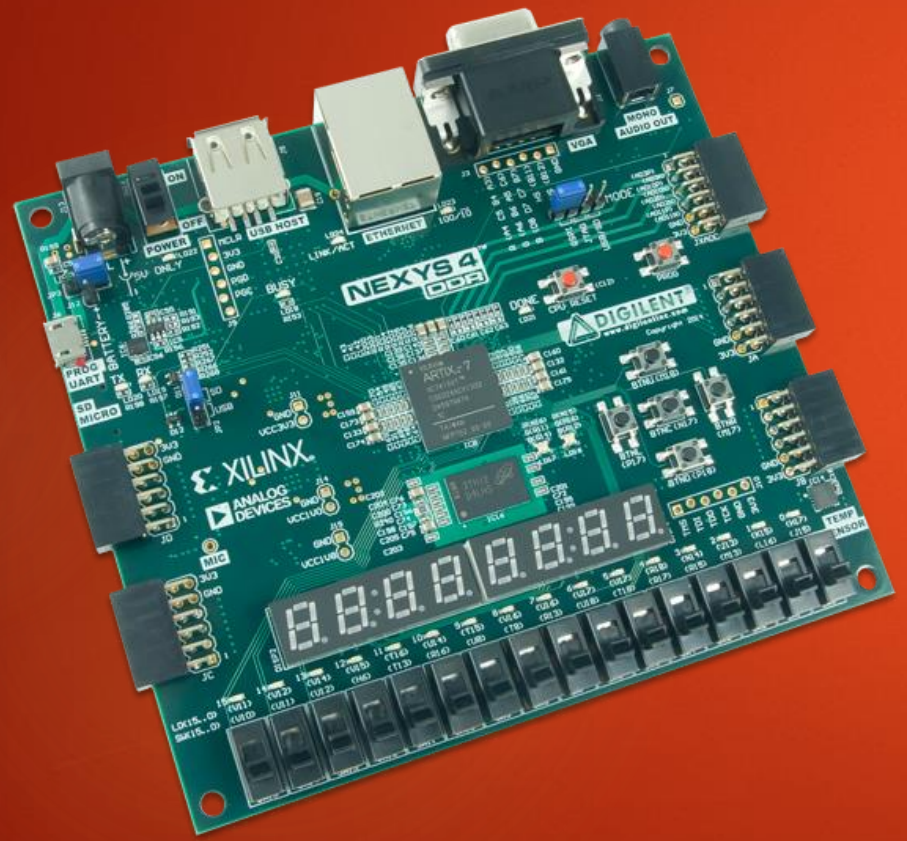
Statistics of Home Security

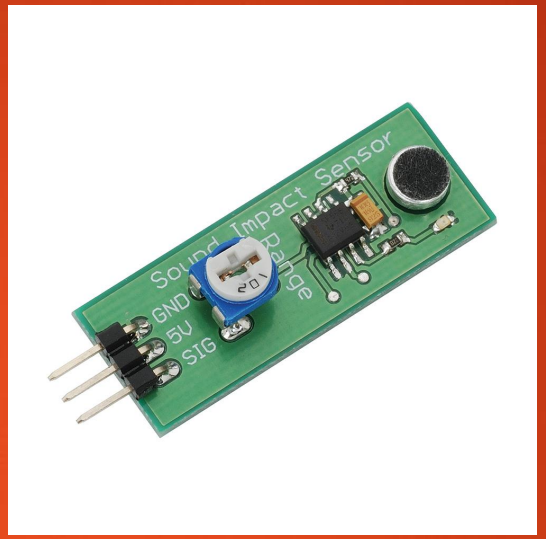
- The estimated amount of house holds that have some sort of home security is about 30%
- The estimated amount of business' that equip their stores or companies with alarms are close to 80%
- However out of these alarms more than 50% are not functional due to improper maintenance of equipment or lack of payment to the respective companies to maintain their service.

Inspiration for Our Basic Home Security

- Having a system that uses very inexpensive sensors that are able to track movement within a given space rather than expensive company branded equipment.
- Easy programmable system for plug and play ability of the consumer.
- Being able to reach more people due to relatively low cost of system to put together, install, and maintain.
- Ability to connect directly to the consumer and rely on them to contact the authorities rather than over paying to have someone in a different state or country wait for a signal then do the same thing the home owner could.

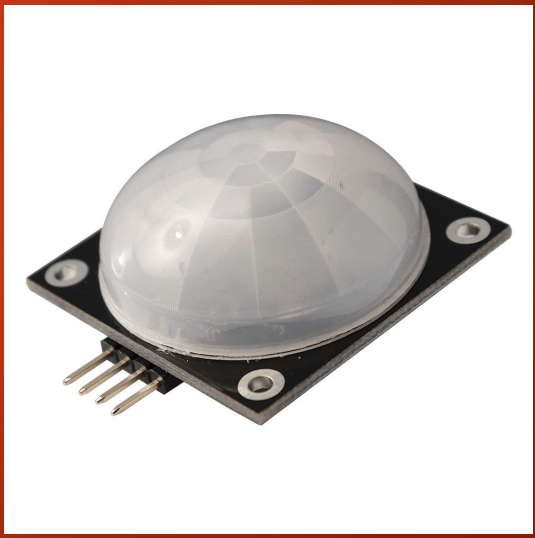
Alarm System Components





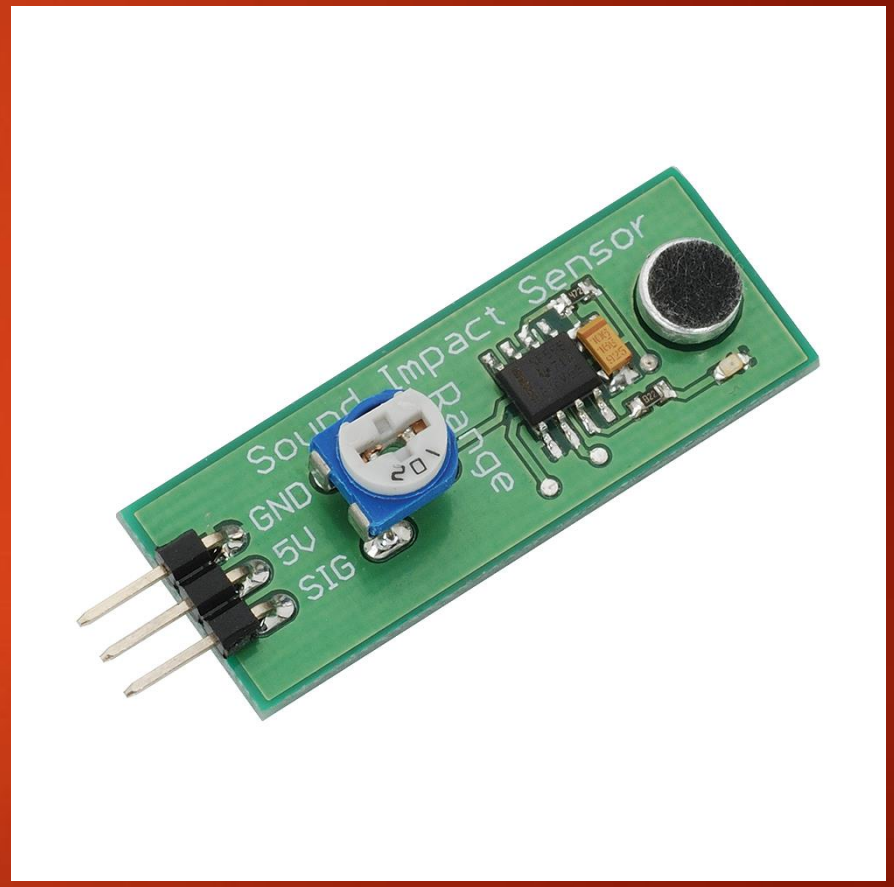
Parallax Sound Impact Sensor

Parallax Wide Angle Passive IR Sensor



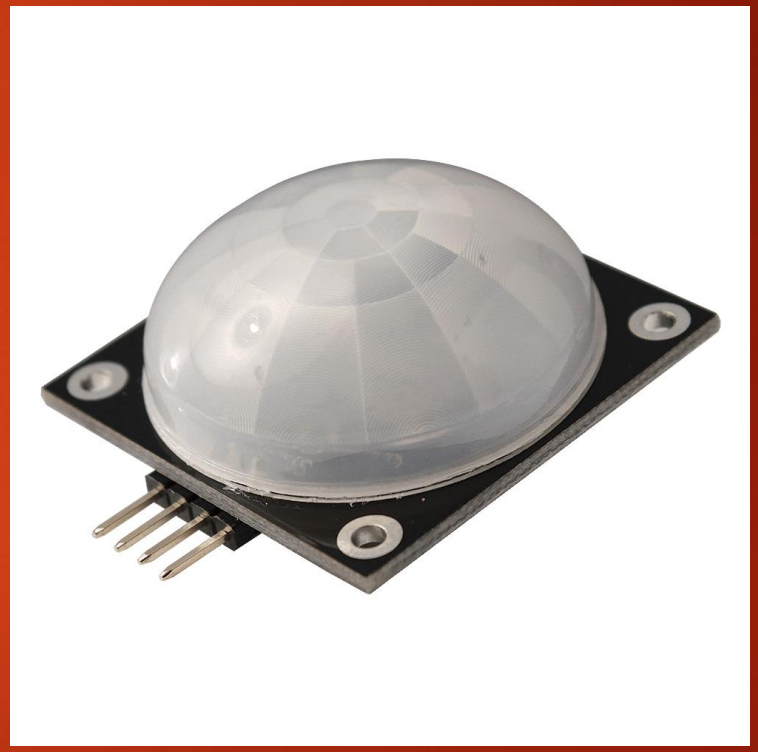
Parallax Sound Impact Sensor

- Impact Sensor from Parallax takes incoming pressure from sound due to the wave created to produce a signal.
- Sensor is a one bit producing sensor. Such that if pressure is detected within its 3 meter radius of sensing it will produce a high 1 bit output.
- Detects such sounds as glass breaking or clapping of hands, any thing that produces a high decibel change in a short period of time.



Parallax Wide Angle Passive IR Sensor

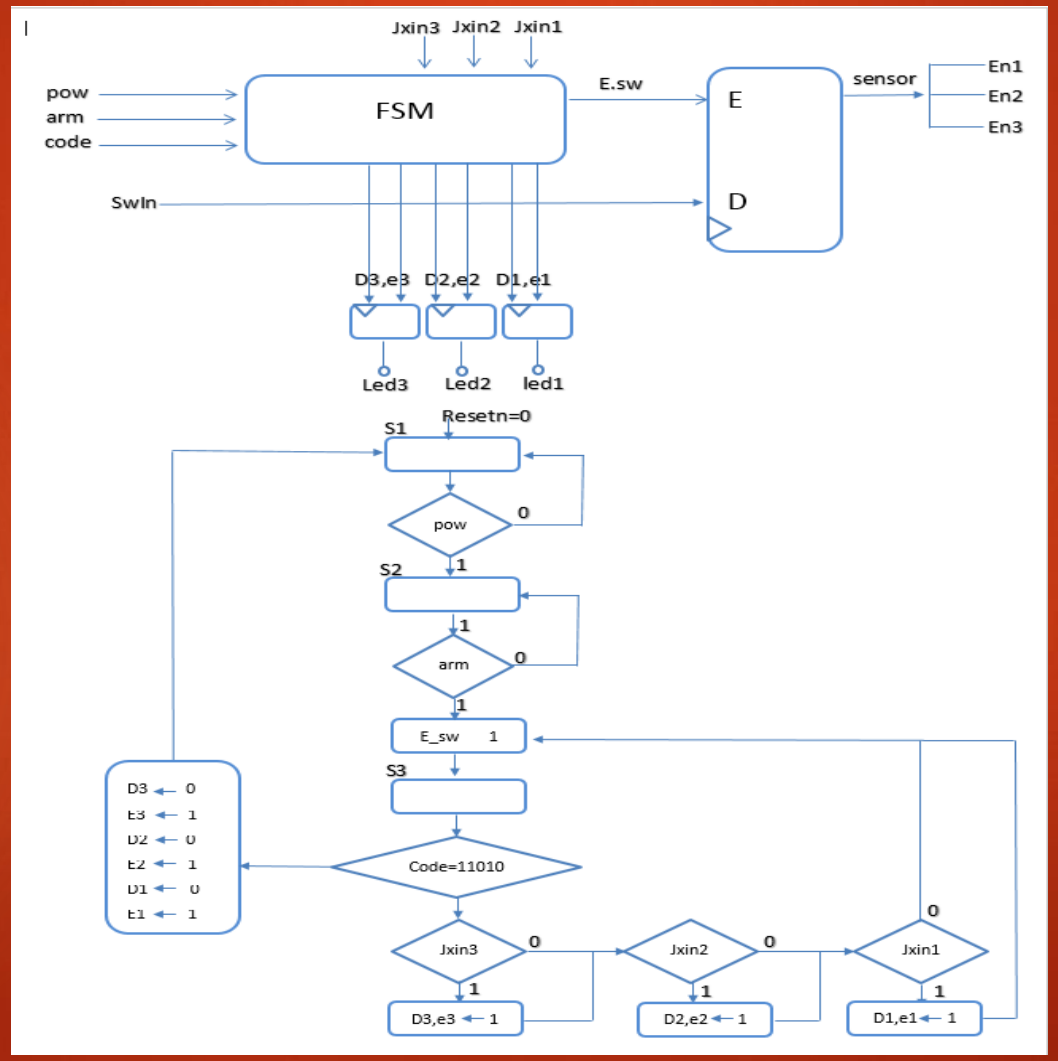
- Parallax's Wide Angle Passive IR Sensor is a digital sensor that detects motion within a 180 Degree path of its detection area.
- When motion is detected the sensor outputs a 1 High bit that is used by the board to signal the system that the alarm has been tripped within its area of view



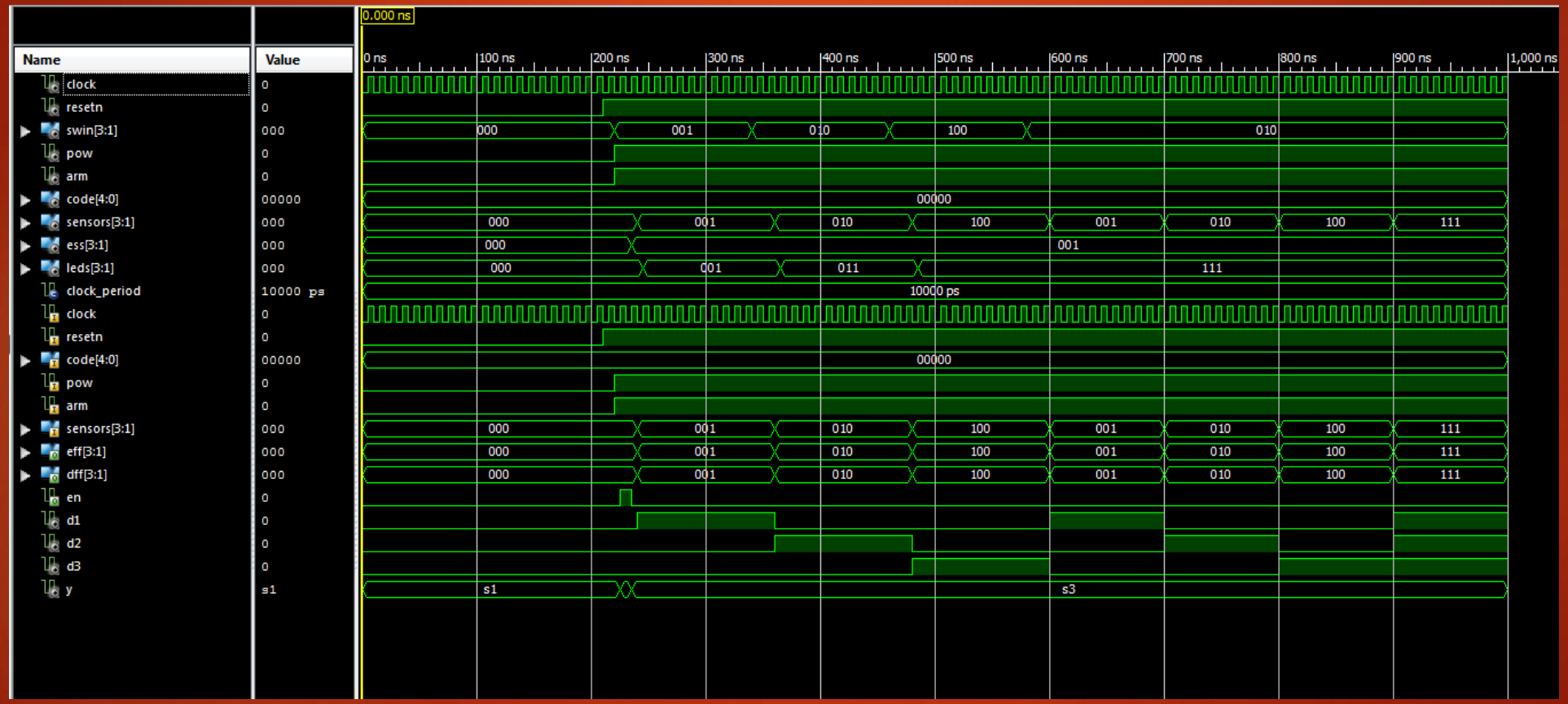
Current Limitations

- Current limitations of the current setup presented start with lack available sensors that work out of the box.
- With the inexpensive nature of these sensors most that were tested with the board failed to produce a good enough signal to be read appropriately by the board.
- Due to limited time and other stumbles along the way with programing time was not able to be put in to access the sound on the board to output an alarm tone.
- Unable to find a way to communicate with home owner with current equipment, blue tooth or a LAN connection could be used with more time and development.

ASM Format for Home Security System.



Test Bench


0.000 ns
Name
Value
0 ns
100 ns
200 ns
300 ns
400 ns
500 ns
600 ns
700 ns
800 ns
900 ns
1,000 ns
clock
resetn
swin[3:1]
pow
arm
code[4:0]
sensors[3:1]
ess[3:1]
leds[3:1]
clock_period
eff[3:1]
dff[3:1]
en
d1
d2
d3
y
10000 ps
s1
s3

Sample Code

```
begin
dff<= d3&d2&d1;
Transitions: process (resetn, clock,pow)
begin
    if resetn = '0' then
    y <= S1;
    elsif (clock'event and clock = '1') then
           case y is
           when S1 =>
              if pow ='1' then y<=S2;
              else y<=S1;
              end if;
           when S2 =>
              if  arm ='1' then y <= S3;
              else y<=S2;
              end if;
           when S3 =>
              if code =("11010") then y<= S1;
              elsif code /=("11010") then y<=S3;
              end if;
           end case;
       end if;
    end process;
    Outputs: process (y,sensors,code, arm)
       begin

           d3 <= '0';d2<='0';d1 <='0'; eff  <="000";     En <= '0';
           case y is
              when S1 =>
              when S2 =>
                 if arm = '1' then En <= '1'; end if;
              when S3 =>
                 if code /= "11010" then
                    if sensors(3) = '1' then
                       d3 <= '1'; eff(3) <= '1';
                    end if;
                    if sensors(2) = '1' then
                       d2 <= '1'  ; eff(2) <= '1';
                    end if;
                    if sensors(1) = '1' then
                       d1 <= '1'; eff(1) <= '1';
                    end if;
                 else
                    d3 <= '0'; eff(3) <= '1';
                    d2 <= '0'; eff(2) <= '1';
                    d1 <= '0'; eff(1) <= '1';

                 end if;
           end case;
    end process;
end Behavioral;
```

Use of Basic Home Alarm System

- Time to test it!