Simple Logic Elevator

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Overview

Proposal
Specifications
Features
Design Process
Computer Code
Circuit Diagram
AutoCAD
Cost Estimate
Conclusion
Proposal

- A three-floored elevator
- One door with safety sensor
- Indicator
- Suitable for parking garage, subway station, etc.
Specifications

- Prototype is controlled by BS2
- Safety circuitry
- Instantaneous automatic and manual control
- Included actuators and sensors
- Feedback system
Features

- Smoke detector
- Safety sensory system
Design Process

- Mechanical construction
  1. Track
  2. Elevator box
  3. Sliding door
Design process

- Programming & Electrical circuit
  1. Elevation
  2. Door movement
  3. Status indication
  4. BS2 protection
  5. User interface hardware
'{$STAMP BS2}
debug "start program", cr
position var nib
rct var word
x var word
n var word
a var bit
log var bit(6)
ptr var nib
ptr=0
position=1
for x=0 to 5
    'initialize array to all 0s
    log(n)=0
next
high 7

mainloop:
gosub check0
    'constantly checking user inputs

start:
for n=ptr to 5 'set pointer to the first destination
    if log(n)=1 then setptr
next

for n=0 to ptr 'set pointer to the first destination
    if log(n)=1 then setptr
next
if in8=0 then alarm
loop:
debug "floor = ", dec position, tab, "pointer ", dec ptr, cr
if (position=1) and (ptr=2 or ptr=3) then goup1f
if (position=1) and (ptr=4 or ptr=5) then goup2f
if (position=2) and (ptr=0 or ptr=1) then godown1f
if (position=2) and (ptr=4 or ptr=5) then goup1f
if (position=3) and (ptr=0 or ptr=1) then godown2f
if (position=3) and (ptr=2 or ptr=3) then godown1f
if a=1 then stopelevator
if (position=1) and (ptr=0 or ptr=1) then donothing
if (position=2) and (ptr=2 or ptr=3) then donothing
if (position=3) and (ptr=4 or ptr=5) then donothing
goto mainloop
goup1f:
gosub close_door
for x=1 to (8*42)
pulsout 11, 300
pause 10
gosub check0
next
gosub open_door
position=position+1
goto start


goup2f:
gosub close_door
for x=1 to (16*42)
pulsout 11,300
pause 10
gosub check0
next
gosub open_door
position=position+2
goto start
godown1f:
gosub close_door
for x=1 to (8*36)
pulsout 11, 1700
pause 10
gosub check0
next
gosub open_door
position=position-1
goto start

godown2f:
gosub close_door
for x=1 to (16*37)
pulsout 11, 1700
pause 10
gosub check0
next
gosub open_door
position=position-2
goto start
check0:
if (in0=1 and log(0)=0) then
location0
check1:
if (in1=1 and log(1)=0) then
location1
check2:
if (in2=1 and log(2)=0) then
location2
check3:
if (in3=1 and log(3)=0) then
location3
check4:
if (in4=1 and log(4)=0) then
location4
check5:
if (in5=1 and log(5)=0) then
location5
return

location0:
log(0)=1
if ptr>=4 then setptrto0
goto check1
location1:
log(1)=1
if ptr>=4 then setptrto0
goto check2

location2:
log(2)=1
if ptr>=4 then setptrto0
goto check3

location3:
log(3)=1
if ptr>=4 then setptrto0
goto check4

location4:
log(4)=1
if ptr>=4 then setptrto0
goto check5
location5:
log(5)=1
if ptr>=4 then setptrto0
return

setptrto0:
ptr=0
goto mainloop

setptr:
ptr=n
goto loop

alarm:
a = 1
freqout 9,200,2900
ptr = 1
debug "alarm", cr
goto loop

stopelevator:
stop
open_door:
out7=1
for x=1 to 100
pulsout 10, 1200
pause 10
next
log(ptr)=0
for x=1 to 500
gosub check0
next
return
open:
for x=1 to 100
pulsout 10, 1200
pause 10
next
close_door:
for n=1 to 100
pulsout 10, 400
pause 10
high 6
RCtime 6,1,rct
if (rct>5000) or (rct=0) then open
next
debug "here"
out7=0
return
donething:
log(ptr)=0
goto mainloop
Elevator Track
Elevator
## Cost Estimate

<table>
<thead>
<tr>
<th>Components</th>
<th>Price</th>
<th>Quantities</th>
<th>subtotal, dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Button</td>
<td>1.4</td>
<td>6</td>
<td>8.4</td>
</tr>
<tr>
<td>LED</td>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Servo-Motor</td>
<td>12</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>Continuous Motor</td>
<td>13</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Photodiode</td>
<td>1.5</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Resistors</td>
<td>0.2</td>
<td>8</td>
<td>1.6</td>
</tr>
<tr>
<td>Construction Materials</td>
<td>35</td>
<td>boards</td>
<td>35</td>
</tr>
</tbody>
</table>
## Cost Estimate

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<th>Price</th>
<th>Quantities</th>
<th>subtotal, dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitors</td>
<td>0.25</td>
<td>1</td>
<td>0.25</td>
</tr>
<tr>
<td>Piezo-Speaker</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Circuit Board</td>
<td>9</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>BS2</td>
<td>100</td>
<td>1</td>
<td>100</td>
</tr>
</tbody>
</table>

**Total Cost** 205.75
Conclusion

- Easy operation
- Clear indication
- Effective safety design
- Low cost with multipurpose features