Halo Gun Controller
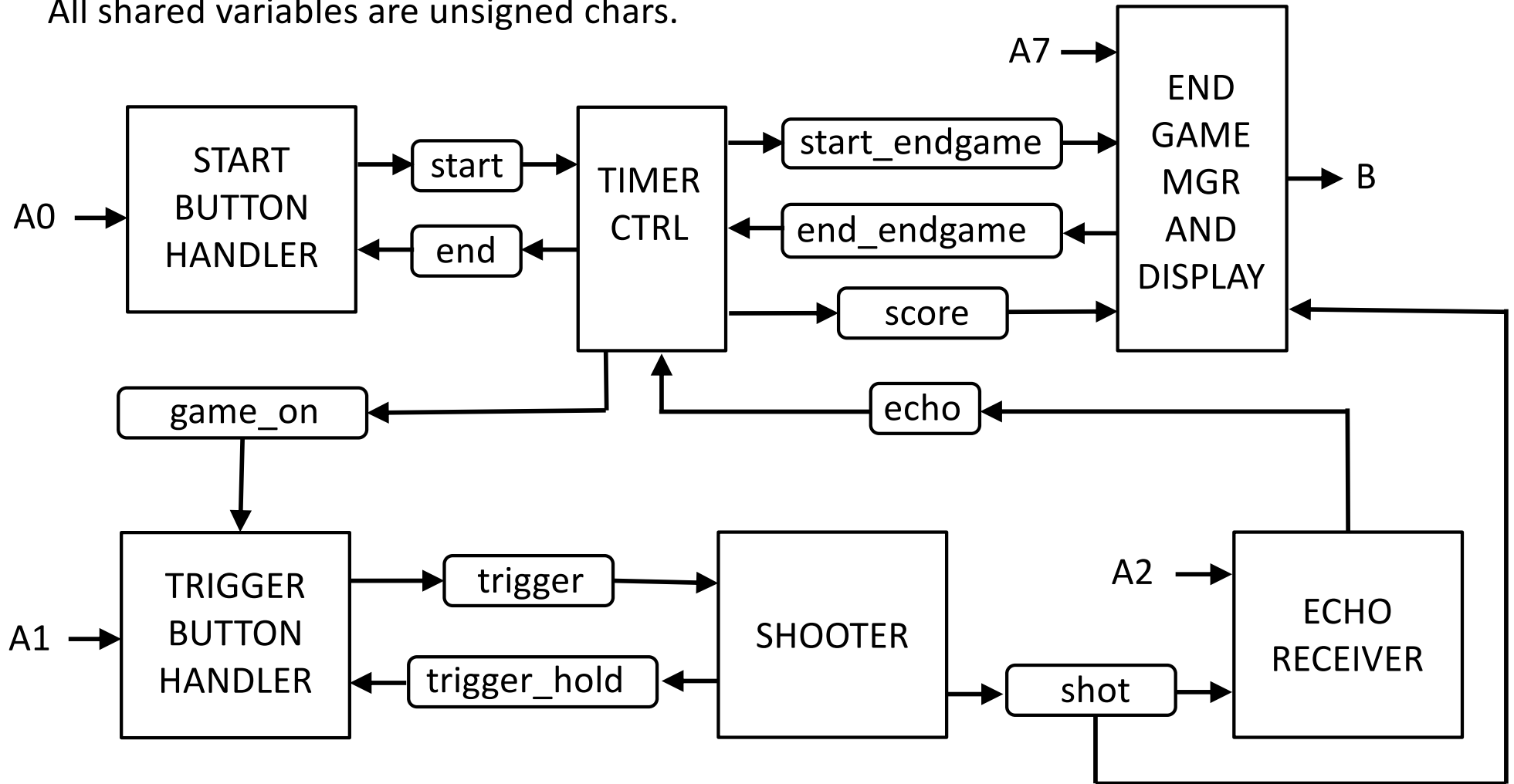# Design Problem Solution

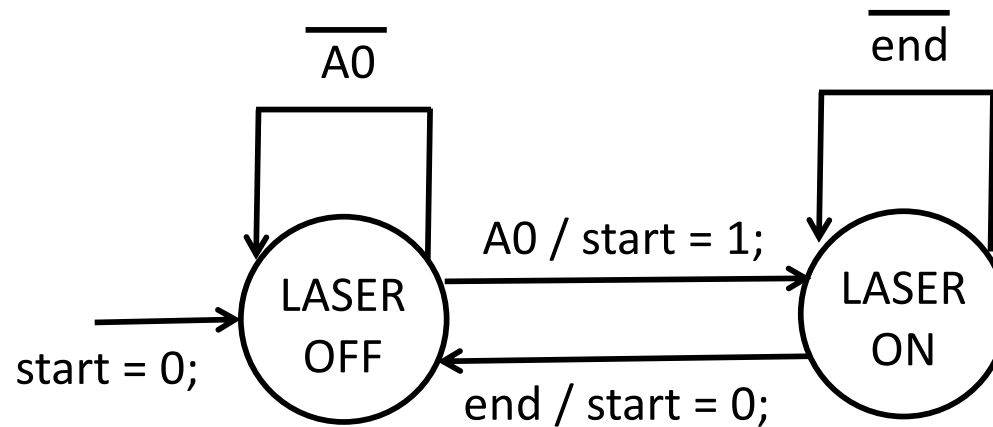# Task Diagram

Period = 100ms.

All shared variables are unsigned chars.
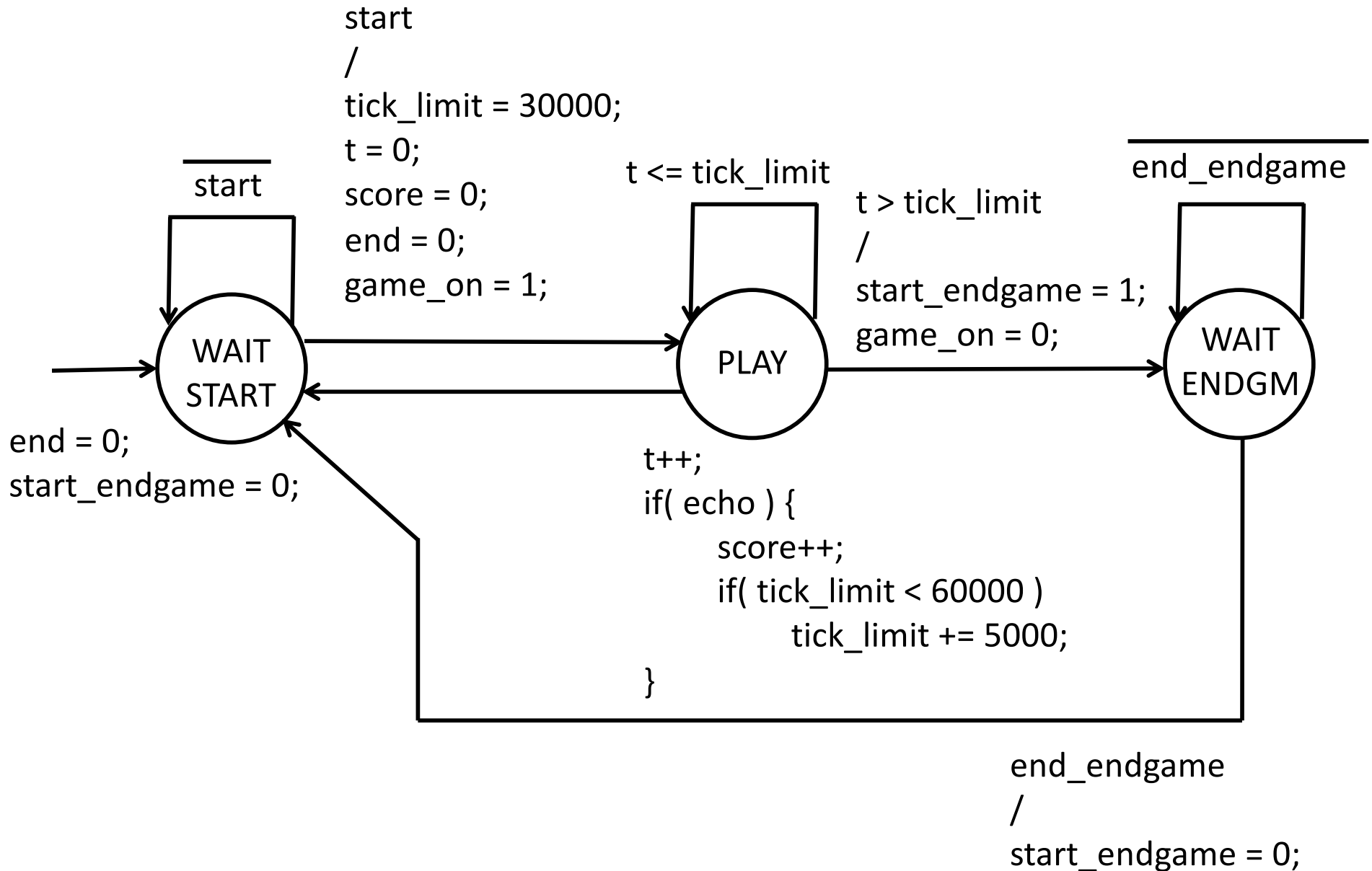
A0 → START BUTTON HANDLER → start → TIMER CTRL

A7 → END GAME MGR AND DISPLAY → B

TIMER CTRL → start_endgame → END GAME MGR AND DISPLAY

END GAME MGR AND DISPLAY → end_endgame → TIMER CTRL

TIMER CTRL → end → START BUTTON HANDLER

TIMER CTRL → score → END GAME MGR AND DISPLAY

TIMER CTRL → game_on → TRIGGER BUTTON HANDLER

ECHO RECEIVER → echo → TIMER CTRL

A1 → TRIGGER BUTTON HANDLER → trigger → SHOOTER

SHOOTER → trigger_hold → TRIGGER BUTTON HANDLER

A2 → ECHO RECEIVER

SHOOTER → shot → ECHO RECEIVER

START BUTTON HANDLER Task

$\overline{A0}$

$\overline{end}$

A0 / start = 1;

LASER OFF

LASER ON

start = 0;

end / start = 0;

TIMER CTRL Task

unsigned short tick_limit;
unsigned short t;
unsigned char score;

start
/
tick_limit = 30000;
t = 0;
score = 0;
end = 0;
game_on = 1;

start

t <= tick_limit

t > tick_limit
/
start_endgame = 1;
game_on = 0;

end_endgame

WAIT START

PLAY

WAIT ENDGM

end = 0;
start_endgame = 0;

t++;
if(echo) {
        score++;
        if(tick_limit < 60000)
                tick_limit += 5000;
}

end_endgame
/
start_endgame = 0;

TRIGGER BUTTON HANDLER Task

$\overline{game\_on}$ || trigger_hold || $\overline{A1}$

game_on && $\overline{trigger\_hold}$ && A1

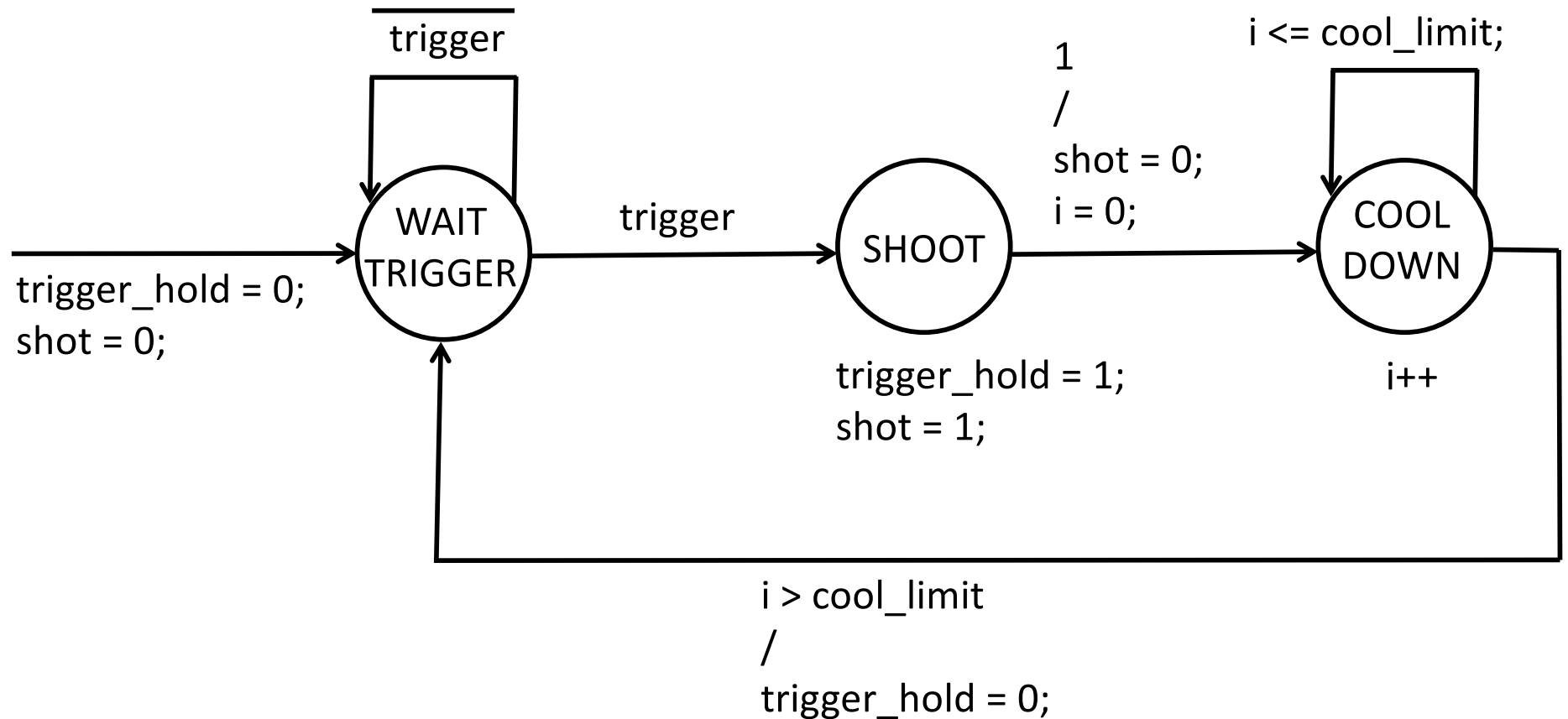WAIT PRESS

trigger = 0;

DOWN

trigger = 1;

1
/
trigger = 0;

A1

HOLD BUTTON

$\overline{A1}$
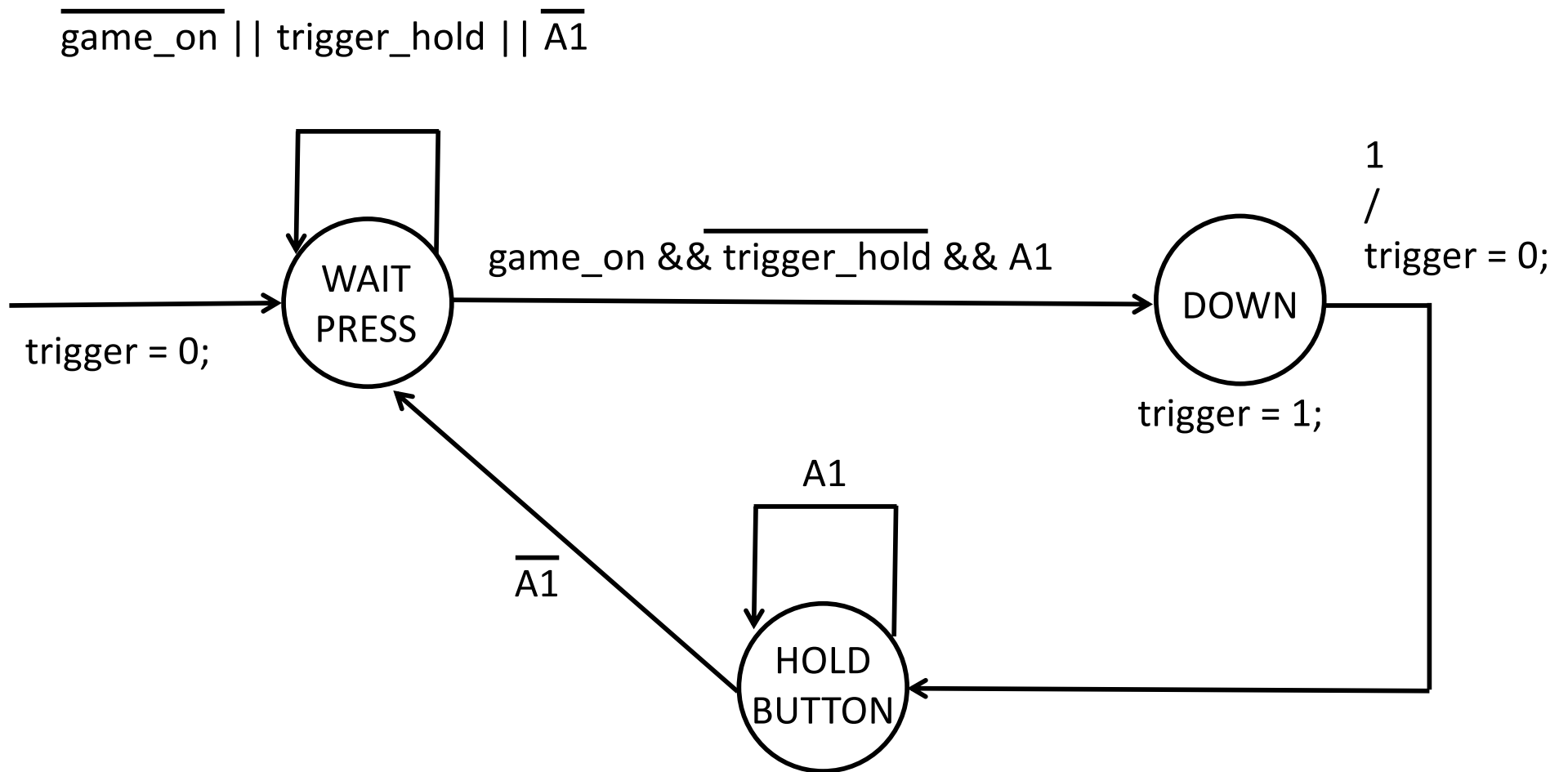
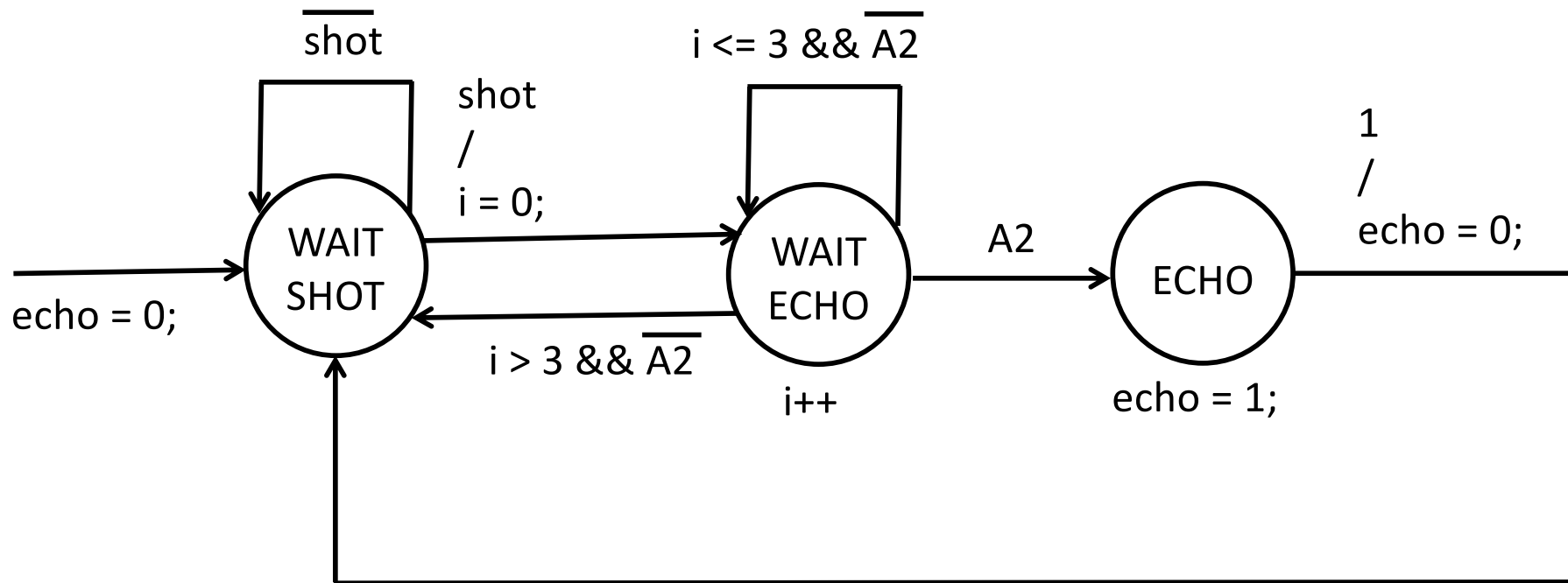# SHOOTER Task

const unsigned char cool_limit = 7;
unsigned char i;

ECHO RECEIVER Task

unsigned char i;

END GAME MGR AND DISPLAY Task

unsigned char i, j;

$\overline{\text{start\_endgame}}$

start_endgame
&& score >= 5
/
end_endgame = 1;
i = j = 0;

i <= 5

i > 5
/
i = 0;
j++;

i <= 5

WIN BLINK OFF

i++;
B = 0;

i > 5 && j <= 5
/
i = 0;

WIN BLINK ON

i++;
B = 0xF8;

WAIT

B = shot |
   (score & 0x01F) << 3
end_endgame = 0;

start_endgame
&& score < 5

$\overline{\text{A7}}$

LOSE

A7

B = 1;

i > 5 && j > 5