

```
1  #include "GPIO.h"
2
3  namespace Hardware
4  {
5      GPIO::GPIO(int number)
6      {
7
8          this->number = number;
9          gpiopath = GPIOs + NumberToString<int>(number);
10
11         if (!isExported(number, direction, edge))
12         {
13             ExportPin(number);
14             direction = ReadsDirection(gpiopath);
15             edge = ReadsEdge(gpiopath);
16         }
17         usleep(250000);
18     }
19
20     GPIO::~~GPIO()
21     {
22         UnexportPin(number);
23     }
24
25     int GPIO::WaitForEdge(CallbackType callback)
26     {
27         threadRunning = true;
28         callbackFunction = callback;
29         if (pthread_create(&this->thread, NULL, &threadedPollGPIO, static_cast<void*>(this)))
30         {
31             threadRunning = false;
32             throw Exception::FailedToCreateGPiOPollingThreadException();
33         }
34         return 0;
35     }
36
37     int GPIO::WaitForEdge()
38     {
39         if (direction == Output) { SetDirection(Input); }
40         int fd, i, epollfd, count = 0;
41         struct epoll_event ev;
42         epollfd = epoll_create(1);
```

```
43     if (epollfd == -1)
44     {
45         throw Exception::FailedToCreateGIOPollingThreadException("GPIO: Failed to create epollfd!");
46     }
47     if ((fd = open((gpiopath + VALUE).c_str(), O_RDONLY | O_NONBLOCK)) == -1)
48     {
49         throw Exception::GPIOReadException();
50     }
51
52     // read operation | edge triggered | urgent data
53     ev.events = EPOLLIN | EPOLLET | EPOLLPRI;
54     ev.data.fd = fd;
55
56     if (epoll_ctl(epollfd, EPOLL_CTL_ADD, fd, &ev) == -1)
57     {
58         throw Exception::FailedToCreateGIOPollingThreadException("GPIO: Failed to add control interface!");
59     }
60
61     while (count <= 1)
62     {
63         i = epoll_wait(epollfd, &ev, 1, -1);
64         if (i == -1)
65         {
66             close(fd);
67             return -1;
68         }
69         else
70         {
71             count++;
72         }
73     }
74     close(fd);
75     return 0;
76 }
77
78 GPIO::Value GPIO::GetValue() { return ReadsValue(gpiopath); }
79 void GPIO::SetValue(GPIO::Value value) { WritesValue(gpiopath, value); }
80
81 GPIO::Direction GPIO::GetDirection() { return direction; }
82 void GPIO::SetDirection(Direction direction)
83 {
84     this->direction = direction;
85 }
```

```
86     }
87
88     GPIO::Edge GPIO::GetEdge() { return edge; }
89     void GPIO::SetEdge(Edge edge)
90     {
91         this->edge = edge;
92         WritesEdge(gpiopath, edge);
93     }
94
95     bool GPIO::isExported(int number, Direction &dir, Edge &edge)
96     {
97         // Checks if directory exist and therefore is exported
98         if (!DirectoryExist(gpiopath)) { return false; }
99
100        // Reads the data associated with the pin
101        dir = ReadsDirection(gpiopath);
102        edge = ReadsEdge(gpiopath);
103        return true;
104    }
105
106    bool GPIO::ExportPin(int number)
107    {
108        Write(EXPORT_PIN, NumberToString<int>(number));
109        usleep(250000);
110    }
111
112    bool GPIO::UnexportPin(int number)
113    {
114        Write(UNEXPORT_PIN, NumberToString<int>(number));
115    }
116
117
118    GPIO::Direction GPIO::ReadsDirection(const string &gpiopath)
119    {
120        if (Read(gpiopath + DIRECTION) == "in") { return Input; }
121        else { return Output; }
122    }
123
124    void GPIO::WritesDirection(const string &gpiopath, Direction direction)
125    {
126        switch (direction)
127        {
128            case Hardware::GPIO::Input:
```

```
129     Write((gpiopath + DIRECTION), "in");
130     break;
131 case Hardware::GPIO::Output:
132     Write((gpiopath + DIRECTION), "out");
133     break;
134 }
135 }
136
137 GPIO::Edge GPIO::ReadsEdge(const string &gpiopath)
138 {
139     string reader = Read(gpiopath + EDGE);
140     if (reader == "none") { return None; }
141     else if (reader == "rising") { return Rising; }
142     else if (reader == "falling") { return Falling; }
143     else { return Both; }
144 }
145
146 void GPIO::WritesEdge(const string &gpiopath, Edge edge)
147 {
148     switch (edge)
149     {
150     case Hardware::GPIO::None:
151         Write((gpiopath + EDGE), "none");
152         break;
153     case Hardware::GPIO::Rising:
154         Write((gpiopath + EDGE), "rising");
155         break;
156     case Hardware::GPIO::Falling:
157         Write((gpiopath + EDGE), "falling");
158         break;
159     case Hardware::GPIO::Both:
160         Write((gpiopath + EDGE), "both");
161         break;
162     default:
163         break;
164     }
165 }
166
167 GPIO::Value GPIO::ReadsValue(const string &gpiopath)
168 {
169     string path(gpiopath + VALUE);
```

```
170     int res = StringToNumber<int>(Read(path));
171     return (Value)res;
172 }
173
174 void GPIO::WritesValue(const string &gpiopath, Value value)
175 {
176     Write(gpiopath + VALUE, NumberToString<int>(value));
177 }
178
179
180 void* threadedPollGPIO(void *value)
181 {
182     GPIO *gpio = static_cast<GPIO*>(value);
183     while (gpio->threadRunning)
184     {
185         gpio->callbackFunction(gpio->WaitForEdge());
186         usleep(gpio->debounceTime * 1000);
187     }
188     return 0;
189 }
190 }
```