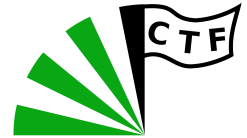
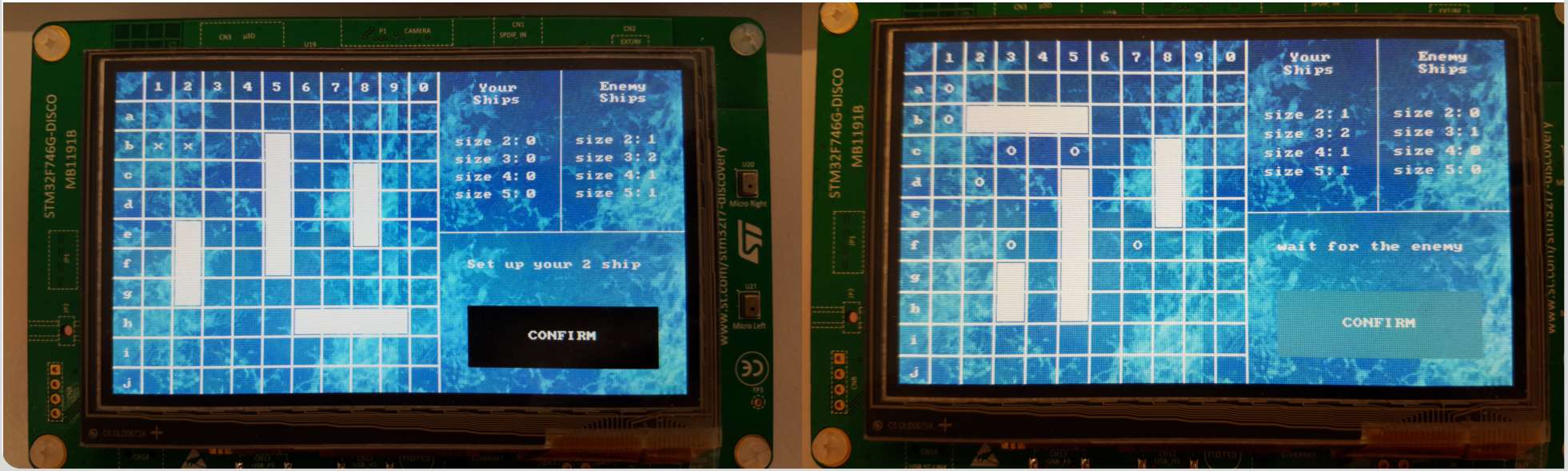


Battleships

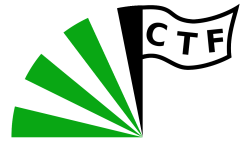
Praktikum: Sichere Softwareentwicklung für Mikrocontroller (in vernetzten Energiesystemen)

Stefan Gapp, Steffen Gufler, Joachim Müssig



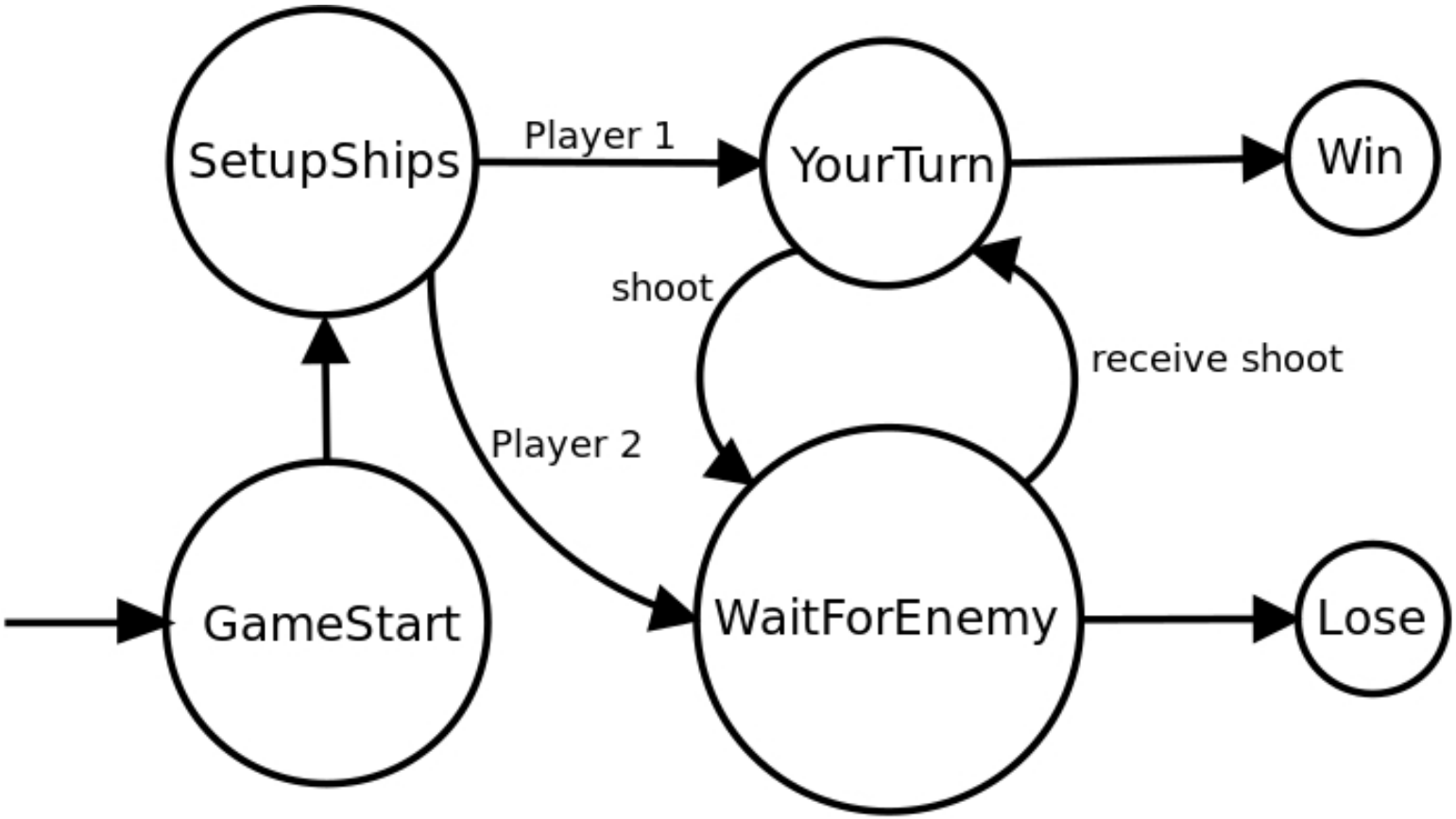
KIT – University of the State of Baden-Wuerttemberg and
National Research Center of the Helmholtz Association

Game



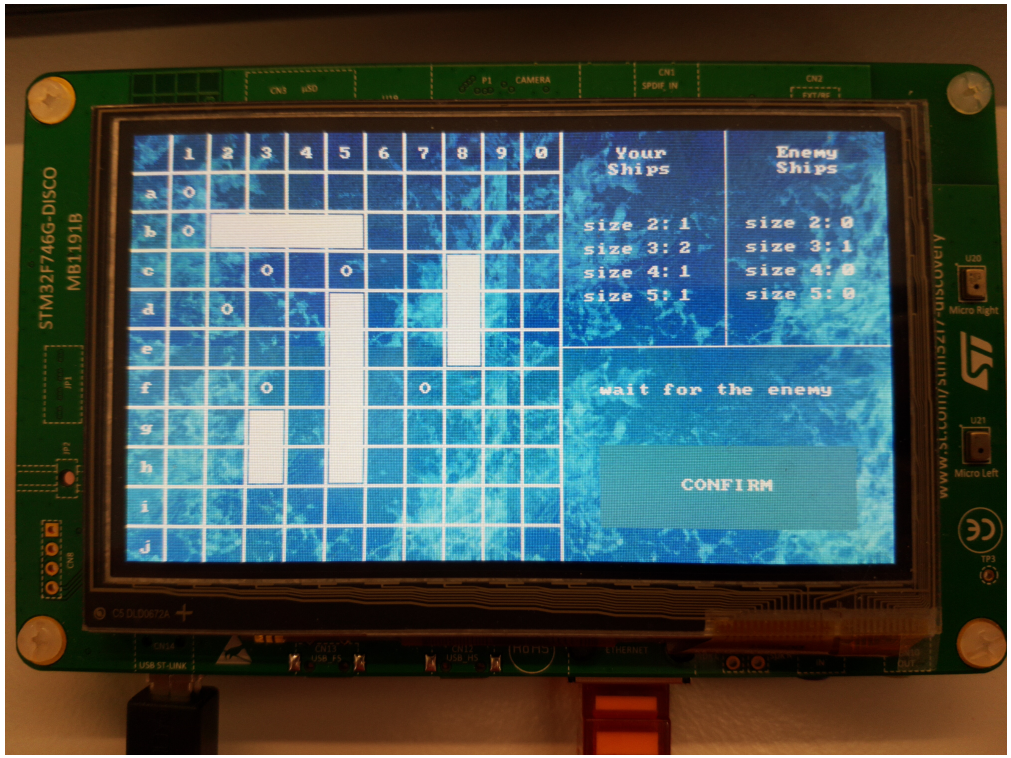
- Well-known Battleships pen and paper game
- For 2 players
- Microcontrollers communicate over LAN
- State-based game
- Ships:
  - 1 of length 5
  - 1 of length 4
  - 2 of length 3
  - 1 of length 2

Game States

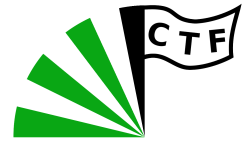

SetupShips
Player 1
YourTurn
Win
shoot
receive shoot
Player 2
GameStart
WaitForEnemy
Lose

Gameboard

```rust
pub struct Board {
    ships: Vec<Ship>,
    fields_shot: [[bool; 10]; 10],
    setup_field: [[bool; 10]; 10],
    placed_ships: [[bool; 10]; 10],
    pub enemy_ships_hit: [[bool; 10]; 10],
    remaining_enemy_ships: [u8; 4],
    pub enemy_fields_shot: [[bool; 10]; 10],
}
```



Network




```rust
#[derive(Debug, Copy, Clone)]
pub struct ShootPacket {
    pub line: u8,
    pub column: u8,
}

#[derive(Debug, Copy, Clone)]
pub struct FeedbackPacket {
    pub hit: bool,
    pub sunk: u8,
    pub you_win: bool,
}

#[derive(Debug, Copy, Clone)]
pub struct WhoamiPacket {
    pub is_server: bool,
}
```

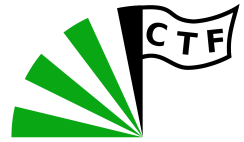
```rust
pub trait Serializable {
    fn serialize(&self) -> Vec<u8>;
    fn deserialize(input: &[u8]) -> Self;
    fn len() -> usize;
}
```


Demo


STM32F746G-DISCO
MB1191B
WINNER


STM32F746G-DISCO
MB1191B
LOSER

The End



Thank you for your attention!