# Lessons Learned From Developing a Bluetooth-Multiplayer-Game

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*Student Paper – Extended Abstract*

***Abstract*— In this paper, we describe our experiences gained from developing a multiplayer card game based on Bluetooth technology. We developed the game as a student project for lectures on hardware oriented programming at the University of Rostock. In particular, this work focuses on issues of bluetooth network organization, piconet broadcasting mechanisms, and component-based software development. As the main result, we provide precious hints on the implementation of a Bluetooth-based multiplayer game and for distributed software development using Bluetooth as communication platform in general.**

## I. Introduction

A growing number of electronic devices is equipped with Bluetooth technology for wireless data exchange. Cellphones, PDAs, or Laptops can easily be connected to each other or to peripheral hardware using Bluetooth as communication interface. One of the most advanced application field for mobile devices using Bluetooth are gaming applications. Existing Bluetooth games, however, often are limited to a maximum number of two players. Additionally, most existing Bluetooth devices do not support to connect more than seven other devices at the same time due to Bluetooth piconet limitations. Interconnected piconets, so-called scatternets, are not yet widely supported. In this paper, we present our experiences gained from developing a distributed multiplayer game using Bluetooth technology. The number of players is not limited by communication technology. A strict component-oriented software development makes each part of the application easily exchangeable.

## II. BlueMauMau

### A. General Remarks

During this year's lectures in hardware-oriented programming at the University of Rostock, each student of the course had to develop a distributed application using Bluetooth as communication standard. The main objective of the project was to familiarize students with concepts of wireless networks and Bluetooth technology. One of the developed applications is BlueMauMau, a distributed version of the well-known card game MauMau. BlueMauMau primarily consists of three components: a network component, a gaming component, and a graphical component. Each of these components is described in the following subsections.

### B. Network Component

In general, one of the Bluetooth devices participating in the game has to act as game server coordinating communications among all players. The game server must be a Bluetooth master. If new players want to participate in the game they have to create a connection to the game server. Bluetooth specification postulates that the initiator of a Bluetooth connection always is the master. Thus, a role change is necessary in order to let the game server act as master again after a new connection has been established.

### C. Gaming Component

The gaming component monitors all player's actions. It validates the legitimacy of player actions, e.g. taking up cards. For the mutual exclusion of player's actions, a token is used that is handed over between players.

### D. Graphical Component

In order to reduce the effort of developing the graphical user interface, we used a library provided by WindowsXP called cards.dll. This library is used for the drawing of the cards and the gaming field.

### E. Development System

As development system we used personal computers running WindowsXP and a Bluetooth driver called C-Stack. The C-Stack is a COM-object and can be programmed using C++ or Visual Basic. The BlueMauMau application is programmed in VB6. As Bluetooth hardware we used BlueNodes - tiny Bluetooth-boards developed at the University of Rostock connected via serial links to their hosts.

## III. Conclusion

During the development of BlueMauMau, several issues and challenges evolved regarding Bluetooth and its applicability to wireless multiplayer games for mobile devices. Most of the challenges are due to piconet limitations and restricted broadcast capability of Bluetooth. In the full paper, we will show the real bounds of available Bluetooth hardware concerning the implementations of multiplayer games with less and more than eight players.